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Health care seeking behavior in rural Ethiopia: Evidence from clinical vignettes

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Abstract

Background Between 2000 and 2011, Ethiopia rapidly expanded its health-care infrastructure recording an 18-fold increase in the number of health posts and a 7-fold increase in the number of health centers. However, health care utilization has increased only marginally and remains among the lowest in the region.

Methods This paper investigates the determinants of foregoing health care use using data from a household survey conducted in 2011 in the four main regions of Ethiopia that included five clinical vignettes covering a range of context-specific child and adult-related diseases. The analysis deals with responses to three issues, that is, whether and where to seek care and when to seek care.

Results We find almost universal preference for modern care. Foregone care ranges from 0.6 % for diarrhea to 2.5 % for tetanus. There is a systematic relationship between socioeconomic status and choice of providers mainly for adult-related conditions with households in higher consumption quintiles more likely to seek care in health centers, private/NGO clinics as opposed to health posts. Similarly, delays in care-seeking behavior are apparent mainly for adult-related conditions and among poorer households.

Conclusion The differences in care seeking behavior between adult and child related conditions may be attributed to the recent spread of health posts which have focused on raising awareness of maternal and child health. Overall, the analysis suggests that the lack of health-care utilization is not driven by the inability to recognize health problems or due to a low perceived need for modern care but is more likely to be related to the quality and cost of available care.

Key Words: Health care seeking behaviour, Ethiopia, Clinical vignettes, Foregone care

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Strengths of this study

- To the best of our knowledge, this is the first study which addresses policy relevant issue regarding the deriving forces of health care seeking behaviour using context-specific clinical vignettes in low income countries.
- Unlike the existing studies, it examines the health care need for child and adult related conditions separately and shade differences in the level of care sought and on the timing of care seeking behaviour.
- It also examines forgone care that could happen due to choosing inappropriate care and delayed health care seeking behaviour separately.

Limitations of this study

- While the use of clinical vignettes allows us to establish patterns of health care seeking behavior across population groups that are not driven by differences in health status, there is the risk that reported hypothetical health care seeking behavior does not match actual health care seeking behavior.
- because the symptoms described in the vignettes are quite specific and severe, they might not pick up foregone care in relation to diseases that are more difficult to recognize or more chronic in nature.

- while we have detailed information on individual and household (demand side) characteristics, we do not have information on health care supply, apart from the distance to health care facilities, which can be linked to the household data.

Data sharing statement Extra data related to this study is available by emailing to the corresponding author <mebratie@iss.nl>

Ethical approval statement this study was approved by by the Ethics Committee at the International Institute of Social Studies (approval reference: iss0001946).

Authors' contributions A D Mebratie designed the proposal, collected data, cleaned data and performed analysis; E Van de Poel designed the proposal, prepared the questionnaire, and performed analysis; Z Yilma performed data collection and cleaning; D Abebaw collected data; G Alemu designed the proposal and collected data; A S Bedi designed the proposal and commented on the analysis.

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Competing interests There are no competing interests related to this study.

Introduction

Over the past decade, Ethiopia has recorded notable progress in a number of population health outcomes. These changes have been accompanied by a rapid expansion of health-care infrastructure at all levels.[1-3] There has been an 18-fold increase in the number of health posts in 2011 and a 7-fold increase in the number of health centers over the same period.[4-6] Consequently it is estimated that primary health care coverage, defined as village-level access to a health post, has increased from 51 % in 2000 to 92 % in 2011.[1, 3]

Despite these increases in the supply of health care and increases in the utilization of some specific services, overall outpatient health care utilization rates remain low and have increased only marginally from 0.27 visits in 2000 to 0.3 visits in 2011.[1, 3, 7] Institutional deliveries have gone up from 5 to 11 % in the same period, but remain extremely low compared to other sub Saharan African countries (for instance, 28.3 % in Eritrea, 43 % in Kenya, 73 % in Senegal, and 75 % in Malawi).[8] Therefore, the main aim of this paper is to examine the extent of foregone care and to gain an understanding of the factors that are responsible for driving a wedge between availability and utilization.

Self-reported information on foregone care is likely to be biased, in particular in low-income settings where knowledge about medical conditions and the need for care may be limited.[9] This is illustrated by comparing data from the Ethiopian World Health Survey which reveals that only 13 % of respondents in the poorest quintile reported an unmet need for medical care[10], to data from the 2011 Ethiopian Demographic Health Survey in which 74.4 % of women in the poorest quintile reported not to have received any antenatal care during their last pregnancy.[11] The current study therefore uses a series of context-specific child and adult related clinical vignettes to explore the health care seeking behavior of rural Ethiopian households. Survey respondents are presented with well-defined medical cases and asked about treatment needed. By fixing the medical condition, variation in responses to the vignettes may be attributed only to individual differences in perceptions of the care needed and not due to varying severity in the ill health condition.[12-16] Despite the potential advantages of using health care vignettes as an alternative technique to analyze health care seeking behavior, this approach has not been widely used in the context of low and middle-income countries.

The analysis deals with three issues. First, do households seek modern care, second, conditional on seeking modern care where do they seek care and finally the timing of their care-seeking behavior.

Data

This study is based on a household survey which covers the four main regions of the country (Tigray, Amhara, Oromiya, and SNNPR). From each of these regions, which together account for about 86 % of the country's population[17] four districts were selected and within each district a household survey was canvassed in 6 randomly chosen kebeles (peasant associations). In each of the 96 kebeles, 17 households were randomly surveyed yielding a total of 1,632 households comprising 9,455 individuals. The survey was canvassed between March and April 2011 and contains extensive information on a variety of individual and household socio-economic attributes including information on health status, health care utilization and health care seeking behavior.

The household survey instrument contains five short clinical vignettes which were developed with input from researchers at Addis Ababa University's School of Public Health. The vignettes are based on illnesses that are widely prevalent in the study region and may be related to acute respiratory infection/pneumonia among babies, diarrhea affecting female infants, adult male experiencing malaria, adult male experiencing tetanus, and an adult female affected by tuberculosis. The vignettes were primarily designed to enable an exploration of heterogeneity in health care seeking behavior for conditions affecting children and adults. For each case respondents were asked what they would do, that is, whether and where they would seek care and when they would seek care in case they or someone in their household were to experience the symptoms described in the vignettes. Respondents were offered a set of 11 choices for health care provider including an option for foregone care (do nothing). Based on the government's service guidelines, diagnosis and treatment for diarrhea and malaria is expected to be available at health posts. Health centers and hospitals are expected to be able to cater to all the illnesses described in the

vignettes. The vignettes were designed with the view that medically the immediate care-seeking option may be considered the appropriate course of action (for details see Appendix 1).

In addition to the vignettes, information on a range of other variables was collected in order to enable an exploration of the associations between health care seeking behavior and other attributes of interest. These include information on household demographic composition, education of the household head, household health status, economic status as captured by per capita household consumption, attitudes towards modern health care, a range of variables to control for access to public (health) infrastructure and finally a set of indicators to control for regional differences. Descriptive statistics for the sample as a whole as well as region-specific descriptive statistics are provided in Appendix 2.

Methods

The analysis deals with responses to three issues, that is, whether and where to seek care and when to seek care. Whether to seek care - the probability of seeking (modern) care versus the alternative of other care options (do nothing, traditional healers, religious healers, and visiting a pharmacy/drug store) is treated as a binary outcome. Odds ratios based on logit regressions of the binary outcome as a function of a number of household and village characteristics are provided for each vignette. This is followed by estimates of a series of multinomial logit (MNL) models for the type of provider sought in response to each vignette. To enhance the tractability of the empirical work, the 11 options are classified into five options which include seeking care from health posts, health centers, private/NGO clinics, public/private/NGO hospitals and other options. We follow this five-part classification for all the vignettes except for the tuberculosis-related vignette where due to the unlikelihood of getting treatment from a health post for the described symptoms, we classify seeking care from a health post as part of other care options. Conditional on choosing modern care we examine the timing of care-seeking behavior using a set of ordered logit models. The outcome variable consists of five options – seek care immediately, the next day, after two days, between three days to one week, a week or more. This study was done based on the data collected in rural Ethiopia to assess a pilot community based health insurance scheme and the study was approved by the Ethics Committee at the International Institute of Social Studies.

Results

Whether to seek care

Table 1 provides vignette-specific information on the reported choices. The table reveals a striking pattern – a very small proportion of respondents would forego treatment all together (do nothing) with foregone care ranging from 0.6 % for diarrhea to 2.5 % for tetanus. Similarly, across all vignettes there is a strong preference for modern care (health center and health post). Given the country's low socio-economic development and low educational stock this is surprising. A potential explanation may lie in the rapid and recent spread of health posts and health extension workers who since 2003 have been charged with the responsibility of raising awareness of health issues. This interpretation is buttressed by the descriptive statistics provided in Appendix 2 which show that across the board 85 % of the sample respondents agree with the statement that modern sources of health care can be trusted.

To explore patterns in health care seeking behavior across various characteristics we provide estimates of the probability of using modern versus alternative care based on a set of logit models. Table 2 presents estimates for each of the vignettes. Across all socio-economic categories, as captured by the education of the household head and consumption quintiles, health care seeking behavior for the two most common sources of child morbidity and mortality (ARI/pneumonia and diarrhea) do not differ systematically. Differences are more pronounced for vignettes related to malaria and TB. The effects of education are mixed, but the effects of economic status point to important inequities. In the case of malaria, households in the richer quintiles are 2.1 ($p=0.043$) to 3.4 times ($p=0.008$) more likely to seek modern care as compared to those in the poorest quintile and for tuberculosis households in the richer quintiles are 2.3 ($p<0.0001$) to 3.6 times ($p<0.0001$) more likely to avoid the other care option.

Demographics generally do not have a bearing on the health-seeking behavior. However, the religion of the household head plays a role. In three of the five cases (ARI/pneumonia, malaria and tuberculosis) households

headed by orthodox Christians are 2.5 (p<0.0001) to 3.7 times (p=0.004) more likely to seek modern care as compared to Muslim headed households. The regional patterns indicate that for diarrhea, tetanus and tuberculosis, households in Amhara and Oromiya are far more likely to use modern care as compared to their counterparts in SNNPR.

Where to seek care

Tables 3A and 3B provide multinomial logit estimates of health-seeking behavior for each of the child and adult related vignettes respectively. As covariates related to demographics, trust in modern care and household health status were not found to be systematically related to health care seeking behavior, these are omitted from the tables for the sake of parsimony. Full regression results can be found in the appendix.

Household heads with informal education are 1.6 times (p=0.023) more likely to take their children to health centers for ARI/pneumonia (baseline is health posts) which potentially offer higher quality of care as compared to household heads with no education. Education does not exert much of an influence on care seeking behaviour for diarrhea. However, in both cases, there is clearer evidence that richer households are more likely to access hospitals as opposed to health posts.

Household consumption plays an even more important role in influencing choice of health care provider for adult conditions (Table 3B). Households in the bottom quintile are far more likely to visit health posts while all other consumption quintiles are more likely to access higher level care. At the same time there is no evidence that households in the lower-most quintile are being pushed to other care options, except for tuberculosis.

The estimates reveal systematic differences in the choice of health care providers across different religions. For both child and adult vignettes, Orthodox Christians and Protestants are more likely to choose higher level care (health centers and private clinics) as compared to Muslims. For instance, in the case of ARI/pneumonia and diarrhea (Table 3A), Orthodox Christians are about 3 times (p<0.0001) more likely to use health centers.

When to seek care

Table 1 displays the distribution of the time lag between the onset of symptoms and the action of respondents. For both the child-related vignettes the reaction of respondents is swift and 91 (85) % report that they would seek care immediately or the next day in the case of ARI/pneumonia (diarrhea). For the other vignettes, the response is slower and ranges from an immediate/next day response rate of 46 % for tuberculosis to 59 % for malaria and tetanus. For tuberculosis the reaction time is quite slow with about a quarter of respondents indicating that they would wait for a week or more after the onset of symptoms.

Odds ratios based on a set of vignette specific ordered logit estimates are provided in Table 4. Across the various vignettes, educational attainment seems to play a stronger role in influencing timing of care as opposed to choice of health care provider. For instance, in the case of tuberculosis, household heads with informal education are 1.6 (p=0.008) times more likely to delay seeking immediate care as opposed to those with secondary education. Similarly, for diarrhea, malaria, and tetanus vignettes, the estimates show that household heads with primary or secondary education are systematically more likely to seek care immediately as opposed to their less educated counterparts. Households in richer quintiles are also more likely to seek care immediately. For instance in the case of ARI/pneumonia households in the two highest quintiles are 35 (p=0.02) to 39 % (p=0.015) more likely to seek care immediately as compared to households in lower consumption quintiles. Similar patterns prevail for malaria and tetanus although not for diarrhea and tuberculosis.

The link between religion of the household head and the time of health care seeking behavior varies across vignettes. For the case of child symptoms, Orthodox Christians are more likely to delay care than Muslims while the reverse is true for the adult-vignettes. The effects of travel time do not show a clear pattern. Regional differences continue to remain pronounced. Almost, across all the vignettes households living in the Amhara and Tigray region display a greater propensity to seek care immediately as compared to households living in SNNPR. Differences are

particularly pronounced in the case of the Amahra region where households are at least 80 % ($p<0.0001$) more likely to seek care immediately as opposed to households living in SNNPR.

Discussion

Ethiopia has invested substantially in its health care infrastructure in the last decade through the expansion of health posts and health centers. Despite these investments, utilization of maternal and child care and more general outpatient utilization rates remain among the lowest in Sub-Saharan Africa. To gain an understanding of the factors responsible for driving a wedge between availability and utilization this paper relied on five context-relevant clinical vignettes for common child and adult conditions to probe whether households seek modern care, where they seek care and the timing of care-seeking behavior.

The estimates suggest that the large majority of respondents recognize the severity of the symptoms described in the vignettes and prefer modern over traditional care and self-treatment. This is especially the case for child related conditions and might be related to the health education campaigns that have taken place in recent years in the context of the Health Extension Program. Indeed, the uniformity of health care seeking behavior for child morbidity displayed across consumption quintiles suggests that information on health education and the appropriate course of action for the most common childhood diseases, which is the focus of the health extension program, seems to have percolated to the lowest socio-economic quintiles.

For adult related conditions, we do find variations across socioeconomic status with households in the highest consumption quintile two to three times more likely to seek modern care as compared to households in the lowest quintiles. These socioeconomic inequalities are also found in the choice of health care provider, and the timing of seeking care. Households in the lowest consumption quintiles are generally more likely to resort to lower level care and postpone seeking care compared to better off households. Taking the example of tuberculosis, which can only be properly treated in health centers and hospitals, we find that households in the upper consumption quintile are three times more likely to seek care in a hospital compared to those in the poorest. We also find variation in the timing of care seeking behavior with respondents typically acting faster for child related conditions as compared to adult conditions.

There appears to be considerable regional variation in health care seeking behavior, with households in Amhara being most likely to seek (higher level) care, and those in SNNPR most likely to forego or delay seeking care. Since access to public health facilities in SNNPR seems to be at least at par or at times better as compared to other regions (see Appendix 3), it is likely that the lower probability of using care in SNNPR may be due to the limited implementation of the fee waiver system, which was implemented since 2008 with the aim of increasing access for the "poorest of the poor", in this region as compared to Amhara and Oromiya regions.[18]

There are some limitations to this paper. While the use of clinical vignettes allows us to establish patterns of health care seeking behavior across population groups that are not driven by differences in health status, there is the risk that reported hypothetical health care seeking behavior does not match actual health care seeking behavior. However, the overwhelming reliance on modern care found in the actual utilization data (see Appendix 4) does suggest that results from the vignettes analysis are able to capture preferences and are not merely a result of the lack of understanding of the survey instrument. Second, because the symptoms described in the vignettes are quite specific and severe, they might not pick up foregone care in relation to diseases that are more difficult to recognize or more chronic in nature. Third, while we have detailed information on individual and household (demand side) characteristics, we do not have information on health care supply, apart from the distance to health care facilities, which can be linked to the household data.

Notwithstanding these limitations, based on the empirical evidence assembled in the paper we tend to conclude that the low utilization rates in Ethiopia are unlikely to be linked to lack of awareness of the symptoms of the most common diseases or a low-perceived need for health care but are more likely to be related to the quality and cost of available care. With regard to the latter, the scaling-up of the recently introduced community-based health insurance schemes may play an important role in reducing socioeconomic inequalities in access to health care. [19, 20]

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Tables

	Case vignette[a]				
	ARI/Pneumonia	Diarrhea	Malaria	Tetanus	Tuberculosis
Where to seek care					
Health post	41.17	33.56	21.72	24.80	20.02
Health center	50.00	56.63	62.02	59.05	60.57
Private clinic	4.05	5.64	6.63	6.63	5.96
Mission/NGO clinic	0.25	0.18	0.31	0.18	0.37
Public hospital	1.41	1.47	4.48	4.42	9.95
Private hospital	0.12	0.18	0.18	0.12	0.31
Mission/NGO hospital	0.06	0.06	0.18	0.06	0.00
Pharmacy/drug store	0.25	0.37	0.25	0.37	0.00
Religious healer	0.74	0.31	1.10	0.12	1.11
Traditional healer	0.80	1.04	1.84	1.78	0.68
Do nothing	1.17	0.55	1.47	2.46	1.04
N	1,630	1,630	1,630	1,629	1,628
When to seek care[b]					
Immediately	54.24	45.76	27.67	34.86	21.05
The next day	37.04	39.11	31.47	25.97	25.35
After two days	6.95	11.61	22.72	17.27	17.64
Between three and a week	1.33	2.64	12.42	11.86	12.77
After a week or more than a week	0.44	0.88	5.73	10.05	23.20
N	1,582	1,593	1,554	1,552	1,582

Notes: [a] All figures in the table are in %. [b] Only for respondents who use modern care (health post, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and Mission/NGO hospitals).

Table 1: Responses to the vignettes

VARIABLES	ARI/ Pneumonia	Diarrhea	Malaria	Tetanus	Tuberculosis
Head sex	1.809	1.926	1.104	0.984	1.299
Head age	0.998	0.978	1.019	0.982	0.983**
Head's education (ref: no education at all)					
Informal education	0.749	0.304**	0.378***	1.317	1.013
Primary & higher	0.958	0.868	1.987*	1.348	0.620***
Religion of the head (ref: Muslim & other religions)					
Orthodox Christian	2.612*	1.205	3.699***	2.192	2.521***
Protestant	1.352	2.341	1.069	1.276	1.723***
Household size	1.038	1.103	0.901	1.229**	1.031
HH composition (ref: prop. of male adults aged 16 to 64)					
Prop. of children aged under 6	0.083	0.038*	0.23	0.038***	0.602
Prop. of males aged 6 to 15	0.856	0.257	0.406	0.157*	1.389
Prop. of females aged 6 to 15	0.034**	1.093	0.89	0.448	1.107
Prop. of females aged 16 to 64	1.498	1.119	0.112*	1.815	0.423
Prop. of elderly aged above 64	0.139	0.139	0.027***	0.582	0.646
HH health status (ref: Prop. of households with good SAH)					
Prop. of household with fair & low SAH	2.579	2.168	2.260	2.085	1.036
Consumption quintiles (ref: poorest quintile)					
2nd quintile	3.010*	2.927*	2.149**	1.478	2.335***
3rd quintile	1.662	1.496	1.854	0.995	2.278***
4th quintile	0.842	1.273	3.381***	1.281	3.634***
Richest quintile	0.798	3.333	2.126*	0.998	2.525***
Trust in modern heath care (ref: disagree)					
Agree	1.302	2.084	3.593***	2.472**	0.452***
Neither agree nor disagree	0.631	0.627	0.659	0.367**	0.196***
Access to public infrastructure					
Water using from public sources	0.919	0.857	1.275	1.047	0.972
Use electricity	4.331	2.217	0.932	1.265	2.581***
No TV signal	1.256	2.605**	1.156	0.812	0.681**
No mobile signal	1.029	0.919	1.210	1.298	1.022
Travel time to the nearest health post (in minutes)	1.003	0.99	1.017**	1.009	1.005
Travel time to the nearest health center (in minutes)	1.003	1.008	0.994	0.996	0.993***
Travel time to the nearest public hospital (in minutes)	0.994**	0.991**	0.995**	0.997	1.002*
Regions (ref: SNNPR)					
Tigray	3.598	11.87***	1.415	3.153*	0.698
Amhara	4.270	15.41***	1.551	2.646*	4.946***
Oromiya	3.060	13.15***	2.475	5.592***	8.463***
Pseudo R^2	0.147	0.21	0.178	0.156	0.195
N	1,546	1,546	1,546	1,545	1,545

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals and other care option includes do nothing, traditional healers, religious healers, and pharmacies/drug stores. In the case of tuberculosis, health posts are included as part of the other care option.

Table 2: Probability of seeking modern care – Odds ratios based on logit specifications

VARIABLES	ARI/pneumonia			Diarrhea		
	Health center	Hospital/ Clinic	Other	Health center	Hospital/ Clinic	Other
Head's education						
Informal education	1.623**	0.760	0.811	1.306	0.443*	3.042
Primary & higher	1.247	0.612	0.526	0.889	0.595*	0.940
Religion of the head						
Orthodox Christian	2.922***	4.220***	1.901	3.062***	3.672***	1.204
Protestant	1.727*	0.600	1.259	1.982**	0.705	0.419
Consumption quintiles						
2nd quintile	1.442*	2.426**	0.424	1.482**	2.475**	0.492
3rd quintile	1.378	2.630**	0.877	1.663**	2.212*	1.029
4th quintile	1.416	2.955**	1.625	1.388	2.733**	1.685
Richest quintile	1.398	4.379***	1.216	1.459	2.631**	0.581
Access to public infrastructure						
Water using from public sources	1.378**	0.643	1.017	1.113	0.652*	1.849
Use electricity	4.514***	5.199***	0.000	3.960***	5.583***	0.000
No TV signal	0.881	0.771	0.407*	0.759*	0.930	0.374*
No mobile signal	1.807***	0.853	0.817	0.925	0.298***	0.826
Travel time to the nearest health post	1.014***	1.002	1.011	1.015***	1.002	1.027**
Travel time to the nearest health center	0.990***	1.002	0.994	0.992***	1.004	0.980***
Travel time to the nearest public hospital	1.001	0.994**	1.010***	1.001	0.991***	1.015***
Regions						
Tigray	0.390***	0.032***	0.060***	0.414***	0.037***	0.015***
Amhara	5.639***	0.542	0.578	4.279***	1.079	0.110**
Oromiya	2.234***	0.278***	0.104**	3.200***	1.057	0.000
Pseudo R^2	0.1758			0.1761		
N	1,527			1,537		

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores. Models also control for demographics, household health status, trust in modern care (as in Table 2). References categories are as in Table 2.

Table 3A: Probability of seeking care for ARI/pneumonia and diarrhea– Relative risk ratios based on multinomial logit specifications

VARIABLES	Malaria				Tetanus				Tuberculosis		
	Health Center	Clinic	Hospital	Other	Health Center	Clinic	Hospital	Other	Clinic	Hospital	Other
Head's education											
Informal education	1.550	1.064	1.554	6.447***	1.142	0.404**	0.583	0.4	0.569	1.263	0.977
Primary & higher	0.705**	0.527**	0.986	0.281**	0.815	0.416***	0.701	0.361**	0.727	0.901	1.564***
Religion of the head											
Orthodox Christian	2.453***	1.815***	0.723	0.359	2.746***	1.794*	0.679	0.171	0.552**	0.162***	0.287***
Protestant	2.346***	0.486	0.35	1.594	1.967***	0.541	0.262	0.907	0.254***	0.139***	0.367***
Consumption quintiles											
2nd quintile	1.991***	3.980***	3.357**	0.856	1.788***	2.992***	7.390**	1.457	1.354	1.807	0.454***
3rd quintile	2.233***	3.695***	4.802***	0.802	1.624**	2.513**	11.48***	1.596	1.193	2.215*	0.477***
4th quintile	2.574***	4.198***	8.622***	0.819	2.696***	2.908**	28.86***	3.414**	0.872	3.466***	0.308***
Richest quintile	1.987***	5.438***	5.156***	1.057	1.818**	3.105**	9.315***	4.491**	1.343	2.948**	0.447***
Access to public infrastructure											
Water using from public sources	1.075	0.742	0.470**	0.631	1.023	0.711	0.345***	0.992	0.693	0.557***	0.939
Use electricity	3.832***	1.811	6.228***	3.748*	2.340***	2.384*	3.676**	0.943	0.858	1.433	0.404**
No TV signal	0.466***	0.484**	2.141*	0.404**	0.587***	0.537**	2.139**	0.674	1.016	1.240	1.502**
No mobile signal	1.352	0.509**	0.443**	1.276	1.174	0.410***	0.395**	0.56	0.394***	0.756	0.845
Travel time to the nearest health post	1.012***	0.995	1.002	0.993	1.017***	1.006	1.004	1.001	0.987*	0.997	0.993*
Travel time to the nearest health center	0.991***	1.003	0.999	1.001	0.989***	1.003	1.001	1.002	1.010***	1.002	1.008***
Travel time to the nearest public hospital	1.002**	0.992***	1.003	1.008**	1.002**	0.988***	0.998	1.002	0.989***	0.997	0.997**
Regions											
Tigray	0.869	0.067***	0.571	0.182	0.804	0.058***	0.732	0.572	0.116***	1.258	1.236
Amhara	4.982***	1.379**	3.012*	1.277	3.952***	1.366	1.553	1.059	0.316***	0.925	0.171***
Oromiya	10.47***	3.733***	3.719*	0.308	10.56***	5.592***	4.215*	0	0.469**	0.589	0.098***
Pseudo R^2	0.192				0.199				0.176		
N	1,523				1,507				1,545		

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores (and health centers for the model on tuberculosis). Models also control for demographics, household health status, trust in modern care (as in Table 2). Reference categories as in Table 2.

Table 3B: Probability of seeking care for malaria, tetanus and tuberculosis – Relative risk ratios based on multinomial logit specifications

VARIABLES	ARI/pneumonia	Diarrhea	Malaria	Tetanus	Tuberculosis
Head's education					
Informal education	0.993	0.888	0.935	0.806	1.567***
Primary & higher	0.777	0.657***	0.661***	0.807*	1.004
Consumption quintiles					
2nd quintile	0.936	0.836	1.087	0.987	0.944
3rd quintile	0.808	0.929	0.837	0.647***	0.911
4th quintile	0.649**	0.838	0.550***	0.515***	0.826
Richest quintile	0.613**	1.002	0.631**	0.481***	1.017
Trust in modern health care					
Agree	1.473**	1.461**	0.829	0.824	1.696***
Neither agree nor disagree	1.700**	1.178	0.437***	0.589**	0.799
Access to public infrastructure					
Water using from public sources	0.761**	1.008	0.764**	0.793**	0.916
Use electricity	0.626*	0.648**	1.102	0.673*	0.951
No TV signal	0.724**	0.484***	0.495***	0.554***	0.457***
No mobile signal	1.174	0.919	1.220	1.211	2.130***
Travel time to the nearest health post	0.995**	0.993***	0.994**	1.005**	1.000
Travel time to the nearest health center	0.997**	1.002	1.002	1.000	1.000
Travel time to the nearest public hospital	1.004***	1.001	1.003***	1.002**	1.004***
Religion of the head					
Orthodox Christian	1.946***	1.231*	0.694*	0.638***	0.422***
Protestant	0.944	1.054	0.759	0.690*	0.638
Regions					
Tigray	0.287***	0.658	0.49	0.452**	0.406*
Amhara	0.104***	0.175***	0.159***	0.202***	0.115***
Oromiya	0.373**	0.926	1.200**	1.023	0.877
Pseudo R^2	0.081	0.063	0.064	0.052	0.088
N	1,502	1,518	1,475	1,477	1,192

Notes: *** p<0.01, ** p<0.05, * p<0.1. The dependent variable is increasing in time to seek care. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals. In the case of tuberculosis, health posts are not included as part of the modern care option. Models also control for demographics, household health status, trust in modern care (as in Table 2). Reference categories as in Table 2.

Table 4: When to seek modern care – Odds ratios based on ordered logit specifications

Appendix 1: Clinical Vignettes

1. Vignette 1: A 3 month old baby, who has always been healthy and playful, has been coughing quite a lot in the last few days and is breathing rapidly. The baby has difficulty sleeping because of this cough.
   1a. What would you do? (code 1) [If 11 go to 2]
   1b. When would you take the baby to this facility? (code 2)

2. Vignette 2: A 1 year old girl, generally in good health, has diarrhea for 3 days now. She is still drinking some fluids, but since this morning, she's feeling sleepy and doesn't want to play.
   2a. What would you do? (code 1) [If 11 go to 3]
   2b. When would you take the girl to this facility? (code 2)

3. Vignette 3: A 20 year old male has always been healthy. For the last week, he has episodes of sudden coldness followed by rigor and then fever and sweating. These episodes occur about every two days. In between episodes he can still do some light housework.
   3a. What would you do? (code 1) [If 11 go to 4]
   3b. When would you go to this facility? (code 2)

4. Vignette 4: A 25 year old male has got a small cut in his leg when working on the field three days ago. The wound has become red and from time to time he feels a throbbing pain in his leg, but he can still walk around and do some work.
   4a. What would you do? (code 1) [If 11 go to 5]
   4b. When would you go to this facility? (code 2)

5. Vignette 5: A 35 year old female has been coughing for three weeks now. She feels more tired than usual but can still do some housework. Her relatives think she looks thinner than a few weeks ago.
   5a. What would you do? (code 1)
   5b. When would you go to this facility? (code 2)

Code 1
1=go to Health post
2=go to Health center
3=go to Private clinic
4=go to Mission/NGO clinic
5=go to Public hospital
6=go to Private hospital
7=go to Mission/NGO hospital
8=go to Pharmacy/drug store
9=go to religious healer
10= go to traditional healer
11=do nothing

Code 2
1=immediately
2=the next day if symptoms continue
3=after two days if symptoms continue
4=between three days and a week if symptoms continue
5=after a week if symptoms continue
6=after more than a week if symptoms continue

Characteristics	Region				Total sample	N
	Tigray	Amhara	Oromiya	SNNPR		
Male headed households (1/0)	0.72	0.91	0.91	0.90	0.86	1,632
Age of the household heads (years)	48.01	47.64	44.01	45.25	46.23	1,631
Head's education (1/0)						
No education at all	0.59	0.43	0.46	0.38	0.47	1,631
Informal education	0.08	0.26	0.14	0.03	0.13	1,631
Primary	0.31	0.29	0.36	0.49	0.36	1,631
Secondary or postsecondary	0.01	0.02	0.04	0.10	0.04	1,631
Religion of the head (1/0)						
Orthodox Christian	0.99	0.50	0.49	0.10	0.52	1,632
Protestant	0.00	0.00	0.02	0.76	0.19	1,632
Muslim	0.01	0.50	0.49	0.05	0.26	1,632
Other religion or no religion	0.00	0.00	0.00	0.10	0.03	1,632
HH size (number of persons)	5.17	5.69	5.91	6.40	5.79	1,632
Household composition						
Proportion of children aged under 6	0.15	0.13	0.17	0.14	0.15	1,632
Proportion of males aged 6 to 15	0.15	0.15	0.18	0.16	0.16	1,632
Proportion of females aged 6 to 15	0.14	0.15	0.14	0.16	0.15	1,632
Proportion of males aged 16 to 64	0.22	0.26	0.24	0.26	0.25	1,632
Proportion of females aged 16 to 64	0.26	0.26	0.24	0.25	0.25	1,632
Proportion of elderly aged above 64	0.08	0.05	0.03	0.03	0.05	1,632
Self-assessed health status (SAH)						
Proportion of household members with good SAH	0.70	0.74	0.93	0.79	0.79	1,632
Proportion of household members with fair SAH	0.24	0.22	0.05	0.15	0.17	1,632
Proportion of household members with low SAH	0.05	0.04	0.01	0.06	0.04	1,632
Consumption quintiles (1/0)						
Poorest quintile	0.22	0.15	0.06	0.37	0.20	1,593
2nd quintile	0.26	0.21	0.11	0.22	0.20	1,593
3rd quintile	0.22	0.22	0.21	0.15	0.20	1,593
4th quintile	0.14	0.24	0.29	0.12	0.20	1,593
Richest quintile	0.16	0.17	0.33	0.14	0.20	1,593
Modern care can be trusted (1/0)						
Disagree	0.14	0.05	0.06	0.08	0.08	1,627
Neither agree nor disagree	0.07	0.03	0.09	0.06	0.06	1,627
Agree	0.80	0.92	0.85	0.86	0.85	1,627
Access to public infrastructure						
Water using from public sources (1/0)	0.77	0.57	0.34	0.67	0.59	1,631
Use electricity (1/0)	0.06	0.15	0.02	0.06	0.07	1,626
No TV signal (1/0)	0.80	0.53	0.81	0.68	0.70	1,631
No mobile signal (1/0)	0.92	0.73	0.74	0.78	0.79	1,632
Travel time to the nearest health post (in minutes)	34.54	31.2	24.65	21.36	27.81	1,599
Travel time to the nearest health center (in minutes)	74.38	65.65	63.92	54.68	64.66	1,632
Travel time to the nearest public hospital (in minutes)	140.87	116.83	96.31	88.68	110.65	1,631

Appendix 2: Means of covariates

Region	Hospitals		Health center (HC)		Health post (HP)		Primary health care coverage
	N	Hospital-Pop. Ratio	N	HC-Pop. Ratio	N	HP-Pop. Ratio	
Tigray	14	1:340,168	183	1:26,024	552	1:8627	58.0
Amhara	19	1:969,200	724	1:25,435	3,093	1:5954	84.0
Oromia	41	1:742,648	991	1:30,725	6,053	1:5030	99.4
SNNPR	20	1:843,242	513	1:32,875	3,603	1:4681	106.8
National	122	1:671,402	2,660	1:30,794	15,095	1:5426	92.1

Appendix 3: Regional distribution of health facilities in 2011

Source: Ethiopian health and health related indicator statistics obtained from the Ethiopian Federal Ministry of Health (FMoH).

Health care use indicator	%
Obtained health care conditional on illness/injury (percent of those reporting illness/injury)	69.58
Source of care (percent who report conditional on illness/injury)	
Health post	7.42
Health center	50.65
Private clinic	18.49
Mission/NGO clinic	0.78
Public hospital	8.98
Private hospital	1.56
Mission/NGO hospital	0.91
Pharmacy/drug store	4.04
Religious healer	0.52
Traditional healer	2.99
At home	2.47
Neighbor's home	0.26
Other	0.91

Notes: Table shows outpatient health care utilization for the sample of household members reporting illness/injury in the two months preceding the survey (N=1161)

Appendix 4: Outpatient care utilization

VARIABLES	Health center	Public/Private/ NGO hospital/clinic	Other care options
Head sex	1.020	2.231	0.762
Head age	0.991	1.000	1.007
Head's education (ref: no education at all)			
Informal education	1.623**	0.760	0.811
Primary & higher	1.247	0.612	0.526
Household size	1.066	1.015	0.959
HH composition (ref: Prop. of male adults aged 16 to 64)			
Prop. of children aged under 6	0.248**	0.478	23.118
Prop. of males aged 6 to 15	0.704	3.839	8.080
Prop. of females aged 6 to 15	0.928	2.165	40.943*
Prop. of females aged 16 to 64	0.490	0.773	3.774
Prop. of elderly aged above 64	0.913	0.055	20.162
HH health status (ref: Prop. of households with good SAH)			
Prop. of household with fair & low SAH	0.686*	0.338**	0.346
Consumption quintiles (ref: poorest quintile)			
2nd quintile	1.442*	2.426**	0.424
3rd quintile	1.378	2.630**	0.877
4th quintile	1.416	2.955**	1.625
Richest quintile	1.398	4.379***	1.216
Trust in modern heath care (ref: disagree)			
Agree	0.660*	0.706	0.407
Neither agree nor disagree	0.380***	0.531	0.926
Access to public infrastructure			
Water using from public sources	1.378**	0.643	1.017
Use electricity	4.514***	5.199***	0.000
No TV signal	0.881	0.771	0.407*
No mobile signal	1.807***	0.853	0.817
Travel time to the nearest health post (in minutes)	1.014***	1.002	1.011
Travel time to the nearest health center (in minutes)	0.990***	1.002	0.994
Travel time to the nearest public hospital (in minutes)	1.001	0.994**	1.010***
Religion of the head (ref: Muslim & other religions)			
Orthodox Christian	2.922***	4.220***	1.901
Protestant	1.727*	0.600	1.259
Regions(ref: SNNPR)			
Tigray	0.390***	0.032***	0.060***
Amhara	5.639***	0.542	0.578
Oromiya	2.234***	0.278***	0.104**
Pseudo R^2	0.1758		
N	1,527		

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5A: Probability of seeking care for ARI/pneumonia– Relative risk ratios, based on multinomial logit specifications

VARIABLES	Health center	Public/Private/ NGO hospital/clinic	Other care options
Head sex	0.948	1.358	1.113
Head age	0.988*	0.989	1.011
Head's education (ref: no education at all)			
Informal education	1.306	0.443*	3.042
Primary & higher	0.889	0.595*	0.940
Household size	1.068	1.143*	0.966
HH composition (ref: Prop. of male adults aged 16 to 64)			
Prop. of children aged under 6	0.285**	0.138*	8.476
Prop. of males aged 6 to 15	0.767	0.845	5.472
Prop. of females aged 6 to 15	0.520	0.375	0.145
Prop. of females aged 16 to 64	0.659	0.553	2.647
Prop. of elderly aged above 64	0.820	0.107	34.974*
HH health status (ref: Prop. of households with good SAH)			
Prop. of household with fair & low SAH	0.750	0.442*	0.416
Consumption quintiles (ref: poorest quintile)			
2nd quintile	1.482**	2.475**	0.492
3rd quintile	1.663**	2.212*	1.029
4th quintile	1.388	2.733**	1.685
Richest quintile	1.459	2.631**	0.581
Trust in modern heath care (ref: disagree)			
Agree	0.705	0.724	0.243**
Neither agree nor disagree	0.352***	0.560	0.966
Access to public infrastructure			
Water using from public sources	1.113	0.652*	1.849
Use electricity	3.960***	5.583***	0.000
No TV signal	0.759*	0.930	0.374*
No mobile signal	0.925	0.298***	0.826
Travel time to the nearest health post (in minutes)	1.015***	1.002	1.027**
Travel time to the nearest health center (in minutes)	0.992***	1.004	0.980***
Travel time to the nearest public hospital (in minutes)	1.001	0.991***	1.015***
Religion of the head (ref: Muslim & other religions)			
Orthodox Christian	3.062***	3.672***	1.204
Protestant	1.982**	0.705	0.419
Regions(ref: SNNPR)			
Tigray	0.414***	0.037***	0.015***
Amhara	4.279***	1.079	0.110**
Oromiya	3.200***	1.057	0.000
Pseudo R^2		0.1761	
N		1,537	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5B: Probability of seeking care for diarrhea– Relative risk ratios based on multinomial logit specifications

VARIABLES	Health center	Private/ NGO clinic	Public/Private/ NGO hospital	Other care options
Head sex	1.099	1.291	1.874	1.029
Head age	0.988	0.998	0.987	0.953**
Head's education (ref: no education at all)				
Informal education	1.550	1.064	1.554	6.447***
Primary & higher	0.705**	0.527**	0.986	0.281**
Household size	1.062	1.157**	1.075	1.288**
HH composition (ref: Prop. of male adults aged 16 to 64)				
Prop. of children aged under 6	0.635	0.449	0.429	0.577
Prop. of males aged 6 to 15	1.257	2.730	1.910	4.232
Prop. of females aged 6 to 15	1.054	1.529	1.226	1.825
Prop. of females aged 16 to 64	0.719	0.232	0.623	13.12
Prop. of elderly aged above 64	0.628	0.410	3.329	331.7***
HH health status (ref: Prop. of households with good SAH)				
Prop. of household with fair & low SAH	0.935	0.959	0.469	0.133*
Consumption quintiles (ref: poorest quintile)				
2nd quintile	1.991***	3.980***	3.357**	0.856
3rd quintile	2.233***	3.695***	4.802***	0.802
4th quintile	2.574***	4.198***	8.622***	0.819
Richest quintile	1.987***	5.438***	5.156***	1.057
Trust in modern heath care (ref: disagree)				
Agree	0.394***	0.989	0.541	0.077***
Neither agree nor disagree	0.202***	0.420	0.265	0.171***
Access to public infrastructure				
Water using from public sources	1.075	0.742	0.470**	0.631
Use electricity	3.832***	1.811	6.228***	3.748*
No TV signal	0.466***	0.484**	2.141*	0.404**
No mobile signal	1.352	0.509**	0.443**	1.276
Travel time to the nearest health post (in minutes)	1.012***	0.995	1.002	0.993
Travel time to the nearest health center (in minutes)	0.991***	1.003	0.999	1.001
Travel time to the nearest public hospital (in minutes)	1.002**	0.992***	1.003	1.008**
Religion of the head (ref: Muslim & other religions)				
Orthodox Christian	2.453***	1.815***	0.723	0.359
Protestant	2.346***	0.486	0.350	1.594
Regions (ref: SNNPR)				
Tigray	0.869	0.067***	0.571	0.182
Amhara	4.982***	1.379**	3.012*	1.277
Oromiya	10.47***	3.733***	3.719*	0.308
Pseudo R^2			0.192	
N			1,523	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5C: Probability of seeking care for malaria – Relative risk ratios based on multinomial logit specifications

VARIABLES	Health center	Private/ NGO clinic	Public/Private/ NGO hospital	Other care options
Head sex	0.839	1.631	2.098	1.276
Head age	0.990	0.996	1.002	0.986
Head's education (ref: no education at all)				
Informal education	1.142	0.404**	0.583	0.400
Primary & higher	0.815	0.416***	0.701	0.361**
Household size	1.080*	1.070	1.066	1.052
HH composition (ref: Prop. of male adults aged 16 to 64)				
Prop. of children aged under 6	1.098	1.434	2.213	102.09**
Prop. of males aged 6 to 15	1.817	2.327	2.147	92.37**
Prop. of females aged 6 to 15	0.859	1.165	0.453	4.519
Prop. of females aged 16 to 64	0.943	0.137	1.208	8.443
Prop. of elderly aged above 64	1.174	0.181	2.018	93.48**
HH health status (ref: Prop. of households with good SAH)				
Prop. of household with fair & low SAH	0.796	0.982	0.841	0.201
Consumption quintiles (ref: poorest quintile)				
2nd quintile	1.788***	2.992***	7.390**	1.457
3rd quintile	1.624**	2.513**	11.48***	1.596
4th quintile	2.696***	2.908**	28.86***	3.414**
Richest quintile	1.818**	3.105**	9.315***	4.491**
Trust in modern heath care (ref: disagree)				
Agree	0.399***	2.731	0.977	0.0932***
Neither agree nor disagree	0.305***	0.879	0.442	0.484
Access to public infrastructure				
Water using from public sources	1.023	0.711	0.345***	0.992
Use electricity	2.340***	2.384*	3.676**	0.943
No TV signal	0.587***	0.537**	2.139**	0.674
No mobile signal	1.174	0.410***	0.395**	0.560
Travel time to the nearest health post (in minutes)	1.017***	1.006	1.004	1.001
Travel time to the nearest health center (in minutes)	0.989***	1.003	1.001	1.002
Travel time to the nearest public hospital (in minutes)	1.002**	0.988***	0.998	1.002
Religion of the head (ref: Muslim & other religions)				
Orthodox Christian	2.746***	1.794*	0.679	0.171
Protestant	1.967***	0.541	0.262	0.907
Regions (ref: SNNPR)				
Tigray	0.804	0.058***	0.732	0.572
Amhara	3.952***	1.366	1.553	1.059
Oromiya	10.56***	5.592***	4.215*	0.000
Pseudo R^2			0.199	
N			1,507	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5D: Probability of seeking care for tetanus – Relative risk ratios based on multinomial logit specifications

VARIABLES	Private/ NGO clinic	Public/Private/ NGO hospital	Other care options
Head sex	2.304	1.507	0.822
Head age	1.007	0.999	1.017**
Head's education (ref: no education at all)			
Informal education	0.569	1.263	0.977
Primary & higher	0.727	0.901	1.564***
Household size	0.965	1.001	0.968
HH composition (ref: Prop. of male adults aged 16 to 64)			
Prop. of children aged under 6	0.288	3.514	1.699
Prop. of males aged 6 to 15	1.376	2.155	0.791
Prop. of females aged 6 to 15	0.772	1.961	0.938
Prop. of females aged 16 to 64	0.208	3.054	2.426
Prop. of elderly aged above 64	0.145	3.903	1.633
HH health status (ref: Prop. of households with good SAH)			
Prop. of household with fair & low SAH	1.065	0.989	0.961
Consumption quintiles (ref: poorest quintile)			
2nd quintile	1.354	1.807	0.454***
3rd quintile	1.193	2.215*	0.477***
4th quintile	0.872	3.466***	0.308***
Richest quintile	1.343	2.948**	0.447***
Trust in modern heath care (ref: disagree)			
Agree	3.534**	1.225	2.380***
Neither agree nor disagree	2.426	0.589	4.900***
Access to public infrastructure			
Water using from public sources	0.693	0.557***	0.939
Use electricity	0.858	1.433	0.404**
No TV signal	1.016	1.240	1.502**
No mobile signal	0.394***	0.756	0.845
Travel time to the nearest health post (in minutes)	0.987*	0.997	0.993*
Travel time to the nearest health center (in minutes)	1.010***	1.002	1.008***
Travel time to the nearest public hospital (in minutes)	0.989***	0.997	0.997**
Religion of the head (ref: Muslim & other religions)			
Orthodox Christian	0.552**	0.162***	0.287***
Protestant	0.254***	0.139***	0.367***
Regions(ref: SNNPR)			
Tigray	0.116***	1.258	1.236
Amhara	0.316***	0.925	0.171***
Oromiya	0.469**	0.589	0.098***
Pseudo R^2		0.176	
N		1,545	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health centers. Other care options include do nothing, traditional healers, religious healers, pharmacies/drug stores and health posts.

Appendix 5E: Probability of seeking care for tuberculosis – Relative risk ratios based on multinomial logit specifications

VARIABLES	ARI/ Pneumonia	Diarrhea	Malaria	Tetanus	Tuberculosis
Head sex	1.321	0.903	1.354*	1.283	0.981
Head age	1.007	1.008	0.993	0.997	1.004
Head's education (ref: no education at all)					
Informal education	0.993	0.888	0.935	0.806	1.567***
Primary & higher	0.777	0.657***	0.661***	0.807*	1.004
Household size	0.972	0.988	0.916***	0.901***	0.949
HH composition (ref: Prop. of male adults aged 16 to 64)					
Prop. of children aged under 6	1.011	0.786	0.682	1.039	2.968**
Prop. of males aged 6 to 15	1.191	0.795	0.772	1.236	1.330
Prop. of females aged 6 to 15	0.908	0.917	1.774	1.586	6.623***
Prop. of females aged 16 to 64	1.232	1.044	1.006	1.237	1.231
Prop. of elderly aged above 64	1.092	0.845	1.056	1.134	1.843
HH health status (ref: Prop. of household with good SAH)					
Prop. of household with fair & low SAH	0.964	0.856*	1.719***	1.172	1.183
Consumption quintiles (ref: poorest quintile)					
2nd quintile	0.936	0.836	1.087	0.987	0.944
3rd quintile	0.808	0.929	0.837	0.647***	0.911
4th quintile	0.649**	0.838	0.550***	0.515***	0.826
Richest quintile	0.613**	1.002	0.631**	0.481***	1.017
Trust in modern heath care (ref: disagree)					
Agree	1.473**	1.461**	0.829	0.824	1.696***
Neither agree nor disagree	1.700**	1.178	0.437***	0.589**	0.799
Access to public infrastructure					
Water using from public sources	0.761**	1.008	0.764**	0.793**	0.916
Use electricity	0.626*	0.648**	1.102	0.673*	0.951
No TV signal	0.724**	0.484***	0.495***	0.554***	0.457***
No mobile signal	1.174	0.919	1.220	1.211	2.130***
Travel time to the nearest health post (in minutes)	0.995**	0.993***	0.994**	1.005**	1.000
Travel time to the nearest health center (in minutes)	0.997**	1.002	1.002	1.000	1.000
Travel time to the nearest public hospital (in minutes)	1.004***	1.001	1.003***	1.002**	1.004***
Religion of the head (ref: Muslim & other religions)					
Orthodox Christian	1.946***	1.231*	0.694*	0.638***	0.422***
Protestant	0.944	1.054	0.759	0.690*	0.638
Regions (ref: SNNPR)					
Tigray	0.287***	0.658	0.490	0.452**	0.406*
Amhara	0.104***	0.175***	0.159***	0.202***	0.115***
Oromiya	0.373**	0.926	1.200**	1.023	0.877
Pseudo R^2	0.081	0.063	0.064	0.052	0.088
N	1,502	1,518	1,475	1,477	1,192

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals. In the case of tuberculosis, health posts are not included as part of the modern care option.

Appendix 6: When to seek modern care – Odds ratios based on ordered logit specifications

Health care seeking behavior in rural Ethiopia: Evidence from clinical vignettes

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Health care seeking behaviour in rural Ethiopia: Evidence from clinical vignettes

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Abstract

Background Between 2000 and 2011, Ethiopia rapidly expanded its health-care infrastructure recording an 18-fold increase in the number of health posts and a 7-fold increase in the number of health centers. However, health care utilization has increased only marginally and remains among the lowest in the region.

Methods This paper investigates the determinants of health care seeking behaviour using data from a household survey conducted in 2011 which covers 1,632 households residing in the four main regions of Ethiopia. The survey included five clinical vignettes covering a range of context-specific child and adult-related diseases. The analysis deals with responses to three issues, that is, whether and where to seek care and when to seek care.

Results We find almost universal preference for modern care. Foregone care ranges from 0.6 % for diarrhea to 2.5 % for tetanus. There is a systematic relationship between socioeconomic status and choice of providers mainly for adult-related conditions with households in higher consumption quintiles more likely to seek care in health centers, private/NGO clinics as opposed to health posts. Similarly, delays in care-seeking behaviour are apparent mainly for adult-related conditions and among poorer households.

Conclusion The differences in care seeking behavior between adult and child related conditions may be attributed to the recent spread of health posts which have focused on raising awareness of maternal and child health. Overall, the analysis suggests that the lack of health-care utilization is not driven by the inability to recognize health problems or due to a low perceived need for modern care.

Strengths of this study

- This paper identifies factors that drive health care seeking behaviour in rural Ethiopia using context specific clinical vignettes which avoid reporting bias in self-perceived need. It examines health care seeking behaviour for child and adult related conditions separately and investigates differences in the level and timing of care sought.

Limitations of this study

- While the use of clinical vignettes allows us to establish patterns of health care seeking behaviour across population groups that are not driven by differences in health status, there is the risk that reported hypothetical health care seeking behaviour does not match actual health care seeking behaviour.
- Because the symptoms described in the vignettes are quite specific and severe, they might not pick up foregone care in relation to diseases that are more difficult to recognize or more chronic in nature.
- While we have detailed information on individual and household (demand side) characteristics, we do not have information on health care supply, apart from the distance to health care facilities, which can be linked to the household data.

Introduction

Over the past decade, Ethiopia has recorded notable progress in a number of population health outcomes. These changes have been accompanied by a rapid expansion of health-care infrastructure at all levels.[1-3] There has been an 18-fold increase in the number of health posts in 2011 and a 7-fold increase in the number of health centers over the same period.[4-6] Consequently it is estimated that primary health care coverage, defined as village-level access to a health post, has increased from 51 % in 2000 to 92 % in 2011.[1, 3]

Despite these increases in the supply of health care and increases in the utilization of some specific services, overall outpatient health care utilization rates remain low and has increased only marginally from 0.27 visits in 2000 to 0.3 visits in 2011.[1, 3, 7] Institutional deliveries have gone up from 5 to 11 % in the same period, but remain extremely low compared to other sub Saharan African countries (for instance, 28.3 % in Eritrea, 43 % in Kenya, 73 % in Senegal, and 75 % in Malawi).[8] Therefore, the main aim of this paper is to examine the extent of foregone care and to gain an understanding of the factors that are responsible for driving a wedge between availability and utilization.

Available attempts at measuring foregone care for developed countries typically rely on explicitly asking survey respondents whether they did not use care when needed.[9,10] For low and middle income countries the evidence is mainly limited to the use and inequity in use of maternity and child (preventive) care.[11] Self-reported information on foregone care is likely to be biased, in particular in low-income settings where knowledge about medical conditions and the need for care may be limited.[12] This is illustrated by comparing data from the Ethiopian World Health Survey which reveals that only 13 % of respondents in the poorest quintile reported an unmet need for medical care[13], to data from the 2011 Ethiopian Demographic Health Survey in which 74.4 % of women in the poorest quintile reported not to have received any antenatal care during their last pregnancy.[14] The current study therefore uses a series of context-specific child and adult related clinical vignettes to explore the health care seeking behaviour of rural Ethiopian households. Survey respondents are presented with well-defined medical cases and asked about treatment needed. By fixing the medical condition, variation in responses to the vignettes may be attributed only to individual differences in perceptions of the care needed and not due to varying severity in the ill health condition.[15-19] Studies that have used clinical vignettes in high-income countries reveal that in these countries lower socioeconomic (ethnic or education level) groups are more likely to consult a doctor for a given set of symptoms. Therefore, they conclude that inequalities in actual health care utilization may be attributed to barriers in health care provision and differences in case management due to ethnic origins and not due to difficulties in understanding the symptoms of the disease or due to a lower perception of the need for care. [15-18]Despite the potential advantages of using health care vignettes as an alternative technique to analyze health care seeking behaviour, this approach has not been widely used in the context of low and middle income countries where presumably variations in the perceived need for health care are much greater than in high income countries.[11] A recent exception is a study in Peru. Based on a vignette designed to capture acute coronary syndrome (ACS), this study reports that women are less likely to recognize the symptoms of ACS and also less likely to seek health care for chest pain as compared to men.[19]

The analysis deals with three issues. First, do households seek modern care, second, conditional on seeking modern care where do they seek care and finally the timing of their care-seeking behaviour.

Data

This study is a part of a larger project which aims to evaluate a pilot community based health insurance scheme (CBHI) which was rolled out in four main regions (Tigray, Amhara, Oromiya, and SNNPR) of the country in June 2011 (see Figure 1). In each of the pilot regions, which together account for about 86 % of the country's population[20], the government chose 3 rural districts as CBHI pilot districts. Districts were selected if they had undertaken health care financing reforms designed to increase cost recovery and retention of locally raised revenues

and if it had geographically accessible (located close to a main road) health centres. Our household survey covered all 12 CBHI pilot districts and 4 control districts (1 from each region) which were selected on the same basis as the pilot CBHI districts. It is important to point out that districts were not selected on the basis of health care seeking behaviour or awareness of health issues. From each of the sampled districts, six villages (*kebeles*) were randomly selected and from each of village seventeen households were randomly chosen (based on household lists obtained from the village administrative office) yielding a total of 1,632 households comprising 9,455 individuals. Respondents were typically the head of the household (87%) or the spouse of the household head (13%). The survey was canvassed between March and April 2011 and contains extensive information on a variety of individual and household socio-economic attributes including information on health status, health care utilization and health care seeking behaviour. The study protocol was approved by the Ethics Committee of the International Institute of Social Studies of Erasmus University Rotterdam and informed consent was obtained from potential respondents prior to canvassing the survey.

The household survey instrument contains five short clinical vignettes which were developed with input from researchers at Addis Ababa University's School of Public Health. The vignettes are based on illnesses that are widely prevalent in the study region and may be related to acute respiratory infection/pneumonia among babies, diarrhea affecting female infants, adult male experiencing malaria, adult male experiencing tetanus, and an adult female affected by tuberculosis. According to information from the WHO's Global Health Observatory, in terms of burden of disease (BOD), diarrhea, respiratory infections, malaria and unintentional injuries are the four most prominent contributors to the country's BOD.[21] The vignettes were primarily designed to enable an exploration of heterogeneity in health care seeking behaviour for conditions affecting children and adults. For each case respondents were asked what they would do, that is, whether and where they would seek care and when they would seek care in case they or someone in their household were to experience the symptoms described in the vignettes. Respondents were offered a set of 11 choices for health care provider including an option for foregone care (do nothing). Based on the government's service guidelines, diagnosis and treatment for diarrhea and malaria is expected to be available at health posts. Health centers and hospitals are expected to be able to cater to all the illnesses described in the vignettes. The vignettes were designed with the view that medically the immediate care-seeking option may be considered the appropriate course of action (for details see Appendix 1).

In addition to the vignettes, information on a range of other variables was collected in order to enable an exploration of the associations between health care seeking behaviour and other attributes of interest. These include information on household demographic composition, education of the household head, household health status, economic status as captured by per capita household consumption, attitudes towards modern health care, a range of variables to control for access to public (health) infrastructure and finally a set of indicators to control for regional differences. Descriptive statistics for the sample as a whole as well as region-specific descriptive statistics are provided in Appendix 2.

Methods

The analysis deals with responses to three issues, that is, whether and where to seek care and when to seek care. Whether to seek care - the probability of seeking (modern) care versus the alternative of other care options (do nothing, traditional healers, religious healers, and visiting a pharmacy/drug store) is treated as a binary outcome. Odds ratios based on logit regressions of the binary outcome as a function of a number of household and village characteristics are provided for each vignette. This is followed by estimates of a series of multinomial logit (MNL) models for the type of provider sought in response to each vignette. To enhance the tractability of the empirical work, the 11 options are classified into five options which include seeking care from health posts, health centers, private/NGO clinics, public/private/NGO hospitals and other options. We follow this five-part classification for all the vignettes except for the tuberculosis-related vignette where due to the unlikelihood of getting treatment from a health post for the described symptoms, we classify seeking care from a health post as part of other care options. Conditional on choosing modern care we examine the timing of care-seeking behaviour using a set of ordered logit

models. The outcome variable consists of five options – seek care immediately, the next day, after two days, between three days to one week, a week or more.

Results

Whether to seek care

Table 1 provides vignette-specific information on the reported choices. The table reveals a striking pattern – a very small proportion of respondents would forego treatment all together (do nothing) with foregone care ranging from 0.6 % for diarrhea to 2.5 % for tetanus. Similarly, across all vignettes there is a strong preference for modern care (health center and health post). This finding is buttressed by the descriptive statistics provided in Appendix 2 which show that across the board 85 % of the sample respondents agree with the statement that modern sources of health care can be trusted.

To explore patterns in health care seeking behaviour across various characteristics we provide estimates of the probability of using modern versus alternative care based on a set of logit models. Table 2 presents estimates for each of the vignettes. Across all socio-economic categories, as captured by the education of the household head and consumption quintiles, health care seeking behaviour for the two most common sources of child morbidity and mortality (ARI/pneumonia and diarrhea) do not differ systematically. Differences are more pronounced for vignettes related to malaria and TB. The effects of education are mixed, but the effects of economic status point to important inequities. In the case of malaria, households in the richer quintiles are 2.1 (95% CI 0.89 to 5.08, p=0.09) to 3.4 times (95% CI 1.37 to 8.35, p=0.01) more likely to seek modern care as compared to those in the poorest quintile and for tuberculosis, households in the richer quintiles are 2.3 (95% CI 1.57 to 3.47, p<0.0001) to 3.6 times (95% CI 2.26 to 5.83, p<0.0001) more likely to avoid the other care option.

Demographics generally do not have a bearing on the health-seeking behaviour. However, the religion of the household head plays a role. In three of the five cases (ARI/pneumonia, malaria and tuberculosis) households headed by orthodox Christians are 2.5 (95% CI 1.58 to 4.02, p<0.0001) to 3.7 times (95% CI 1.51 to 9.05, p<0.0001) more likely to seek modern care as compared to Muslim headed households. The regional patterns indicate that for diarrhea, tetanus and tuberculosis, households in Amhara and Oromiya are far more likely to use modern care as compared to their counterparts in SNNPR.

Where to seek care

Tables 3A and 3B provide multinomial logit estimates of health-seeking behaviour for each of the child and adult related vignettes respectively. As covariates related to demographics, trust in modern care and household health status were not found to be systematically related to health care seeking behaviour, these are omitted from the tables for the sake of parsimony. Full regression results can be found in the appendix.

Household heads with informal education are 1.6 times (95% CI 1.07 to 2.46, p=0.02) more likely to take their children to health centers for ARI/pneumonia (baseline is health posts) which potentially offer higher quality of care as compared to household heads with no education. Education does not exert much of an influence on care seeking behaviour for diarrhea. However, in both cases, there is clearer evidence that richer households are more likely to access hospitals as opposed to health posts.

Household consumption plays an even more important role in influencing choice of health care provider for adult conditions (Table 3B). Households in the bottom quintile are far more likely to visit health posts while all other consumption quintiles are more likely to access higher level care. At the same time there is no evidence that households in the lower-most quintile are being pushed to other care options, except for tuberculosis.

The estimates reveal systematic differences in the choice of health care providers across different religions. For both child and adult vignettes, Orthodox Christians and Protestants are more likely to choose higher level care (health

centers and private clinics) as compared to Muslims. For instance, in the case of ARI/pneumonia (Table 3A), Orthodox Christians are about 3 times (95% CI 2.05 to 4.16, p<0.0001) more likely to use health centers.

When to seek care

Table 1 displays the distribution of the time lag between the onset of symptoms and the action of respondents. For both the child-related vignettes the reaction of respondents is swift and 91 (85) % report that they would seek care immediately, that is, on the same day as the occurrence of symptoms or the next day in the case of ARI/pneumonia (diarrhea). For the other vignettes, the response is slower and ranges from an immediate/next day response rate of 46 % for tuberculosis to 59 % for malaria and tetanus. For tuberculosis the reaction time is quite slow with about a quarter of respondents indicating that they would wait for a week or more after the onset of symptoms.

Odds ratios based on a set of vignette specific ordered logit estimates are provided in Table 4A and 4B. Across the various vignettes, educational attainment seems to play a stronger role in influencing timing of care as opposed to choice of health care provider. For instance, in the case of tuberculosis, household heads with informal education are 1.6 (95% CI 1.12 to 2.18, p=0.01) times more likely to delay seeking immediate care as opposed to those with secondary education. Similarly, for diarrhea, malaria, and tetanus vignettes, the estimates show that household heads with primary or secondary education are systematically more likely to seek care immediately as opposed to their less educated counterparts. Households in richer quintiles are also more likely to seek care immediately. For instance in the case of ARI/pneumonia households in the two highest quintiles are 35 (95% CI 0.45 to 0.93, p=0.02) to 39 % (95% CI 0.41 to 0.91, p=0.02) more likely to seek care immediately as compared to households in lower consumption quintiles. Similar patterns prevail for malaria and tetanus although not for diarrhea and tuberculosis.

The link between religion of the household head and the time of health care seeking behaviour varies across vignettes. For the case of child symptoms, Orthodox Christians are more likely to delay care than Muslims while the reverse is true for the adult vignettes. The effects of travel time do not show a clear pattern. Regional differences continue to remain pronounced. Almost, across all the vignettes households living in the Amhara and Tigray region display a greater propensity to seek care immediately as compared to households living in SNNPR. Differences are particularly pronounced in the case of the Amahra region where households are at least 80 % (95% CI 0.13 to 0.31, p<0.0001) more likely to seek care immediately as opposed to households living in SNNPR (Table 4B).

Discussion

Ethiopia has invested substantially in its health care infrastructure in the last decade through the expansion of health posts and health centers.[4-6] Despite these investments, utilization of maternal and child care and more general outpatient utilization rates remain among the lowest in Sub-Saharan Africa.[7, 8]. To gain an understanding of the factors responsible for driving a wedge between availability and utilization this paper relied on five context-relevant clinical vignettes for common child and adult conditions to probe whether households seek modern care, where they seek care and the timing of care-seeking behaviour.

The estimates suggest that the large majority of respondents recognize the severity of the symptoms described in the vignettes and prefer modern over traditional care and self-treatment. This is surprising given the country's low socio-economic development and low educational stock.[22] A potential explanation may lie in the rapid and recent spread of health posts and health extension workers who since 2003 have been charged with the responsibility of raising awareness of health issues.[6] Indeed, the uniformity of health care seeking behaviour for child morbidity displayed across consumption quintiles suggests that information on health education and the appropriate course of action for the most common childhood diseases, which is the focus of the health extension program, seems to have percolated to the lowest socio-economic quintiles.

For adult related conditions, we do find variations across socioeconomic status with households in the highest consumption quintile two to three times more likely to seek modern care as compared to households in the lowest quintiles. These socioeconomic inequalities are also found in the choice of health care provider, and the timing of

seeking care. Households in the lowest consumption quintiles are generally more likely to resort to lower level care and postpone seeking care compared to better off households. Taking the example of tuberculosis, which can only be properly treated in health centers and hospitals, we find that households in the upper consumption quintile are three times more likely to seek care in a hospital compared to those in the poorest. We also find variation in the timing of care seeking behaviour with respondents typically acting faster for child related conditions as compared to adult conditions.

There are differences in health care seeking behaviour across religion. Orthodox Christian households are more likely to seek modern care, to seek higher level modern care and seek care earlier (for adult conditions) as compared to Muslim headed households. While the reasons for this are not entirely clear, since the estimates control for socio economic status, education and ease of access to health care it is possible that the religion variables reflect different levels of confidence and trust in the health care system. This finding is not unique to this study. For instance, a study on maternal health seeking behaviour based on the Ethiopian Demographic and Health Survey finds that Muslim women are less likely to seek delivery and post natal care as compared to Orthodox women.[23]

There also appears to be considerable regional variation in health care seeking behaviour, with households in Amhara being most likely to seek (higher level) care, and those in SNNPR most likely to forego or delay seeking care. Since access to public health facilities in SNNPR seems to be at least at par or at times better as compared to other regions (see Appendix 3), it is likely that the lower probability of using care in SNNPR may be due to the limited implementation of the fee waiver system, which since 2008 has attempted to increase access for the "poorest of the poor", in this region as compared to Amhara and Oromiya regions.[24]

This paper adds to the literature on health care seeking behaviour and foregone care in Ethiopia using specific clinical vignettes which avoids the problem of reporting bias due to unperceived need for health care in low income settings.[11] While the use of such vignettes allows us to establish patterns of health care seeking behaviour across population groups that are not driven by differences in health status, there is the risk that reported hypothetical health care seeking behaviour does not match actual health care seeking behaviour. However, the overwhelming reliance on modern care found in the actual utilization data (see Appendix 4) does suggest that results from the vignettes analysis are able to capture preferences and are not merely a result of the lack of understanding of the survey instrument. The consistency between hypothetical and actual behaviour reported is also supported by research done in other contexts. For instance, a study in the Netherlands shows a strong link between a reported tendency to consult a doctor and observed consultation rates.[25] Second, because the symptoms described in the vignettes are quite specific and severe, they might not pick up foregone care in relation to diseases that are more difficult to recognize or more chronic in nature. Third, while we have detailed information on individual and household (demand side) characteristics, we do not have information on health care supply, apart from the distance to health care facilities, which can be linked to the household data.

Notwithstanding these limitations, based on the empirical evidence assembled in the paper we tend to conclude that the low utilization rates in Ethiopia are unlikely to be linked to lack of awareness of the symptoms of the most common diseases or a low-perceived need for health care. By reducing the cost of care, the scaling-up of the recently introduced community-based health insurance scheme may play an important role in enhancing access to health care. [26, 27]

Figure legend
Figure 1: Location of the survey regions

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Authors' contributions A D Mebratie designed the proposal, collected data, cleaned data and performed analysis; E Van de Poel designed the proposal, prepared the questionnaire, and performed analysis; Z Yilma performed data collection and cleaning; D Abebaw collected data; G Alemu designed the proposal and collected data; A S Bedi designed the proposal and commented on the analysis.

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Tables

	Case vignette[a]				
	ARI/Pneumonia	Diarrhea	Malaria	Tetanus	Tuberculosis
Where to seek care					
Health post	41.17	33.56	21.72	24.80	20.02
Health center	50.00	56.63	62.02	59.05	60.57
Private clinic	4.05	5.64	6.63	6.63	5.96
Mission/NGO clinic	0.25	0.18	0.31	0.18	0.37
Public hospital	1.41	1.47	4.48	4.42	9.95
Private hospital	0.12	0.18	0.18	0.12	0.31
Mission/NGO hospital	0.06	0.06	0.18	0.06	0.00
Pharmacy/drug store	0.25	0.37	0.25	0.37	0.00
Religious healer	0.74	0.31	1.10	0.12	1.11
Traditional healer	0.80	1.04	1.84	1.78	0.68
Do nothing	1.17	0.55	1.47	2.46	1.04
N	1,630	1,630	1,630	1,629	1,628
When to seek care[b]					
Immediately	54.24	45.76	27.67	34.86	21.05
The next day	37.04	39.11	31.47	25.97	25.35
After two days	6.95	11.61	22.72	17.27	17.64
Between three and a week	1.33	2.64	12.42	11.86	12.77
After a week or more than a week	0.44	0.88	5.73	10.05	23.20
N	1,582	1,593	1,554	1,552	1,582

Notes: [a] All figures in the table are in %. [b] Only for respondents who use modern care (health post, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and Mission/NGO hospitals).

Table 1: Responses to the vignettes

VARIABLES	ARI/ Pneumonia		Diarrhea		Malaria		Tetanus		Tuberculosis	
	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value
Head sex										
Female	1.0		1.0		1.0		1.0		1.0	
Male	1.81 (0.67 to 4.85)	0.24	1.93 (0.58 to 6.45)	0.29	1.1 (0.48 to 2.54)	0.82	0.98 (0.43 to 2.24)	0.97	1.3 (0.85 to 1.99)	0.23
Head age	1 (0.97 to 1.03)	0.95	0.98 (0.94 to 1.02)	0.25	1.02 (0.99 to 1.05)	0.17	0.98 (0.96 to 1.01)	0.18	0.98 (0.97 to 1)	0.02
Head's education										
No education at all	1.0		1.0		1.0		1.0		1.0	
Informal education	0.75 (0.25 to 2.21)	0.60	0.3 (0.09 to 0.97)	0.05	0.38 (0.19 to 0.77)	0.01	1.32 (0.51 to 3.42)	0.57	1.01 (0.61 to 1.69)	0.96
Primary & higher	0.96 (0.45 to 2.04)	0.91	0.87 (0.34 to 2.24)	0.77	1.99 (1 to 3.94)	0.05	1.35 (0.71 to 2.56)	0.36	0.62 (0.44 to 0.87)	0.01
Religion of the head										
Muslim & other religions	1.0		1.0		1.0		1.0		1.0	
Orthodox Christian	2.61 (0.91 to 7.53)	0.08	1.21 (0.33 to 4.38)	0.78	3.7 (1.51 to 9.05)	0.00	2.19 (0.93 to 5.17)	0.07	2.52 (1.58 to 4.02)	0.00
Protestant	1.35 (0.47 to 3.93)	0.58	2.34 (0.7 to 7.85)	0.17	1.07 (0.38 to 2.98)	0.90	1.28 (0.49 to 3.3)	0.61	1.72 (1.01 to 2.94)	0.05
Household size	1.04 (0.84 to 1.28)	0.72	1.1 (0.85 to 1.43)	0.45	0.9 (0.77 to 1.06)	0.20	1.23 (1.02 to 1.48)	0.03	1.03 (0.95 to 1.12)	0.48
HH composition										
Prop. of male adults aged 16 to 64	1.0		1.0		1.0		1.0		1.0	
Prop. of children aged under 6	0.08 (0 to 1.53)	0.09	0.04 (0 to 1.12)	0.06	0.23 (0.02 to 2.45)	0.22	0.04 (0 to 0.36)	0.01	0.6 (0.18 to 1.99)	0.41
Prop. of males aged 6 to 15	0.86 (0.05 to 15.75)	0.92	0.26 (0.01 to 6.38)	0.41	0.41 (0.04 to 3.93)	0.44	0.16 (0.02 to 1.43)	0.10	1.39 (0.44 to 4.4)	0.58
Prop. of females aged 6 to 15	0.03 (0 to 0.53)	0.02	1.09 (0.03 to 37.62)	0.96	0.89 (0.08 to 9.73)	0.92	0.45 (0.04 to 4.65)	0.50	1.11 (0.34 to 3.66)	0.87
Prop. of females aged 16 to 64	1.5 (0.04 to 50.24)	0.82	1.12 (0.02 to 66.43)	0.96	0.11 (0.01 to 1.49)	0.10	1.82 (0.12 to 28.57)	0.67	0.42 (0.13 to 1.4)	0.16
Prop. of elderly aged above 64	0.14 (0.01 to 3.43)	0.23	0.14 (0 to 4.55)	0.27	0.03 (0 to 0.32)	0.00	0.58 (0.05 to 6.95)	0.67	0.65 (0.17 to 2.46)	0.52
HH health status										
Prop. of households with good SAH	1.0		1.0		1.0		1.0		1.0	
Prop. of household with fair & low SAH	2.58 (0.71 to 9.33)	0.15	2.17 (0.48 to 9.76)	0.31	2.26 (0.8 to 6.38)	0.12	2.09 (0.81 to 5.39)	0.13	1.04 (0.69 to 1.57)	0.86
Consumption quintiles										
Poorest quintile	1.0		1.0		1.0		1.0		1.0	
2nd quintile	3.01 (0.95 to 9.58)	0.06	2.93 (0.86 to 9.93)	0.09	2.15 (1.02 to 4.52)	0.04	1.48 (0.68 to 3.24)	0.33	2.34 (1.57 to 3.47)	0.00
3rd quintile	1.66 (0.59 to 4.68)	0.34	1.5 (0.5 to 4.51)	0.47	1.85 (0.84 to 4.09)	0.13	1 (0.46 to 2.18)	0.99	2.27 (1.49 to 3.46)	0.00
4th quintile	0.84 (0.34 to 2.09)	0.71	1.27 (0.4 to 4.08)	0.68	3.38 (1.37 to 8.35)	0.01	1.28 (0.55 to 2.97)	0.56	3.63 (2.26 to 5.83)	0.00
Richest quintile	0.8 (0.3 to 2.12)	0.65	3.33 (0.78 to 14.33)	0.11	2.13 (0.89 to 5.08)	0.09	1 (0.42 to 2.38)	1.00	2.53 (1.55 to 4.12)	0.00
Trust in modern heath care										
Disagree	1.0		1.0		1.0		1.0		1.0	

Agree	1.3 (0.5 to 3.42)	0.59	2.08 (0.71 to 6.15)	0.18	3.59 (1.79 to 7.24)	0.00	2.47 (1.19 to 5.15)	0.02	0.45 (0.27 to 0.76)	0.00
Neither agree nor disagree	0.63 (0.18 to 2.19)	0.47	0.63 (0.17 to 2.35)	0.49	0.66 (0.28 to 1.55)	0.34	0.37 (0.15 to 0.88)	0.03	0.2 (0.1 to 0.39)	0.00
Access to public infrastructure										
Water using from public sources										
No	1.0		1.0		1.0		1.0		1.0	
Yes	0.92 (0.48 to 1.76)	0.80	0.86 (0.39 to 1.9)	0.70	1.28 (0.75 to 2.18)	0.37	1.05 (0.61 to 1.8)	0.87	0.97 (0.72 to 1.31)	0.86
Use electricity										
No	1.0		1.0		1.0		1.0		1.0	
Yes	4.33 (0.54 to 34.81)	0.17	2.22 (0.26 to 18.7)	0.46	0.93 (0.32 to 2.71)	0.90	1.27 (0.4 to 3.98)	0.69	2.58 (1.3 to 5.11)	0.01
Access to TV signal										
Yes	1.0		1.0		1.0		1.0		1.0	
No	1.26 (0.6 to 2.62)	0.54	2.61 (1.07 to 6.35)	0.04	1.16 (0.64 to 2.09)	0.63	0.81 (0.44 to 1.49)	0.50	0.68 (0.48 to 0.97)	0.03
Access to mobile signal										
Yes	1.0		1.0		1.0		1.0		1.0	
No	1.03 (0.45 to 2.36)	0.95	0.92 (0.34 to 2.51)	0.87	1.21 (0.63 to 2.32)	0.56	1.3 (0.65 to 2.6)	0.46	1.02 (0.68 to 1.53)	0.92
Travel time to the nearest health post (in minutes)	1 (0.99 to 1.02)	0.73	0.99 (0.97 to 1.01)	0.34	1.02 (1 to 1.03)	0.03	1.01 (0.99 to 1.02)	0.21	1.01 (1 to 1.01)	0.13
Travel time to the nearest health center (in minutes)	1 (0.99 to 1.01)	0.47	1.01 (1 to 1.02)	0.16	0.99 (0.99 to 1)	0.12	1 (0.99 to 1)	0.23	0.99 (0.99 to 1)	0.00
Travel time to the nearest public hospital (in minutes)	0.99 (0.99 to 1)	0.02	0.99 (0.99 to 1)	0.01	0.99 (0.99 to 1)	0.03	1 (0.99 to 1)	0.16	1 (1 to 1)	0.05
Regions										
SNNPR	1.0		1.0		1.0		1.0		1.0	
Tigray	3.6 (0.73 to 17.82)	0.12	11.88 (2.17 to 64.97)	0.00	1.42 (0.37 to 5.48)	0.62	3.15 (0.89 to 11.16)	0.08	0.7 (0.38 to 1.28)	0.25
Amhara	4.27 (1.11 to 16.38)	0.03	15.41 (3.42 to 69.52)	0.00	1.55 (0.52 to 4.62)	0.43	2.65 (0.94 to 7.49)	0.07	4.95 (2.76 to 8.88)	0.00
Oromiya	3.06 (0.91 to 10.33)	0.07	13.16 (2.6 to 66.66)	0.00	2.48 (0.79 to 7.8)	0.12	5.59 (1.85 to 16.9)	0.00	8.46 (4.49 to 15.95)	0.00
Pseudo R^2	0.147		0.21		0.178		0.156		0.195	
N	1,546		1,546		1,546		1,545		1,545	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals and other care option includes do nothing, traditional healers, religious healers, and pharmacies/drug stores. In the case of tuberculosis, health posts are included as part of the other care option.

Table 2: Probability of seeking modern care – Odds ratios based on logit specifications

VARIABLES	ARI/ Pneumonia				Diarrhea			
	Health center		Hospital/clinic		Health center		Hospital/clinic	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head's education								
No education at all	1.00		1.00		1.00		1.00	
Informal education	1.62 (1.07 to 2.46)	0.02	0.76 (0.33 to 1.77)	0.52	1.31 (0.85 to 2.01)	0.23	0.44 (0.18 to 1.07)	0.07
Primary & higher	1.25 (0.92 to 1.68)	0.15	0.61 (0.34 to 1.1)	0.10	0.89 (0.66 to 1.2)	0.45	0.6 (0.35 to 1.02)	0.06
Religion of the head								
Muslim & other religions	1.00		1.00		1.00		1.00	
Orthodox Christian	2.92 (2.05 to 4.16)	0.00	4.22 (2.25 to 7.9)	0.00	3.06 (2.1 to 4.47)	0.00	3.67 (2.05 to 6.57)	0.00
Protestant	1.73 (0.99 to 3.02)	0.06	0.6 (0.26 to 1.41)	0.24	1.98 (1.14 to 3.44)	0.02	0.71 (0.3 to 1.65)	0.42
Consumption quintiles								
Poorest quintile	1.00		1.00		1.00		1.00	
2nd quintile	1.44 (0.98 to 2.12)	0.06	2.43 (1.05 to 5.62)	0.04	1.48 (1.01 to 2.17)	0.04	2.48 (1.17 to 5.24)	0.02
3rd quintile	1.38 (0.93 to 2.05)	0.11	2.63 (1.1 to 6.31)	0.03	1.66 (1.11 to 2.48)	0.01	2.21 (0.99 to 4.95)	0.05
4th quintile	1.42 (0.94 to 2.14)	0.10	2.96 (1.21 to 7.22)	0.02	1.39 (0.92 to 2.1)	0.12	2.73 (1.25 to 5.99)	0.01
Richest quintile	1.4 (0.89 to 2.2)	0.15	4.38 (1.75 to 10.97)	0.00	1.46 (0.93 to 2.29)	0.10	2.63 (1.12 to 6.16)	0.03
Access to public infrastructure								
Water using from public sources								
No	1.00		1.00		1.00		1.00	
Yes	1.38 (1.06 to 1.8)	0.02	0.64 (0.38 to 1.09)	0.10	1.11 (0.85 to 1.45)	0.44	0.65 (0.4 to 1.06)	0.08
Use electricity								
No	1.00		1.00		1.00		1.00	
Yes	4.51 (2.41 to 8.47)	0.00	5.2 (1.9 to 14.21)	0.00	3.96 (2.06 to 7.62)	0.00	5.58 (2.13 to 14.62)	0.00
Access to TV signal								
Yes	1.00		1.00		1.00		1.00	
No	0.88 (0.65 to 1.2)	0.43	0.77 (0.42 to 1.42)	0.41	0.76 (0.55 to 1.04)	0.08	0.93 (0.54 to 1.62)	0.80
Access to mobile signal								
Yes	1.00		1.00		1.00		1.00	
No	1.81 (1.28 to 2.56)	0.00	0.85 (0.45 to 1.61)	0.63	0.93 (0.65 to 1.33)	0.67	0.3 (0.17 to 0.52)	0.00
Travel time to the nearest health post (in minutes)	1.01 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.72	1.02 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.78
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 0.99)	0.00	1 (1 to 1.01)	0.53	0.99 (0.99 to 1)	0.00	1 (1 to 1.01)	0.25

Travel time to the nearest public hospital (in minutes)	1 (1 to 1)	0.24	0.99 (0.99 to 1)	0.03	1 (1 to 1)	0.56	0.99 (0.99 to 1)	0.00
Regions								
SNNPR	1.00		1.00		1.00		1.00	
Tigray	0.39 (0.21 to 0.72)	0.00	0.03 (0.01 to 0.11)	0.00	0.41 (0.23 to 0.76)	0.00	0.04 (0.01 to 0.13)	0.00
Amhara	5.64 (3.15 to 10.11)	0.00	0.54 (0.23 to 1.29)	0.17	4.28 (2.4 to 7.63)	0.00	1.08 (0.46 to 2.55)	0.86
Oromiya	2.23 (1.26 to 3.97)	0.01	0.28 (0.12 to 0.66)	0.00	3.2 (1.8 to 5.69)	0.00	1.06 (0.46 to 2.44)	0.90
Pseudo R^2			0.1758				0.1761	
N			1,527				1,537	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. The outcomes also include other care options (include do nothing, traditional healers, religious healers, and pharmacies/drug stores) and estimates for this outcome are reported in Appendix 5A and 5B. Models also control for demographics, household health status, trust in modern care (as in Table 2).

Table 3A: Probability of seeking care for ARI/pneumonia and diarrhea– Relative risk ratios, based on multinomial logit specifications

VARIABLES	Malaria				Tetanus				Tuberculosis	
	Health center		Hospital		Health center		Hospital		Hospital	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head's education										
No education at all	1.00		1.00		1.00		1.00		1.00	
Informal education	1.55 (0.88 to 2.73)	0.13	1.55 (0.62 to 3.92)	0.35	1.14 (0.71 to 1.84)	0.59	0.58 (0.23 to 1.5)	0.27	1.26 (0.75 to 2.13)	0.38
Primary & higher	0.71 (0.5 to 1)	0.05	0.99 (0.49 to 2.01)	0.97	0.81 (0.58 to 1.14)	0.23	0.7 (0.35 to 1.42)	0.32	0.9 (0.56 to 1.46)	0.67
Religion of the head										
Muslim & other religions	1.00		1.00		1.00		1.00		1.00	
Orthodox Christian	2.45 (1.53 to 3.94)	0.00	0.72 (0.34 to 1.55)	0.41	2.75 (1.77 to 4.27)	0.00	0.68 (0.32 to 1.44)	0.31	0.16 (0.1 to 0.27)	0.00
Protestant	2.35 (1.29 to 4.26)	0.01	0.35 (0.09 to 1.37)	0.13	1.97 (1.09 to 3.54)	0.02	0.26 (0.06 to 1.09)	0.07	0.14 (0.05 to 0.39)	0.00
Consumption quintiles										
Poorest quintile	1.00		1.00		1.00		1.00		1.00	
2nd quintile	1.99 (1.32 to 3.01)	0.00	3.36 (1.05 to 10.78)	0.04	1.79 (1.2 to 2.67)	0.01	7.39 (1.47 to 37.25)	0.02	1.81 (0.79 to 4.15)	0.16
3rd quintile	2.23 (1.43 to 3.48)	0.00	4.8 (1.52 to 15.2)	0.01	1.62 (1.06 to 2.49)	0.03	11.48 (2.36 to 55.8)	0.00	2.22 (0.97 to 5.06)	0.06
4th quintile	2.57 (1.59 to 4.17)	0.00	8.62 (2.78 to 26.76)	0.00	2.7 (1.68 to 4.33)	0.00	28.87 (5.99 to 139.06)	0.00	3.47 (1.55 to 7.75)	0.00
Richest quintile	1.99 (1.19 to 3.33)	0.01	5.16 (1.53 to 17.37)	0.01	1.82 (1.11 to 2.98)	0.02	9.32 (1.78 to 48.69)	0.01	2.95 (1.26 to 6.91)	0.01
Access to public infrastructure										
Water using from public sources										
No	1.00		1.00		1.00		1.00		1.00	
Yes	1.08 (0.79 to 1.47)	0.65	0.47 (0.25 to 0.89)	0.02	1.02 (0.76 to 1.38)	0.88	0.34 (0.18 to 0.66)	0.00	0.56 (0.37 to 0.84)	0.01
Use electricity										
No	1.00		1.00		1.00		1.00		1.00	
Yes	3.83 (1.73 to 8.5)	0.00	6.23 (1.9 to 20.39)	0.00	2.34 (1.22 to 4.47)	0.01	3.68 (1.09 to 12.42)	0.04	1.43 (0.76 to 2.69)	0.26
Access to TV signal										
Yes	1.00		1.00		1.00		1.00		1.00	
No	0.47 (0.32 to 0.69)	0.00	2.14 (0.99 to 4.61)	0.05	0.59 (0.41 to 0.84)	0.00	2.14 (0.99 to 4.61)	0.05	1.24 (0.8 to 1.94)	0.34
Access to mobile signal										
Yes	1.00		1.00		1.00		1.00		1.00	
No	1.35 (0.87 to 2.09)	0.17	0.44 (0.21 to 0.92)	0.03	1.17 (0.78 to 1.77)	0.44	0.39 (0.19 to 0.83)	0.01	0.76 (0.48 to 1.2)	0.24
Travel time to the nearest health post (in minutes)	1.01 (1 to 1.02)	0.00	1 (0.99 to 1.02)	0.82	1.02 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.63	1 (0.99 to 1.01)	0.53
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 0.99)	0.00	1 (0.99 to 1.01)	0.83	0.99 (0.99 to 0.99)	0.00	1 (0.99 to 1.01)	0.68	1 (1 to 1.01)	0.38
Travel time to the nearest public	1 (1 to 1.01)	0.03	1 (1 to 1.01)	0.32	1 (1 to 1)	0.03	1 (0.99 to 1)	0.47	1 (0.99 to 1)	0.17

hospital (in minutes)										
Regions										
SNNPR	1.00		1.00		1.00		1.00		1.00	
Tigray	0.87 (0.45 to 1.67)	0.68	0.57 (0.14 to 2.4)	0.44	0.8 (0.43 to 1.52)	0.50	0.73 (0.18 to 2.96)	0.66	1.26 (0.44 to 3.61)	0.67
Amhara	4.98 (2.65 to 9.37)	0.00	3.01 (0.9 to 10.1)	0.07	3.95 (2.17 to 7.21)	0.00	1.55 (0.46 to 5.28)	0.48	0.93 (0.38 to 2.25)	0.86
Oromiya	10.47 (5.26 to 20.83)	0.00	3.72 (1.07 to 12.97)	0.04	10.56 (5.37 to 20.77)	0.00	4.22 (1.23 to 14.4)	0.02	0.59 (0.24 to 1.47)	0.26
Pseudo R^2			0.192			0.199			0.176	
N			1,523			1,507			1,545	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the case of tuberculosis, the reference outcome is health posts. In case of tuberculosis, the reference outcome is health center. The outcomes also include clinic and other care options and estimates for these outcomes are reported in Appendix 5C to 5E. Except for the case of tuberculosis, the other care option includes do nothing, traditional healers, religious healers, and pharmacies/drug stores. In the case of tuberculosis, health posts are included as part of the other care option. Models also control for demographics, household health status, trust in modern care (as in Table 2).

Table 3B: Probability of seeking care for malaria, tetanus, and tuberculosis – Relative risk ratios based on multinomial logit specifications

VARIABLES	ARI/ Pneumonia		Diarrhea	
	OR (95%CI)	*p* value	OR (95%CI)	*p* value
Head's education				
No education at all	1.00		1.00	
Informal education	0.99 (0.7 to 1.41)	0.97	0.89 (0.64 to 1.24)	0.49
Primary & higher	0.78 (0.6 to 1.01)	0.06	0.66 (0.51 to 0.84)	0.00
Consumption quintiles				
Poorest quintile	1.00		1.00	
2nd quintile	0.94 (0.68 to 1.29)	0.69	0.84 (0.61 to 1.15)	0.27
3rd quintile	0.81 (0.57 to 1.14)	0.22	0.93 (0.67 to 1.3)	0.67
4th quintile	0.65 (0.45 to 0.93)	0.02	0.84 (0.59 to 1.18)	0.32
Richest quintile	0.61 (0.41 to 0.91)	0.02	1 (0.69 to 1.45)	0.99
Trust in modern heath care				
Disagree	1.00		1.00	
Agree	1.47 (0.98 to 2.22)	0.07	1.46 (1 to 2.13)	0.05
Neither agree nor disagree	1.7 (0.98 to 2.96)	0.06	1.18 (0.7 to 1.99)	0.54
Access to public infrastructure				
Water using from public sources				
No	1.00		1.00	
Yes	0.76 (0.6 to 0.96)	0.02	1.01 (0.81 to 1.25)	0.94
Use electricity				
No	1.00		1.00	
Yes	0.63 (0.38 to 1.03)	0.07	0.65 (0.41 to 1.01)	0.06
Access to TV signal				
Yes	1.00		1.00	
No	0.72 (0.54 to 0.96)	0.03	0.48 (0.37 to 0.63)	0.00
Access to mobile signal				
Yes	1.00		1.00	
No	1.17 (0.86 to 1.6)	0.31	0.92 (0.69 to 1.22)	0.56
Travel time to the nearest health post (in minutes)	0.99 (0.99 to 1)	0.06	0.99 (0.99 to 1)	0.01
Travel time to the nearest health center (in minutes)	1 (0.99 to 1)	0.02	1 (1 to 1)	0.26
Travel time to the nearest public hospital (in minutes)	1 (1 to 1.01)	0.00	1 (1 to 1)	0.35
Religion of the head				
Muslim & other religions	1.00		1.00	
Orthodox Christian	1.95 (1.43 to 2.65)	0.00	1.23 (0.93 to 1.63)	0.15
Protestant	0.94 (0.6 to 1.49)	0.81	1.05 (0.68 to 1.64)	0.81
Regions				
SNNPR	1.00		1.00	
Tigray	0.29 (0.17 to 0.47)	0.00	0.66 (0.41 to 1.06)	0.09
Amhara	0.1 (0.06 to 0.17)	0.00	0.18 (0.11 to 0.28)	0.00
Oromiya	0.37 (0.23 to 0.6)	0.00	0.93 (0.59 to 1.45)	0.74
Pseudo R^2	0.081		0.063	
N	1,502		1,518	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals.

Table 4A: When to seek modern care for ARI/pneumonia and diarrhea – Odds ratios based on ordered logit specifications

VARIABLES	Malaria		Tetanus		Tuberculosis	
	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value
Head's education						
No education at all	1.00		1.00		1.00	
Informal education	0.94 (0.68 to 1.28)	0.68	0.81 (0.59 to 1.11)	0.19	1.57 (1.12 to 2.18)	0.01
Primary & higher	0.66 (0.52 to 0.84)	0.00	0.81 (0.64 to 1.02)	0.08	1 (0.77 to 1.31)	0.97
Consumption quintiles						
Poorest quintile	1.00		1.00		1.00	
2nd quintile	1.09 (0.8 to 1.47)	0.59	0.99 (0.73 to 1.32)	0.93	0.94 (0.66 to 1.35)	0.75
3rd quintile	0.84 (0.61 to 1.15)	0.27	0.65 (0.47 to 0.88)	0.01	0.91 (0.63 to 1.32)	0.62
4th quintile	0.55 (0.39 to 0.77)	0.00	0.52 (0.37 to 0.71)	0.00	0.83 (0.57 to 1.2)	0.32
Richest quintile	0.63 (0.44 to 0.9)	0.01	0.48 (0.34 to 0.68)	0.00	1.02 (0.67 to 1.54)	0.93
Trust in modern heath care						
Disagree	1.00		1.00		1.00	
Agree	0.83 (0.58 to 1.18)	0.30	0.82 (0.58 to 1.17)	0.28	1.7 (1.16 to 2.49)	0.01
Neither agree nor disagree	0.44 (0.27 to 0.72)	0.00	0.59 (0.36 to 0.98)	0.04	0.8 (0.45 to 1.42)	0.45
Access to public infrastructure						
Water using from public sources						
No	1.00		1.00		1.00	
Yes	0.76 (0.62 to 0.94)	0.01	0.79 (0.64 to 0.98)	0.03	0.92 (0.73 to 1.16)	0.46
Use electricity						
No	1.00		1.00		1.00	
Yes	1.1 (0.73 to 1.66)	0.64	0.67 (0.44 to 1.04)	0.08	0.95 (0.62 to 1.46)	0.82
Access to TV signal						
Yes	1.00		1.00		1.00	
No	0.5 (0.38 to 0.64)	0.00	0.55 (0.43 to 0.71)	0.00	0.46 (0.34 to 0.61)	0.00
Access to mobile signal						
Yes	1.00		1.00		1.00	
No	1.22 (0.93 to 1.6)	0.15	1.21 (0.93 to 1.59)	0.16	2.13 (1.58 to 2.88)	0.00
Travel time to the nearest health post (in minutes)	0.99 (0.99 to 1)	0.02	1.01 (1 to 1.01)	0.03	1 (1 to 1.01)	0.73
Travel time to the nearest health center (in minutes)	1 (1 to 1)	0.16	1 (1 to 1)	0.89	1 (1 to 1)	0.91
Travel time to the nearest public hospital (in minutes)	1 (1 to 1)	0.00	1 (1 to 1)	0.01	1 (1 to 1.01)	0.00
Religion of the head						
Muslim & other religions	1.00		1.00		1.00	
Orthodox Christian	0.69 (0.53 to 0.91)	0.01	0.64 (0.49 to 0.84)	0.00	0.42 (0.32 to 0.56)	0.00
Protestant	0.76 (0.49 to 1.19)	0.23	0.69 (0.45 to 1.07)	0.09	0.64 (0.36 to 1.14)	0.13
Regions						
SNNPR	1.00		1.00		1.00	
Tigray	0.49 (0.31 to 0.78)	0.00	0.45 (0.29 to 0.72)	0.00	0.41 (0.22 to 0.76)	0.01
Amhara	0.16 (0.1 to 0.25)	0.00	0.2 (0.13 to 0.31)	0.00	0.12 (0.06 to 0.21)	0.00
Oromiya	1.2 (0.77 to 1.87)	0.42	1.02 (0.66 to 1.58)	0.92	0.88 (0.49 to 1.57)	0.66
Pseudo R^2	0.064		0.052		0.088	
N	1,475		1,477		1,192	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals. In the case of tuberculosis, health posts are not included as part of the modern care option.

Table 4B: When to seek modern care for malaria, tetanus and tuberculosis – Odds ratios based on ordered logit specifications

Health care seeking behaviour in rural Ethiopia: Evidence from clinical vignettes

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Abstract

Background Between 2000 and 2011, Ethiopia rapidly expanded its health-care infrastructure recording an 18-fold increase in the number of health posts and a 7-fold increase in the number of health centers. However, health care utilization has increased only marginally and remains among the lowest in the region.

Methods This paper investigates the determinants of health care seeking behaviour using data from a household survey conducted in 2011 which covers 1,632 households residing in the four main regions of Ethiopia. The survey included five clinical vignettes covering a range of context-specific child and adult-related diseases. The analysis deals with responses to three issues, that is, whether and where to seek care and when to seek care.

Results We find almost universal preference for modern care. Foregone care ranges from 0.6 % for diarrhea to 2.5 % for tetanus. There is a systematic relationship between socioeconomic status and choice of providers mainly for adult-related conditions with households in higher consumption quintiles more likely to seek care in health centers, private/NGO clinics as opposed to health posts. Similarly, delays in care-seeking behaviour are apparent mainly for adult-related conditions and among poorer households.

Conclusion The differences in care seeking behavior between adult and child related conditions may be attributed to the recent spread of health posts which have focused on raising awareness of maternal and child health. Overall, the analysis suggests that the lack of health-care utilization is not driven by the inability to recognize health problems or due to a low perceived need for modern care. ~~but is more likely to be related to the quality and cost of available care.~~

Key Words: Health care seeking behaviour, Ethiopia, Clinical vignettes, Foregone care

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Strengths of this study

- ~~This~~ This paper identifies factors that ~~nvestigates what best of our knowledge, this is the first study which addresses policy relevant issue regarding the deriving~~driveing ~~forces of~~ health care seeking behaviour in rural Ethiopia using context specific clinical vignettes which avoid reporting bias in self-perceived need. ~~in low income countries.~~
- It examines ~~the~~ health care seeking behaviour ~~use~~ for child and adult related conditions separately and investigates differences in the level and timing of care sought.
  ~~It also examines forgone care that could happen due to choosing inappropriate care and delayed health care seeking behaviour separately.~~

Limitations of this study

- While the use of clinical vignettes allows us to establish patterns of health care seeking behaviour across population groups that are not driven by differences in health status, there is the risk that reported hypothetical health care seeking behaviour does not match actual health care seeking behaviour.
- Because the symptoms described in the vignettes are quite specific and severe, they might not pick up foregone care in relation to diseases that are more difficult to recognize or more chronic in nature.

- While we have detailed information on individual and household (demand side) characteristics, we do not have information on health care supply, apart from the distance to health care facilities, which can be linked to the household data.

Data sharing statement Extra data related to this study may be obtained by sending an email to the corresponding author <mebratie@iss.nl>

Ethical approval statement this study was approved by the Ethics Committee of the International Institute of Social Studies of Erasmus University Rotterdam (approval reference: iss0001946).

Authors' contributions A D Mebratie designed the proposal, collected data, cleaned data and performed analysis; E Van de Poel designed the proposal, prepared the questionnaire, and performed analysis; Z Yilma performed data collection and cleaning; D Abebaw collected data; G Alemu designed the proposal and collected data; A S Bedi designed the proposal and commented on the analysis.

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Competing interests There are no competing interests related to this study.

Introduction

Over the past decade, Ethiopia has recorded notable progress in a number of population health outcomes. These changes have been accompanied by a rapid expansion of health-care infrastructure at all levels.[1-3] There has been an 18-fold increase in the number of health posts in 2011 and a 7-fold increase in the number of health centers over the same period.[4-6] Consequently it is estimated that primary health care coverage, defined as village-level access to a health post, has increased from 51 % in 2000 to 92 % in 2011.[1, 3]

Despite these increases in the supply of health care and increases in the utilization of some specific services, overall outpatient health care utilization rates remain low and has increased only marginally from 0.27 visits in 2000 to 0.3 visits in 2011.[1, 3, 7] Institutional deliveries have gone up from 5 to 11 % in the same period, but remain extremely low compared to other sub Saharan African countries (for instance, 28.3 % in Eritrea, 43 % in Kenya, 73 % in Senegal, and 75 % in Malawi).[8] Therefore, the main aim of this paper is to examine the extent of foregone care and to gain an understanding of the factors that are responsible for driving a wedge between availability and utilization.

Available attempts at measuring foregone care for developed countries typically rely on explicitly asking survey respondents whether they did not use care when needed.[9,10] For low and middle income countries the evidence is mainly limited to the use and inequity in use of maternity and child (preventive) care.[11] Self-reported information on foregone care is likely to be biased, in particular in low-income settings where knowledge about medical conditions and the need for care may be limited.[12] This is illustrated by comparing data from the Ethiopian World Health Survey which reveals that only 13 % of respondents in the poorest quintile reported an unmet need for medical care[13], to data from the 2011 Ethiopian Demographic Health Survey in which 74.4 % of women in the poorest quintile reported not to have received any antenatal care during their last pregnancy.[14] The current study therefore uses a series of context-specific child and adult related clinical vignettes to explore the health care seeking behaviour of rural Ethiopian households. Survey respondents are presented with well-defined medical cases and asked about treatment needed. By fixing the medical condition, variation in responses to the vignettes may be attributed only to individual differences in perceptions of the care needed and not due to varying severity in the ill health condition.[15-19] Studies that have used clinical vignettes in high-income countries reveal that in these countries lower socioeconomic (ethnic or education level) groups are more likely to consult a doctor for a given set of symptoms. Therefore, they conclude that inequalities in actual health care utilization may be attributed to barriers in health care provision and differences in case management due to ethnic origins and not due to difficulties in understanding the symptoms of the disease or due to a lower perception of the need for care.[15-18] Despite the potential advantages of using health care vignettes as an alternative technique to analyze health care seeking behaviour, this approach has not been widely used in the context of low and middle income countries where presumably variations in the perceived need for health care are much greater than in high income countries.[11] A recent exception is a study in Peru. Based on a vignette designed to capture acute coronary syndrome (ACS), this study reports that women are less likely to recognize the symptoms of ACS and also less likely to seek health care for chest pain as compared to men.[19]

The analysis deals with three issues. First, do households seek modern care, second, conditional on seeking modern care where do they seek care and finally the timing of their care-seeking behaviour.

Data

This study is a part of a larger project which aims to evaluate a pilot community based health insurance scheme (CBHI) which was rolled out in four main regions (Tigray, Amhara, Oromiya, and SNNPR) of the country in June 2011 (see Figure 1). In each of the pilot regions, which together account for about 86 % of the country's population[20], the government chose 3 rural districts as CBHI pilot districts. Districts were selected if they had undertaken health care financing reforms designed to increase cost recovery and retention of locally raised revenues and if it had geographically accessible (located close to a main road) health centres. Our household survey covered all 12 CBHI pilot districts and 4 control districts (1 from each region) which were selected on the same basis as the pilot CBHI districts. It is important to point out that districts were not selected on the basis of health care seeking behaviour or awareness of health issues. From each of the sampled districts, six villages (*kebeles*) were randomly

selected and from each of village seventeen households were randomly chosen (based on household lists obtained from the village administrative office) yielding a total of 1,632 households comprising 9,455 individuals. Respondents were typically the head of the household (87%) or the spouse of the household head (13%). The survey was canvassed between March and April 2011 and contains extensive information on a variety of individual and household socio-economic attributes including information on health status, health care utilization and health care seeking behaviour. The study protocol was approved by the Ethics Committee of the International Institute of Social Studies of Erasmus University Rotterdam and informed consent was obtained from potential respondents prior to canvassing the survey.

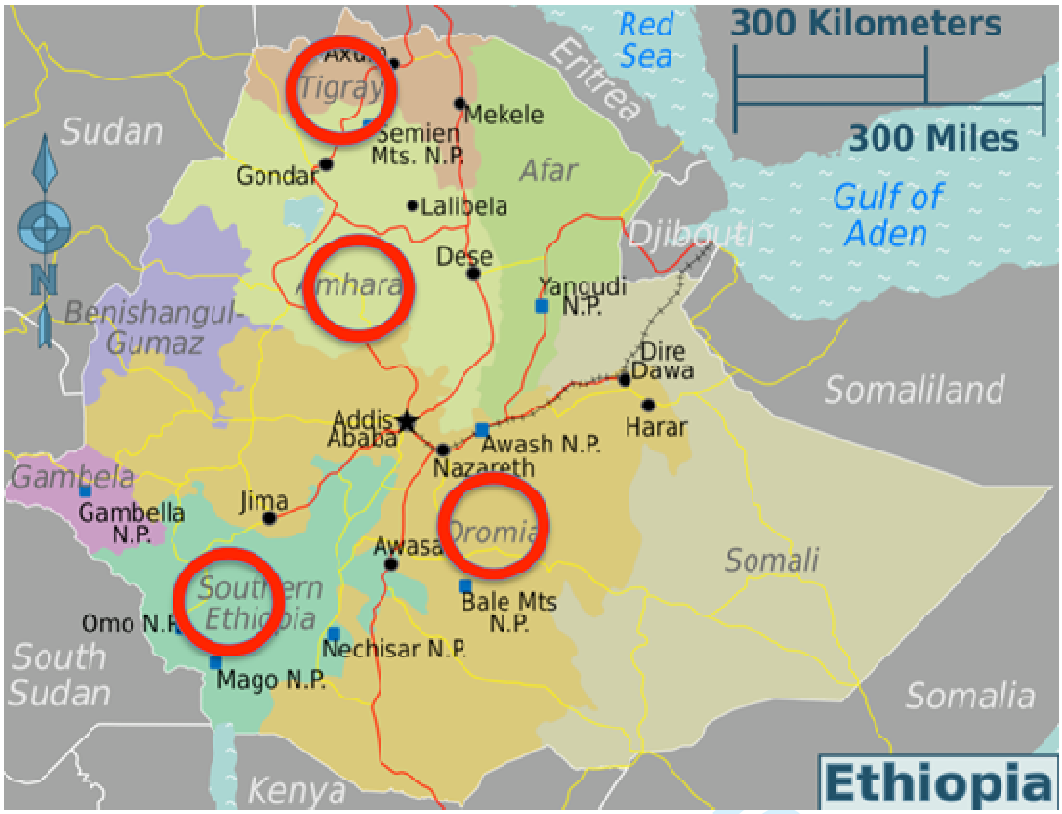

Figure 1: Location of the survey regions

The household survey instrument contains five short clinical vignettes which were developed with input from researchers at Addis Ababa University's School of Public Health. The vignettes are based on illnesses that are widely prevalent in the study region and may be related to acute respiratory infection/pneumonia among babies, diarrhea affecting female infants, adult male experiencing malaria, adult male experiencing tetanus, and an adult female affected by tuberculosis. According to information from the WHO's Global Health Observatory, in terms of burden of disease (BOD), diarrhea, respiratory infections, malaria and unintentional injuries are the four most prominent contributors to the country's BOD.[21] The vignettes were primarily designed to enable an exploration of heterogeneity in health care seeking behaviour for conditions affecting children and adults. For each case respondents were asked what they would do, that is, whether and where they would seek care and when they would seek care in case they or someone in their household were to experience the symptoms described in the vignettes. Respondents were offered a set of 11 choices for health care provider including an option for foregone care (do nothing). Based on the government's service guidelines, diagnosis and treatment for diarrhea and malaria is expected to be available at health posts. Health centers and hospitals are expected to be able to cater to all the illnesses described in the vignettes. The vignettes were designed with the view that medically the immediate care-seeking option may be considered the appropriate course of action (for details see Appendix 1).

In addition to the vignettes, information on a range of other variables was collected in order to enable an exploration of the associations between health care seeking behaviour and other attributes of interest. These include information on household demographic composition, education of the household head, household health status, economic status as captured by per capita household consumption, attitudes towards modern health care, a range of variables to control for access to public (health) infrastructure and finally a set of indicators to control for regional differences. Descriptive statistics for the sample as a whole as well as region-specific descriptive statistics are provided in Appendix 2.

Methods

The analysis deals with responses to three issues, that is, whether and where to seek care and when to seek care. Whether to seek care - the probability of seeking (modern) care versus the alternative of other care options (do nothing, traditional healers, religious healers, and visiting a pharmacy/drug store) is treated as a binary outcome. Odds ratios based on logit regressions of the binary outcome as a function of a number of household and village characteristics are provided for each vignette. This is followed by estimates of a series of multinomial logit (MNL) models for the type of provider sought in response to each vignette. To enhance the tractability of the empirical work, the 11 options are classified into five options which include seeking care from health posts, health centers, private/NGO clinics, public/private/NGO hospitals and other options. We follow this five-part classification for all the vignettes except for the tuberculosis-related vignette where due to the unlikelihood of getting treatment from a health post for the described symptoms, we classify seeking care from a health post as part of other care options. Conditional on choosing modern care we examine the timing of care-seeking behaviour using a set of ordered logit models. The outcome variable consists of five options – seek care immediately, the next day, after two days, between three days to one week, a week or more.

Results

Whether to seek care

Table 1 provides vignette-specific information on the reported choices. The table reveals a striking pattern – a very small proportion of respondents would forego treatment all together (do nothing) with foregone care ranging from 0.6 % for diarrhea to 2.5 % for tetanus. Similarly, across all vignettes there is a strong preference for modern care (health center and health post). ~~Given the country's low socio-economic development and low educational stock this is surprising. A potential explanation may lie in the rapid and recent spread of health posts and health extension workers who since 2003 have been charged with the responsibility of raising awareness of health issues. This interpretation~~This finding is buttressed by the descriptive statistics provided in Appendix 2 which show that across the board 85 % of the sample respondents agree with the statement that modern sources of health care can be trusted.

To explore patterns in health care seeking behaviour across various characteristics we provide estimates of the probability of using modern versus alternative care based on a set of logit models. Table 2 presents estimates for each of the vignettes. Across all socio-economic categories, as captured by the education of the household head and consumption quintiles, health care seeking behaviour for the two most common sources of child morbidity and mortality (ARI/pneumonia and diarrhea) do not differ systematically. Differences are more pronounced for vignettes related to malaria and TB. The effects of education are mixed, but the effects of economic status point to important inequities. In the case of malaria, households in the richer quintiles are 2.1 (95% CI 0.89 to 5.08, p=0.09) to 3.4 times (95% CI 1.37 to 8.35, p=0.01) more likely to seek modern care as compared to those in the poorest quintile and for tuberculosis, households in the richer quintiles are 2.3 (95% CI 1.57 to 3.47, p<0.0001) to 3.6 times (95% CI 2.26 to 5.83, p<0.0001) more likely to avoid the other care option.

Demographics generally do not have a bearing on the health-seeking behaviour. However, the religion of the household head plays a role. In three of the five cases (ARI/pneumonia, malaria and tuberculosis) households headed by orthodox Christians are 2.5 (95% CI 1.58 to 4.02, p<0.0001) to 3.7 times (95% CI 1.51 to 9.05, p≤0.0001) more likely to seek modern care as compared to Muslim headed households. The regional patterns

indicate that for diarrhea, tetanus and tuberculosis, households in Amhara and Oromiya are far more likely to use modern care as compared to their counterparts in SNNPR.

Where to seek care

Tables 3A and 3B provide multinomial logit estimates of health-seeking behaviour for each of the child and adult related vignettes respectively. As covariates related to demographics, trust in modern care and household health status were not found to be systematically related to health care seeking behaviour, these are omitted from the tables for the sake of parsimony. Full regression results can be found in the appendix.

Household heads with informal education are 1.6 times (95% CI 1.07 to 2.46, p=0.02) more likely to take their children to health centers for ARI/pneumonia (baseline is health posts) which potentially offer higher quality of care as compared to household heads with no education. Education does not exert much of an influence on care seeking behaviour for diarrhea. However, in both cases, there is clearer evidence that richer households are more likely to access hospitals as opposed to health posts.

Household consumption plays an even more important role in influencing choice of health care provider for adult conditions (Table 3B). Households in the bottom quintile are far more likely to visit health posts while all other consumption quintiles are more likely to access higher level care. At the same time there is no evidence that households in the lower-most quintile are being pushed to other care options, except for tuberculosis.

The estimates reveal systematic differences in the choice of health care providers across different religions. For both child and adult vignettes, Orthodox Christians and Protestants are more likely to choose higher level care (health centers and private clinics) as compared to Muslims. For instance, in the case of ARI/pneumonia (Table 3A), Orthodox Christians are about 3 times (95% CI 2.05 to 4.16, p<0.0001) more likely to use health centers.

When to seek care

Table 1 displays the distribution of the time lag between the onset of symptoms and the action of respondents. For both the child-related vignettes the reaction of respondents is swift and 91 (85) % report that they would seek care immediately, that is, on the same day as the occurrence of symptoms or the next day in the case of ARI/pneumonia (diarrhea). For the other vignettes, the response is slower and ranges from an immediate/next day response rate of 46 % for tuberculosis to 59 % for malaria and tetanus. For tuberculosis the reaction time is quite slow with about a quarter of respondents indicating that they would wait for a week or more after the onset of symptoms.

Odds ratios based on a set of vignette specific ordered logit estimates are provided in Table 4A and 4B. Across the various vignettes, educational attainment seems to play a stronger role in influencing timing of care as opposed to choice of health care provider. For instance, in the case of tuberculosis, household heads with informal education are 1.6 (95% CI 1.12 to 2.18, p=0.01) times more likely to delay seeking immediate care as opposed to those with secondary education. Similarly, for diarrhea, malaria, and tetanus vignettes, the estimates show that household heads with primary or secondary education are systematically more likely to seek care immediately as opposed to their less educated counterparts. Households in richer quintiles are also more likely to seek care immediately. For instance in the case of ARI/pneumonia households in the two highest quintiles are 35 (95% CI 0.45 to 0.93, p=0.02) to 39 % (95% CI 0.41 to 0.91, p=0.02) more likely to seek care immediately as compared to households in lower consumption quintiles. Similar patterns prevail for malaria and tetanus although not for diarrhea and tuberculosis.

The link between religion of the household head and the time of health care seeking behaviour varies across vignettes. For the case of child symptoms, Orthodox Christians are more likely to delay care than Muslims while the reverse is true for the adult vignettes. The effects of travel time do not show a clear pattern. Regional differences continue to remain pronounced. Almost, across all the vignettes households living in the Amhara and Tigray region display a greater propensity to seek care immediately as compared to households living in SNNPR. Differences are

particularly pronounced in the case of the Amahra region where households are at least 80 % (95% CI 0.13 to 0.31, p<0.0001) more likely to seek care immediately as opposed to households living in SNNPR (Table 4B).

Discussion

Ethiopia has invested substantially in its health care infrastructure in the last decade through the expansion of health posts and health centers.[4-6] Despite these investments, utilization of maternal and child care and more general outpatient utilization rates remain among the lowest in Sub-Saharan Africa.[7, 8] To gain an understanding of the factors responsible for driving a wedge between availability and utilization this paper relied on five context-relevant clinical vignettes for common child and adult conditions to probe whether households seek modern care, where they seek care and the timing of care-seeking behaviour.

The estimates suggest that the large majority of respondents recognize the severity of the symptoms described in the vignettes and prefer modern over traditional care and self-treatment. ~~This is especially the case for child related conditions and might be related to the health education campaigns that have taken place in recent years in the context of the Health Extension Program.~~This is surprising given the country's low socio-economic development and low educational stock.[22] A potential explanation may lie in the rapid and recent spread of health posts and health extension workers who since 2003 have been charged with the responsibility of raising awareness of health issues.[6] Indeed, the uniformity of health care seeking behaviour for child morbidity displayed across consumption quintiles suggests that information on health education and the appropriate course of action for the most common childhood diseases, which is the focus of the health extension program, seems to have percolated to the lowest socio-economic quintiles.

For adult related conditions, we do find variations across socioeconomic status with households in the highest consumption quintile two to three times more likely to seek modern care as compared to households in the lowest quintiles. These socioeconomic inequalities are also found in the choice of health care provider, and the timing of seeking care. Households in the lowest consumption quintiles are generally more likely to resort to lower level care and postpone seeking care compared to better off households. Taking the example of tuberculosis, which can only be properly treated in health centers and hospitals, we find that households in the upper consumption quintile are three times more likely to seek care in a hospital compared to those in the poorest. We also find variation in the timing of care seeking behaviour with respondents typically acting faster for child related conditions as compared to adult conditions.

There are differences in health care seeking behaviour across religion. Orthodox Christian households are more likely to seek modern care, to seek higher level modern care and seek care earlier (for adult conditions) as compared to Muslim headed households. While the reasons for this are not entirely clear, since the estimates control for socio economic status, education and ease of access to health care it is possible that the religion variables reflect different levels of confidence and trust in the health care system. This finding is not unique to this study. For instance, a study on maternal health seeking behaviour based on the Ethiopian Demographic and Health Survey finds that Muslim women are less likely to seek delivery and post natal care as compared to Orthodox women.[23]

There also appears to be considerable regional variation in health care seeking behaviour, with households in Amhara being most likely to seek (higher level) care, and those in SNNPR most likely to forego or delay seeking care. Since access to public health facilities in SNNPR seems to be at least at par or at times better as compared to other regions (see Appendix 3), it is likely that the lower probability of using care in SNNPR may be due to the limited implementation of the fee waiver system, which since 2008 has attempted to increase access for the "poorest of the poor", in this region as compared to Amhara and Oromiya regions.[24]

This paper adds to the literature on health care seeking behaviour and foregone care in Ethiopia using specific clinical vignettes which avoids the problem of reporting bias due to unperceived need for health care in low income settings.[11] While the use of such vignettes allows us to establish patterns of health care seeking behaviour across population groups that are not driven by differences in health status, there is the risk that reported hypothetical

health care seeking behaviour does not match actual health care seeking behaviour. However, the overwhelming reliance on modern care found in the actual utilization data (see Appendix 4) does suggest that results from the vignettes analysis are able to capture preferences and are not merely a result of the lack of understanding of the survey instrument. The consistency between hypothetical and actual behaviour reported is also supported by research done in other contexts. For instance, a study in the Netherlands shows a strong link between a reported tendency to consult a doctor and observed consultation rates.[25] Second, because the symptoms described in the vignettes are quite specific and severe, they might not pick up foregone care in relation to diseases that are more difficult to recognize or more chronic in nature. Third, while we have detailed information on individual and household (demand side) characteristics, we do not have information on health care supply, apart from the distance to health care facilities, which can be linked to the household data.

Notwithstanding these limitations, based on the empirical evidence assembled in the paper we tend to conclude that the low utilization rates in Ethiopia are unlikely to be linked to lack of awareness of the symptoms of the most common diseases or a low-perceived need for health care ~~but are more likely to be related to the quality and cost of available care.~~. ~~With regard to this,~~ tBy reducing the cost of care, the scaling-up of the recently introduced community-based health insurance scheme~~s~~ may play an important role in enhancing ~~reducing socioeconomic~~ access to health care. [26, 27]

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Tables

	Case vignette[a]				
	ARI/Pneumonia	Diarrhea	Malaria	Tetanus	Tuberculosis
Where to seek care					
Health post	41.17	33.56	21.72	24.80	20.02
Health center	50.00	56.63	62.02	59.05	60.57
Private clinic	4.05	5.64	6.63	6.63	5.96
Mission/NGO clinic	0.25	0.18	0.31	0.18	0.37
Public hospital	1.41	1.47	4.48	4.42	9.95
Private hospital	0.12	0.18	0.18	0.12	0.31
Mission/NGO hospital	0.06	0.06	0.18	0.06	0.00
Pharmacy/drug store	0.25	0.37	0.25	0.37	0.00
Religious healer	0.74	0.31	1.10	0.12	1.11
Traditional healer	0.80	1.04	1.84	1.78	0.68
Do nothing	1.17	0.55	1.47	2.46	1.04
N	1,630	1,630	1,630	1,629	1,628
When to seek care[b]					
Immediately	54.24	45.76	27.67	34.86	21.05
The next day	37.04	39.11	31.47	25.97	25.35
After two days	6.95	11.61	22.72	17.27	17.64
Between three and a week	1.33	2.64	12.42	11.86	12.77
After a week or more than a week	0.44	0.88	5.73	10.05	23.20
N	1,582	1,593	1,554	1,552	1,582

Notes: [a] All figures in the table are in %. [b] Only for respondents who use modern care (health post, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and Mission/NGO hospitals).

Table 1: Responses to the vignettes

VARIABLES	ARI/ Pneumonia		Diarrhea		Malaria		Tetanus		Tuberculosis	
	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value
Head sex										
Female	1.0		1.0		1.0		1.0		1.0	
Male	1.81 (0.67 to 4.85)	0.24	1.93 (0.58 to 6.45)	0.29	1.1 (0.48 to 2.54)	0.82	0.98 (0.43 to 2.24)	0.97	1.3 (0.85 to 1.99)	0.23
Head age	1 (0.97 to 1.03)	0.95	0.98 (0.94 to 1.02)	0.25	1.02 (0.99 to 1.05)	0.17	0.98 (0.96 to 1.01)	0.18	0.98 (0.97 to 1)	0.02
Head's education										
No education at all	1.0		1.0		1.0		1.0		1.0	
Informal education	0.75 (0.25 to 2.21)	0.60	0.3 (0.09 to 0.97)	0.05	0.38 (0.19 to 0.77)	0.01	1.32 (0.51 to 3.42)	0.57	1.01 (0.61 to 1.69)	0.96
Primary & higher	0.96 (0.45 to 2.04)	0.91	0.87 (0.34 to 2.24)	0.77	1.99 (1 to 3.94)	0.05	1.35 (0.71 to 2.56)	0.36	0.62 (0.44 to 0.87)	0.01
Religion of the head										
Muslim & other religions	1.0		1.0		1.0		1.0		1.0	
Orthodox Christian	2.61 (0.91 to 7.53)	0.08	1.21 (0.33 to 4.38)	0.78	3.7 (1.51 to 9.05)	0.00	2.19 (0.93 to 5.17)	0.07	2.52 (1.58 to 4.02)	0.00
Protestant	1.35 (0.47 to 3.93)	0.58	2.34 (0.7 to 7.85)	0.17	1.07 (0.38 to 2.98)	0.90	1.28 (0.49 to 3.3)	0.61	1.72 (1.01 to 2.94)	0.05
Household size	1.04 (0.84 to 1.28)	0.72	1.1 (0.85 to 1.43)	0.45	0.9 (0.77 to 1.06)	0.20	1.23 (1.02 to 1.48)	0.03	1.03 (0.95 to 1.12)	0.48
HH composition										
Prop. of male adults aged 16 to 64	1.0		1.0		1.0		1.0		1.0	
Prop. of children aged under 6	0.08 (0 to 1.53)	0.09	0.04 (0 to 1.12)	0.06	0.23 (0.02 to 2.45)	0.22	0.04 (0 to 0.36)	0.01	0.6 (0.18 to 1.99)	0.41
Prop. of males aged 6 to 15	0.86 (0.05 to 15.75)	0.92	0.26 (0.01 to 6.38)	0.41	0.41 (0.04 to 3.93)	0.44	0.16 (0.02 to 1.43)	0.10	1.39 (0.44 to 4.4)	0.58
Prop. of females aged 6 to 15	0.03 (0 to 0.53)	0.02	1.09 (0.03 to 37.62)	0.96	0.89 (0.08 to 9.73)	0.92	0.45 (0.04 to 4.65)	0.50	1.11 (0.34 to 3.66)	0.87
Prop. of females aged 16 to 64	1.5 (0.04 to 50.24)	0.82	1.12 (0.02 to 66.43)	0.96	0.11 (0.01 to 1.49)	0.10	1.82 (0.12 to 28.57)	0.67	0.42 (0.13 to 1.4)	0.16
Prop. of elderly aged above 64	0.14 (0.01 to 3.43)	0.23	0.14 (0 to 4.55)	0.27	0.03 (0 to 0.32)	0.00	0.58 (0.05 to 6.95)	0.67	0.65 (0.17 to 2.46)	0.52
HH health status										
Prop. of households with good SAH	1.0		1.0		1.0		1.0		1.0	
Prop. of household with fair & low SAH	2.58 (0.71 to 9.33)	0.15	2.17 (0.48 to 9.76)	0.31	2.26 (0.8 to 6.38)	0.12	2.09 (0.81 to 5.39)	0.13	1.04 (0.69 to 1.57)	0.86
Consumption quintiles										
Poorest quintile	1.0		1.0		1.0		1.0		1.0	
2nd quintile	3.01 (0.95 to 9.58)	0.06	2.93 (0.86 to 9.93)	0.09	2.15 (1.02 to 4.52)	0.04	1.48 (0.68 to 3.24)	0.33	2.34 (1.57 to 3.47)	0.00
3rd quintile	1.66 (0.59 to 4.68)	0.34	1.5 (0.5 to 4.51)	0.47	1.85 (0.84 to 4.09)	0.13	1 (0.46 to 2.18)	0.99	2.27 (1.49 to 3.46)	0.00
4th quintile	0.84 (0.34 to 2.09)	0.71	1.27 (0.4 to 4.08)	0.68	3.38 (1.37 to 8.35)	0.01	1.28 (0.55 to 2.97)	0.56	3.63 (2.26 to 5.83)	0.00
Richest quintile	0.8 (0.3 to 2.12)	0.65	3.33 (0.78 to 14.33)	0.11	2.13 (0.89 to 5.08)	0.09	1 (0.42 to 2.38)	1.00	2.53 (1.55 to 4.12)	0.00
Trust in modern heath care										
Disagree	1.0		1.0		1.0		1.0		1.0	

Agree	1.3 (0.5 to 3.42)	0.59	2.08 (0.71 to 6.15)	0.18	3.59 (1.79 to 7.24)	0.00	2.47 (1.19 to 5.15)	0.02	0.45 (0.27 to 0.76)	0.00
Neither agree nor disagree	0.63 (0.18 to 2.19)	0.47	0.63 (0.17 to 2.35)	0.49	0.66 (0.28 to 1.55)	0.34	0.37 (0.15 to 0.88)	0.03	0.2 (0.1 to 0.39)	0.00
Access to public infrastructure										
Water using from public sources										
No	1.0		1.0		1.0		1.0		1.0	
Yes	0.92 (0.48 to 1.76)	0.80	0.86 (0.39 to 1.9)	0.70	1.28 (0.75 to 2.18)	0.37	1.05 (0.61 to 1.8)	0.87	0.97 (0.72 to 1.31)	0.86
Use electricity										
No	1.0		1.0		1.0		1.0		1.0	
Yes	4.33 (0.54 to 34.81)	0.17	2.22 (0.26 to 18.7)	0.46	0.93 (0.32 to 2.71)	0.90	1.27 (0.4 to 3.98)	0.69	2.58 (1.3 to 5.11)	0.01
Access to TV signal										
Yes	1.0		1.0		1.0		1.0		1.0	
No	1.26 (0.6 to 2.62)	0.54	2.61 (1.07 to 6.35)	0.04	1.16 (0.64 to 2.09)	0.63	0.81 (0.44 to 1.49)	0.50	0.68 (0.48 to 0.97)	0.03
Access to mobile signal										
Yes	1.0		1.0		1.0		1.0		1.0	
No	1.03 (0.45 to 2.36)	0.95	0.92 (0.34 to 2.51)	0.87	1.21 (0.63 to 2.32)	0.56	1.3 (0.65 to 2.6)	0.46	1.02 (0.68 to 1.53)	0.92
Travel time to the nearest health post (in minutes)	1 (0.99 to 1.02)	0.73	0.99 (0.97 to 1.01)	0.34	1.02 (1 to 1.03)	0.03	1.01 (0.99 to 1.02)	0.21	1.01 (1 to 1.01)	0.13
Travel time to the nearest health center (in minutes)	1 (0.99 to 1.01)	0.47	1.01 (1 to 1.02)	0.16	0.99 (0.99 to 1)	0.12	1 (0.99 to 1)	0.23	0.99 (0.99 to 1)	0.00
Travel time to the nearest public hospital (in minutes)	0.99 (0.99 to 1)	0.02	0.99 (0.99 to 1)	0.01	0.99 (0.99 to 1)	0.03	1 (0.99 to 1)	0.16	1 (1 to 1)	0.05
Regions										
SNNPR	1.0		1.0		1.0		1.0		1.0	
Tigray	3.6 (0.73 to 17.82)	0.12	11.88 (2.17 to 64.97)	0.00	1.42 (0.37 to 5.48)	0.62	3.15 (0.89 to 11.16)	0.08	0.7 (0.38 to 1.28)	0.25
Amhara	4.27 (1.11 to 16.38)	0.03	15.41 (3.42 to 69.52)	0.00	1.55 (0.52 to 4.62)	0.43	2.65 (0.94 to 7.49)	0.07	4.95 (2.76 to 8.88)	0.00
Oromiya	3.06 (0.91 to 10.33)	0.07	13.16 (2.6 to 66.66)	0.00	2.48 (0.79 to 7.8)	0.12	5.59 (1.85 to 16.9)	0.00	8.46 (4.49 to 15.95)	0.00
Pseudo R^2	0.147		0.21		0.178		0.156		0.195	
N	1,546		1,546		1,546		1,545		1,545	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals and other care option includes do nothing, traditional healers, religious healers, and pharmacies/drug stores. In the case of tuberculosis, health posts are included as part of the other care option.

Table 2: Probability of seeking modern care – Odds ratios based on logit specifications

VARIABLES	ARI/ Pneumonia				Diarrhea			
	Health center		Hospital/clinic		Health center		Hospital/clinic	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head's education								
No education at all	1.00		1.00		1.00		1.00	
Informal education	1.62 (1.07 to 2.46)	0.02	0.76 (0.33 to 1.77)	0.52	1.31 (0.85 to 2.01)	0.23	0.44 (0.18 to 1.07)	0.07
Primary & higher	1.25 (0.92 to 1.68)	0.15	0.61 (0.34 to 1.1)	0.10	0.89 (0.66 to 1.2)	0.45	0.6 (0.35 to 1.02)	0.06
Religion of the head								
Muslim & other religions	1.00		1.00		1.00		1.00	
Orthodox Christian	2.92 (2.05 to 4.16)	0.00	4.22 (2.25 to 7.9)	0.00	3.06 (2.1 to 4.47)	0.00	3.67 (2.05 to 6.57)	0.00
Protestant	1.73 (0.99 to 3.02)	0.06	0.6 (0.26 to 1.41)	0.24	1.98 (1.14 to 3.44)	0.02	0.71 (0.3 to 1.65)	0.42
Consumption quintiles								
Poorest quintile	1.00		1.00		1.00		1.00	
2nd quintile	1.44 (0.98 to 2.12)	0.06	2.43 (1.05 to 5.62)	0.04	1.48 (1.01 to 2.17)	0.04	2.48 (1.17 to 5.24)	0.02
3rd quintile	1.38 (0.93 to 2.05)	0.11	2.63 (1.1 to 6.31)	0.03	1.66 (1.11 to 2.48)	0.01	2.21 (0.99 to 4.95)	0.05
4th quintile	1.42 (0.94 to 2.14)	0.10	2.96 (1.21 to 7.22)	0.02	1.39 (0.92 to 2.1)	0.12	2.73 (1.25 to 5.99)	0.01
Richest quintile	1.4 (0.89 to 2.2)	0.15	4.38 (1.75 to 10.97)	0.00	1.46 (0.93 to 2.29)	0.10	2.63 (1.12 to 6.16)	0.03
Access to public infrastructure								
Water using from public sources								
No	1.00		1.00		1.00		1.00	
Yes	1.38 (1.06 to 1.8)	0.02	0.64 (0.38 to 1.09)	0.10	1.11 (0.85 to 1.45)	0.44	0.65 (0.4 to 1.06)	0.08
Use electricity								
No	1.00		1.00		1.00		1.00	
Yes	4.51 (2.41 to 8.47)	0.00	5.2 (1.9 to 14.21)	0.00	3.96 (2.06 to 7.62)	0.00	5.58 (2.13 to 14.62)	0.00
Access to TV signal								
Yes	1.00		1.00		1.00		1.00	
No	0.88 (0.65 to 1.2)	0.43	0.77 (0.42 to 1.42)	0.41	0.76 (0.55 to 1.04)	0.08	0.93 (0.54 to 1.62)	0.80
Access to mobile signal								
Yes	1.00		1.00		1.00		1.00	
No	1.81 (1.28 to 2.56)	0.00	0.85 (0.45 to 1.61)	0.63	0.93 (0.65 to 1.33)	0.67	0.3 (0.17 to 0.52)	0.00
Travel time to the nearest health post (in minutes)	1.01 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.72	1.02 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.78
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 0.99)	0.00	1 (1 to 1.01)	0.53	0.99 (0.99 to 1)	0.00	1 (1 to 1.01)	0.25

Travel time to the nearest public hospital (in minutes)	1 (1 to 1)	0.24	0.99 (0.99 to 1)	0.03	1 (1 to 1)	0.56	0.99 (0.99 to 1)	0.00
Regions								
SNNPR	1.00		1.00		1.00		1.00	
Tigray	0.39 (0.21 to 0.72)	0.00	0.03 (0.01 to 0.11)	0.00	0.41 (0.23 to 0.76)	0.00	0.04 (0.01 to 0.13)	0.00
Amhara	5.64 (3.15 to 10.11)	0.00	0.54 (0.23 to 1.29)	0.17	4.28 (2.4 to 7.63)	0.00	1.08 (0.46 to 2.55)	0.86
Oromiya	2.23 (1.26 to 3.97)	0.01	0.28 (0.12 to 0.66)	0.00	3.2 (1.8 to 5.69)	0.00	1.06 (0.46 to 2.44)	0.90
Pseudo R^2			0.1758				0.1761	
N			1,527				1,537	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. The outcomes also include other care options (include do nothing, traditional healers, religious healers, and pharmacies/drug stores) and estimates for this outcome are reported in Appendix 5A and 5B. Models also control for demographics, household health status, trust in modern care (as in Table 2).

Table 3A: Probability of seeking care for ARI/pneumonia and diarrhea– Relative risk ratios, based on multinomial logit specifications

VARIABLES	Malaria				Tetanus				Tuberculosis	
	Health center		Hospital		Health center		Hospital		Hospital	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head's education										
No education at all	1.00		1.00		1.00		1.00		1.00	
Informal education	1.55 (0.88 to 2.73)	0.13	1.55 (0.62 to 3.92)	0.35	1.14 (0.71 to 1.84)	0.59	0.58 (0.23 to 1.5)	0.27	1.26 (0.75 to 2.13)	0.38
Primary & higher	0.71 (0.5 to 1)	0.05	0.99 (0.49 to 2.01)	0.97	0.81 (0.58 to 1.14)	0.23	0.7 (0.35 to 1.42)	0.32	0.9 (0.56 to 1.46)	0.67
Religion of the head										
Muslim & other religions	1.00		1.00		1.00		1.00		1.00	
Orthodox Christian	2.45 (1.53 to 3.94)	0.00	0.72 (0.34 to 1.55)	0.41	2.75 (1.77 to 4.27)	0.00	0.68 (0.32 to 1.44)	0.31	0.16 (0.1 to 0.27)	0.00
Protestant	2.35 (1.29 to 4.26)	0.01	0.35 (0.09 to 1.37)	0.13	1.97 (1.09 to 3.54)	0.02	0.26 (0.06 to 1.09)	0.07	0.14 (0.05 to 0.39)	0.00
Consumption quintiles										
Poorest quintile	1.00		1.00		1.00		1.00		1.00	
2nd quintile	1.99 (1.32 to 3.01)	0.00	3.36 (1.05 to 10.78)	0.04	1.79 (1.2 to 2.67)	0.01	7.39 (1.47 to 37.25)	0.02	1.81 (0.79 to 4.15)	0.16
3rd quintile	2.23 (1.43 to 3.48)	0.00	4.8 (1.52 to 15.2)	0.01	1.62 (1.06 to 2.49)	0.03	11.48 (2.36 to 55.8)	0.00	2.22 (0.97 to 5.06)	0.06
4th quintile	2.57 (1.59 to 4.17)	0.00	8.62 (2.78 to 26.76)	0.00	2.7 (1.68 to 4.33)	0.00	28.87 (5.99 to 139.06)	0.00	3.47 (1.55 to 7.75)	0.00
Richest quintile	1.99 (1.19 to 3.33)	0.01	5.16 (1.53 to 17.37)	0.01	1.82 (1.11 to 2.98)	0.02	9.32 (1.78 to 48.69)	0.01	2.95 (1.26 to 6.91)	0.01
Access to public infrastructure										
Water using from public sources										
No	1.00		1.00		1.00		1.00		1.00	
Yes	1.08 (0.79 to 1.47)	0.65	0.47 (0.25 to 0.89)	0.02	1.02 (0.76 to 1.38)	0.88	0.34 (0.18 to 0.66)	0.00	0.56 (0.37 to 0.84)	0.01
Use electricity										
No	1.00		1.00		1.00		1.00		1.00	
Yes	3.83 (1.73 to 8.5)	0.00	6.23 (1.9 to 20.39)	0.00	2.34 (1.22 to 4.47)	0.01	3.68 (1.09 to 12.42)	0.04	1.43 (0.76 to 2.69)	0.26
Access to TV signal										
Yes	1.00		1.00		1.00		1.00		1.00	
No	0.47 (0.32 to 0.69)	0.00	2.14 (0.99 to 4.61)	0.05	0.59 (0.41 to 0.84)	0.00	2.14 (0.99 to 4.61)	0.05	1.24 (0.8 to 1.94)	0.34
Access to mobile signal										
Yes	1.00		1.00		1.00		1.00		1.00	
No	1.35 (0.87 to 2.09)	0.17	0.44 (0.21 to 0.92)	0.03	1.17 (0.78 to 1.77)	0.44	0.39 (0.19 to 0.83)	0.01	0.76 (0.48 to 1.2)	0.24
Travel time to the nearest health post (in minutes)	1.01 (1 to 1.02)	0.00	1 (0.99 to 1.02)	0.82	1.02 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.63	1 (0.99 to 1.01)	0.53
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 0.99)	0.00	1 (0.99 to 1.01)	0.83	0.99 (0.99 to 0.99)	0.00	1 (0.99 to 1.01)	0.68	1 (1 to 1.01)	0.38
Travel time to the nearest public	1 (1 to 1.01)	0.03	1 (1 to 1.01)	0.32	1 (1 to 1)	0.03	1 (0.99 to 1)	0.47	1 (0.99 to 1)	0.17

hospital (in minutes)										
Regions										
SNNPR	1.00		1.00		1.00		1.00		1.00	
Tigray	0.87 (0.45 to 1.67)	0.68	0.57 (0.14 to 2.4)	0.44	0.8 (0.43 to 1.52)	0.50	0.73 (0.18 to 2.96)	0.66	1.26 (0.44 to 3.61)	0.67
Amhara	4.98 (2.65 to 9.37)	0.00	3.01 (0.9 to 10.1)	0.07	3.95 (2.17 to 7.21)	0.00	1.55 (0.46 to 5.28)	0.48	0.93 (0.38 to 2.25)	0.86
Oromiya	10.47 (5.26 to 20.83)	0.00	3.72 (1.07 to 12.97)	0.04	10.56 (5.37 to 20.77)	0.00	4.22 (1.23 to 14.4)	0.02	0.59 (0.24 to 1.47)	0.26
Pseudo R^2			0.192			0.199			0.176	
N			1,523			1,507			1,545	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the case of tuberculosis, the reference outcome is health posts. In case of tuberculosis, the reference outcome is health center. The outcomes also include clinic and other care options and estimates for these outcomes are reported in Appendix 5C to 5E. Except for the case of tuberculosis, the other care option includes do nothing, traditional healers, religious healers, and pharmacies/drug stores. In the case of tuberculosis, health posts are included as part of the other care option. Models also control for demographics, household health status, trust in modern care (as in Table 2).

Table 3B: Probability of seeking care for malaria, tetanus, and tuberculosis – Relative risk ratios based on multinomial logit specifications

VARIABLES	ARI/ Pneumonia		Diarrhea	
	OR (95%CI)	*p* value	OR (95%CI)	*p* value
Head's education				
No education at all	1.00		1.00	
Informal education	0.99 (0.7 to 1.41)	0.97	0.89 (0.64 to 1.24)	0.49
Primary & higher	0.78 (0.6 to 1.01)	0.06	0.66 (0.51 to 0.84)	0.00
Consumption quintiles				
Poorest quintile	1.00		1.00	
2nd quintile	0.94 (0.68 to 1.29)	0.69	0.84 (0.61 to 1.15)	0.27
3rd quintile	0.81 (0.57 to 1.14)	0.22	0.93 (0.67 to 1.3)	0.67
4th quintile	0.65 (0.45 to 0.93)	0.02	0.84 (0.59 to 1.18)	0.32
Richest quintile	0.61 (0.41 to 0.91)	0.02	1 (0.69 to 1.45)	0.99
Trust in modern heath care				
Disagree	1.00		1.00	
Agree	1.47 (0.98 to 2.22)	0.07	1.46 (1 to 2.13)	0.05
Neither agree nor disagree	1.7 (0.98 to 2.96)	0.06	1.18 (0.7 to 1.99)	0.54
Access to public infrastructure				
Water using from public sources				
No	1.00		1.00	
Yes	0.76 (0.6 to 0.96)	0.02	1.01 (0.81 to 1.25)	0.94
Use electricity				
No	1.00		1.00	
Yes	0.63 (0.38 to 1.03)	0.07	0.65 (0.41 to 1.01)	0.06
Access to TV signal				
Yes	1.00		1.00	
No	0.72 (0.54 to 0.96)	0.03	0.48 (0.37 to 0.63)	0.00
Access to mobile signal				
Yes	1.00		1.00	
No	1.17 (0.86 to 1.6)	0.31	0.92 (0.69 to 1.22)	0.56
Travel time to the nearest health post (in minutes)	0.99 (0.99 to 1)	0.06	0.99 (0.99 to 1)	0.01
Travel time to the nearest health center (in minutes)	1 (0.99 to 1)	0.02	1 (1 to 1)	0.26
Travel time to the nearest public hospital (in minutes)	1 (1 to 1.01)	0.00	1 (1 to 1)	0.35
Religion of the head				
Muslim & other religions	1.00		1.00	
Orthodox Christian	1.95 (1.43 to 2.65)	0.00	1.23 (0.93 to 1.63)	0.15
Protestant	0.94 (0.6 to 1.49)	0.81	1.05 (0.68 to 1.64)	0.81
Regions				
SNNPR	1.00		1.00	
Tigray	0.29 (0.17 to 0.47)	0.00	0.66 (0.41 to 1.06)	0.09
Amhara	0.1 (0.06 to 0.17)	0.00	0.18 (0.11 to 0.28)	0.00
Oromiya	0.37 (0.23 to 0.6)	0.00	0.93 (0.59 to 1.45)	0.74
Pseudo R^2	0.081		0.063	
N	1,502		1,518	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals.

Table 4A: When to seek modern care for ARI/pneumonia and diarrhea – Odds ratios based on ordered logit specifications

VARIABLES	Malaria		Tetanus		Tuberculosis	
	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value
Head's education						
No education at all	1.00		1.00		1.00	
Informal education	0.94 (0.68 to 1.28)	0.68	0.81 (0.59 to 1.11)	0.19	1.57 (1.12 to 2.18)	0.01
Primary & higher	0.66 (0.52 to 0.84)	0.00	0.81 (0.64 to 1.02)	0.08	1 (0.77 to 1.31)	0.97
Consumption quintiles						
Poorest quintile	1.00		1.00		1.00	
2nd quintile	1.09 (0.8 to 1.47)	0.59	0.99 (0.73 to 1.32)	0.93	0.94 (0.66 to 1.35)	0.75
3rd quintile	0.84 (0.61 to 1.15)	0.27	0.65 (0.47 to 0.88)	0.01	0.91 (0.63 to 1.32)	0.62
4th quintile	0.55 (0.39 to 0.77)	0.00	0.52 (0.37 to 0.71)	0.00	0.83 (0.57 to 1.2)	0.32
Richest quintile	0.63 (0.44 to 0.9)	0.01	0.48 (0.34 to 0.68)	0.00	1.02 (0.67 to 1.54)	0.93
Trust in modern heath care						
Disagree	1.00		1.00		1.00	
Agree	0.83 (0.58 to 1.18)	0.30	0.82 (0.58 to 1.17)	0.28	1.7 (1.16 to 2.49)	0.01
Neither agree nor disagree	0.44 (0.27 to 0.72)	0.00	0.59 (0.36 to 0.98)	0.04	0.8 (0.45 to 1.42)	0.45
Access to public infrastructure						
Water using from public sources						
No	1.00		1.00		1.00	
Yes	0.76 (0.62 to 0.94)	0.01	0.79 (0.64 to 0.98)	0.03	0.92 (0.73 to 1.16)	0.46
Use electricity						
No	1.00		1.00		1.00	
Yes	1.1 (0.73 to 1.66)	0.64	0.67 (0.44 to 1.04)	0.08	0.95 (0.62 to 1.46)	0.82
Access to TV signal						
Yes	1.00		1.00		1.00	
No	0.5 (0.38 to 0.64)	0.00	0.55 (0.43 to 0.71)	0.00	0.46 (0.34 to 0.61)	0.00
Access to mobile signal						
Yes	1.00		1.00		1.00	
No	1.22 (0.93 to 1.6)	0.15	1.21 (0.93 to 1.59)	0.16	2.13 (1.58 to 2.88)	0.00
Travel time to the nearest health post (in minutes)	0.99 (0.99 to 1)	0.02	1.01 (1 to 1.01)	0.03	1 (1 to 1.01)	0.73
Travel time to the nearest health center (in minutes)	1 (1 to 1)	0.16	1 (1 to 1)	0.89	1 (1 to 1)	0.91
Travel time to the nearest public hospital (in minutes)	1 (1 to 1)	0.00	1 (1 to 1)	0.01	1 (1 to 1.01)	0.00
Religion of the head						
Muslim & other religions	1.00		1.00		1.00	
Orthodox Christian	0.69 (0.53 to 0.91)	0.01	0.64 (0.49 to 0.84)	0.00	0.42 (0.32 to 0.56)	0.00
Protestant	0.76 (0.49 to 1.19)	0.23	0.69 (0.45 to 1.07)	0.09	0.64 (0.36 to 1.14)	0.13
Regions						
SNNPR	1.00		1.00		1.00	
Tigray	0.49 (0.31 to 0.78)	0.00	0.45 (0.29 to 0.72)	0.00	0.41 (0.22 to 0.76)	0.01
Amhara	0.16 (0.1 to 0.25)	0.00	0.2 (0.13 to 0.31)	0.00	0.12 (0.06 to 0.21)	0.00
Oromiya	1.2 (0.77 to 1.87)	0.42	1.02 (0.66 to 1.58)	0.92	0.88 (0.49 to 1.57)	0.66
Pseudo R^2	0.064		0.052		0.088	
N	1,475		1,477		1,192	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals. In the case of tuberculosis, health posts are not included as part of the modern care option.

Table 4B: When to seek modern care for malaria, tetanus and tuberculosis – Odds ratios based on ordered logit specifications

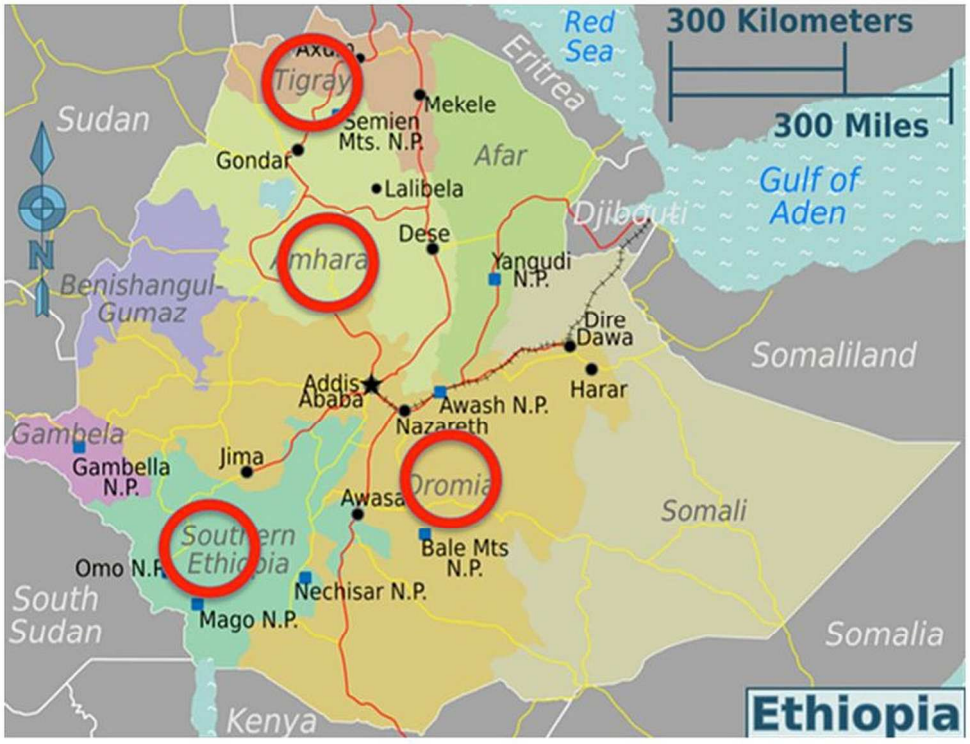

Figure 1: Location of the survey regions

106x90mm (300 x 300 DPI)

Appendix 1: Clinical Vignettes

1. Vignette 1: A 3 month old baby, who has always been healthy and playful, has been coughing quite a lot in the last few days and is breathing rapidly. The baby has difficulty sleeping because of this cough.
   1a. What would you do? (code 1) [If 11 go to 2]
   1b. When would you take the baby to this facility? (code 2)

2. Vignette 2: A 1 year old girl, generally in good health, has diarrhea for 3 days now. She is still drinking some fluids, but since this morning, she's feeling sleepy and doesn't want to play.
   2a. What would you do? (code 1) [If 11 go to 3]
   2b. When would you take the girl to this facility? (code 2)

3. Vignette 3: A 20 year old male has always been healthy. For the last week, he has episodes of sudden coldness followed by rigor and then fever and sweating. These episodes occur about every two days. In between episodes he can still do some light housework.
   3a. What would you do? (code 1) [If 11 go to 4]
   3b. When would you go to this facility? (code 2)

4. Vignette 4: A 25 year old male has got a small cut in his leg when working on the field three days ago. The wound has become red and from time to time he feels a throbbing pain in his leg, but he can still walk around and do some work.
   4a. What would you do? (code 1) [If 11 go to 5]
   4b. When would you go to this facility? (code 2)

5. Vignette 5: A 35 year old female has been coughing for three weeks now. She feels more tired than usual but can still do some housework. Her relatives think she looks thinner than a few weeks ago.
   5a. What would you do? (code 1)
   5b. When would you go to this facility? (code 2)

Code 1
1=go to Health post
2=go to Health center
3=go to Private clinic
4=go to Mission/NGO clinic
5=go to Public hospital
6=go to Private hospital
7=go to Mission/NGO hospital
8=go to Pharmacy/drug store
9=go to religious healer
10= go to traditional healer
11=do nothing

Code 2
1=immediately
2=the next day if symptoms continue
3=after two days if symptoms continue
4=between three days and a week if symptoms continue
5=after a week if symptoms continue
6=after more than a week if symptoms continue

Characteristics	Region				Total sample	N
	Tigray	Amhara	Oromiya	SNNPR		
Male headed households (1/0)	0.72	0.91	0.91	0.90	0.86	1,632
Age of the household heads (years)	48.01	47.64	44.01	45.25	46.23	1,631
Head's education (1/0)						
No education at all	0.59	0.43	0.46	0.38	0.47	1,631
Informal education	0.08	0.26	0.14	0.03	0.13	1,631
Primary	0.31	0.29	0.36	0.49	0.36	1,631
Secondary or postsecondary	0.01	0.02	0.04	0.10	0.04	1,631
Religion of the head (1/0)						
Orthodox Christian	0.99	0.50	0.49	0.10	0.52	1,632
Protestant	0.00	0.00	0.02	0.76	0.19	1,632
Muslim	0.01	0.50	0.49	0.05	0.26	1,632
Other religion or no religion	0.00	0.00	0.00	0.10	0.03	1,632
HH size (number of persons)	5.17	5.69	5.91	6.40	5.79	1,632
Household composition						
Proportion of children aged under 6	0.15	0.13	0.17	0.14	0.15	1,632
Proportion of males aged 6 to 15	0.15	0.15	0.18	0.16	0.16	1,632
Proportion of females aged 6 to 15	0.14	0.15	0.14	0.16	0.15	1,632
Proportion of males aged 16 to 64	0.22	0.26	0.24	0.26	0.25	1,632
Proportion of females aged 16 to 64	0.26	0.26	0.24	0.25	0.25	1,632
Proportion of elderly aged above 64	0.08	0.05	0.03	0.03	0.05	1,632
Self-assessed health status (SAH)						
Proportion of household members with good SAH	0.70	0.74	0.93	0.79	0.79	1,632
Proportion of household members with fair SAH	0.24	0.22	0.05	0.15	0.17	1,632
Proportion of household members with low SAH	0.05	0.04	0.01	0.06	0.04	1,632
Consumption quintiles (1/0)						
Poorest quintile	0.22	0.15	0.06	0.37	0.20	1,593
2nd quintile	0.26	0.21	0.11	0.22	0.20	1,593
3rd quintile	0.22	0.22	0.21	0.15	0.20	1,593
4th quintile	0.14	0.24	0.29	0.12	0.20	1,593
Richest quintile	0.16	0.17	0.33	0.14	0.20	1,593
Modern care can be trusted (1/0)						
Disagree	0.14	0.05	0.06	0.08	0.08	1,627
Neither agree nor disagree	0.07	0.03	0.09	0.06	0.06	1,627
Agree	0.80	0.92	0.85	0.86	0.85	1,627
Access to public infrastructure						
Water using from public sources (1/0)	0.77	0.57	0.34	0.67	0.59	1,631
Use electricity (1/0)	0.06	0.15	0.02	0.06	0.07	1,626
No TV signal (1/0)	0.80	0.53	0.81	0.68	0.70	1,631
No mobile signal (1/0)	0.92	0.73	0.74	0.78	0.79	1,632
Travel time to the nearest health post (in minutes)	34.54	31.2	24.65	21.36	27.81	1,599
Travel time to the nearest health center (in minutes)	74.38	65.65	63.92	54.68	64.66	1,632
Travel time to the nearest public hospital (in minutes)	140.87	116.83	96.31	88.68	110.65	1,631

Appendix 2: Means of covariates

Region	Hospitals		Health center (HC)		Health post (HP)		Primary health care coverage
	N	Hospital-Pop. Ratio	N	HC-Pop. Ratio	N	HP-Pop. Ratio	
Tigray	14	1:340,168	183	1:26,024	552	1:8627	58.0
Amhara	19	1:969,200	724	1:25,435	3,093	1:5954	84.0
Oromia	41	1:742,648	991	1:30,725	6,053	1:5030	99.4
SNNPR	20	1:843,242	513	1:32,875	3,603	1:4681	106.8
National	122	1:671,402	2,660	1:30,794	15,095	1:5426	92.1

Appendix 3: Regional distribution of health facilities in 2011

Source: Ethiopian health and health related indicator statistics obtained from the Ethiopian Federal Ministry of Health (FMoH).

Health care use indicator	%
Obtained health care conditional on illness/injury (percent of those reporting illness/injury)	69.58
Source of care (percent who report conditional on illness/injury)	
Health post	7.42
Health center	50.65
Private clinic	18.49
Mission/NGO clinic	0.78
Public hospital	8.98
Private hospital	1.56
Mission/NGO hospital	0.91
Pharmacy/drug store	4.04
Religious healer	0.52
Traditional healer	2.99
At home	2.47
Neighbor's home	0.26
Other	0.91

Notes: Table shows outpatient health care utilization for the sample of household members reporting illness/injury in the two months preceding the survey (N=1161)

Appendix 4: Outpatient care utilization

VARIABLES	Health center		Public/Private/ NGO hospital/clinic		Other care options	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head sex	1.02 (0.69 to 1.52)	0.92	2.23 (0.83 to 6.02)	0.11	0.76 (0.22 to 2.64)	0.67
Head age	0.99 (0.98 to 1)	0.19	1 (0.97 to 1.03)	0.98	1.01 (0.97 to 1.05)	0.75
Head's education (ref: no education at all)						
Informal education	1.62 (1.07 to 2.46)	0.02	0.76 (0.33 to 1.77)	0.52	0.81 (0.16 to 4.1)	0.80
Primary & higher	1.25 (0.92 to 1.68)	0.15	0.61 (0.34 to 1.1)	0.10	0.53 (0.19 to 1.43)	0.21
Household size	1.07 (0.98 to 1.15)	0.12	1.02 (0.87 to 1.19)	0.85	0.96 (0.73 to 1.26)	0.76
HH composition (ref: Prop. of male adults aged 16 to 64)						
Prop. of children aged under 6	0.25 (0.08 to 0.73)	0.01	0.48 (0.05 to 5.01)	0.54	23.11 (0.42 to 1279.6)	0.13
Prop. of males aged 6 to 15	0.7 (0.25 to 1.98)	0.51	3.84 (0.47 to 31.08)	0.21	8.08 (0.2 to 333.62)	0.27
Prop. of females aged 6 to 15	0.93 (0.32 to 2.73)	0.89	2.16 (0.23 to 20.73)	0.50	40.93 (0.91 to 1833.71)	0.06
Prop. of females aged 16 to 64	0.49 (0.16 to 1.53)	0.22	0.77 (0.06 to 9.95)	0.84	3.77 (0.05 to 258.91)	0.54
Prop. of elderly aged above 64	0.91 (0.26 to 3.19)	0.89	0.05 (0 to 2.43)	0.13	20.16 (0.38 to 1073.38)	0.14
HH health status (ref: Prop. of households with good SAH)						
Prop. of household with fair & low SAH	0.69 (0.46 to 1.02)	0.06	0.34 (0.12 to 0.94)	0.04	0.35 (0.07 to 1.63)	0.18
Consumption quintiles (ref: poorest quintile)						
2nd quintile	1.44 (0.98 to 2.12)	0.06	2.43 (1.05 to 5.62)	0.04	0.42 (0.11 to 1.68)	0.22
3rd quintile	1.38 (0.93 to 2.05)	0.11	2.63 (1.1 to 6.31)	0.03	0.88 (0.24 to 3.19)	0.84
4th quintile	1.42 (0.94 to 2.14)	0.10	2.96 (1.21 to 7.22)	0.02	1.62 (0.49 to 5.34)	0.42
Richest quintile	1.4 (0.89 to 2.2)	0.15	4.38 (1.75 to 10.97)	0.00	1.22 (0.32 to 4.68)	0.78
Trust in modern heath care (ref: disagree)						
Agree	0.66 (0.43 to 1.02)	0.06	0.71 (0.27 to 1.84)	0.48	0.41 (0.13 to 1.29)	0.13
Neither agree nor disagree	0.38 (0.2 to 0.7)	0.00	0.53 (0.13 to 2.09)	0.37	0.93 (0.21 to 4.16)	0.92
Access to public infrastructure						
Water using from public sources	1.38 (1.06 to 1.8)	0.02	0.64 (0.38 to 1.09)	0.10	1.02 (0.44 to 2.37)	0.97
Use electricity	4.51 (2.41 to 8.47)	0.00	5.2 (1.9 to 14.21)	0.00	0 (0 to .)	0.98
No TV signal	0.88 (0.65 to 1.2)	0.43	0.77 (0.42 to 1.42)	0.41	0.41 (0.16 to 1.05)	0.06
No mobile signal	1.81 (1.28 to 2.56)	0.00	0.85 (0.45 to 1.61)	0.63	0.82 (0.28 to 2.36)	0.71
Travel time to the nearest health post (in minutes)	1.01 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.72	1.01 (0.99 to 1.03)	0.26
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 0.99)	0.00	1 (1 to 1.01)	0.53	0.99 (0.98 to 1)	0.27
Travel time to the nearest public hospital (in minutes)	1 (1 to 1)	0.24	0.99 (0.99 to 1)	0.03	1.01 (1 to 1.02)	0.00
Religion of the head (ref: Muslim & other religions)						
Orthodox Christian	2.92 (2.05 to 4.16)	0.00	4.22 (2.25 to 7.9)	0.00	1.9 (0.5 to 7.3)	0.35
Protestant	1.73 (0.99 to 3.02)	0.06	0.6 (0.26 to 1.41)	0.24	1.26 (0.28 to 5.62)	0.76
Regions(ref: SNNPR)						
Tigray	0.39 (0.21 to 0.72)	0.00	0.03 (0.01 to 0.11)	0.00	0.06 (0.01 to 0.43)	0.01
Amhara	5.64 (3.15 to 10.11)	0.00	0.54 (0.23 to 1.29)	0.17	0.58 (0.11 to 2.93)	0.51
Oromiya	2.23 (1.26 to 3.97)	0.01	0.28 (0.12 to 0.66)	0.00	0.1 (0.01 to 0.76)	0.03
Pseudo R^2					0.1758	
N					1,527	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5A: Probability of seeking care for ARI/pneumonia– Relative risk ratios, based on multinomial logit specifications

VARIABLES	Health center		Public/Private/ NGO hospital/clinic		Other care options	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head sex	0.95 (0.64 to 1.41)	0.79	1.36 (0.56 to 3.29)	0.50	1.11 (0.22 to 5.7)	0.90
Head age	0.99 (0.98 to 1)	0.07	0.99 (0.96 to 1.02)	0.42	1.01 (0.97 to 1.06)	0.62
Head's education (ref: no education at all)						
Informal education	1.31 (0.85 to 2.01)	0.23	0.44 (0.18 to 1.07)	0.07	3.04 (0.65 to 14.25)	0.16
Primary & higher	0.89 (0.66 to 1.2)	0.45	0.6 (0.35 to 1.02)	0.06	0.94 (0.3 to 2.98)	0.92
Household size			1.14 (0.99 to 1.32)	0.07	0.97 (0.7 to 1.33)	0.83
HH composition (ref: Prop. of male adults aged 16 to 64)	1.07 (0.98 to 1.16)	0.11				
Prop. of children aged under 6	0.28 (0.1 to 0.85)	0.02	0.14 (0.02 to 1.15)	0.07	8.48 (0.11 to 650.03)	0.33
Prop. of males aged 6 to 15	0.77 (0.27 to 2.19)	0.62	0.84 (0.12 to 5.94)	0.87	5.47 (0.11 to 271.94)	0.39
Prop. of females aged 6 to 15	0.52 (0.18 to 1.54)	0.24	0.38 (0.05 to 2.91)	0.35	0.14 (0 to 18.09)	0.43
Prop. of females aged 16 to 64	0.66 (0.21 to 2.05)	0.47	0.55 (0.05 to 5.96)	0.63	2.65 (0.03 to 226.79)	0.67
Prop. of elderly aged above 64	0.82 (0.23 to 2.88)	0.76	0.11 (0 to 2.67)	0.17	34.99 (0.61 to 1992.14)	0.09
HH health status (ref: Prop. of households with good SAH)						
Prop. of household with fair & low SAH	0.75 (0.51 to 1.11)	0.15	0.44 (0.18 to 1.11)	0.08	0.42 (0.07 to 2.42)	0.33
Consumption quintiles (ref: poorest quintile)						
2nd quintile	1.48 (1.01 to 2.17)	0.04	2.48 (1.17 to 5.24)	0.02	0.49 (0.1 to 2.33)	0.37
3rd quintile	1.66 (1.11 to 2.48)	0.01	2.21 (0.99 to 4.95)	0.05	1.03 (0.25 to 4.31)	0.97
4th quintile	1.39 (0.92 to 2.1)	0.12	2.73 (1.25 to 5.99)	0.01	1.69 (0.41 to 6.95)	0.47
Richest quintile	1.46 (0.93 to 2.29)	0.10	2.63 (1.12 to 6.16)	0.03	0.58 (0.11 to 3.07)	0.52
Trust in modern heath care (ref: disagree)						
Agree	0.7 (0.45 to 1.1)	0.12	0.72 (0.3 to 1.75)	0.47	0.24 (0.06 to 0.91)	0.04
Neither agree nor disagree	0.35 (0.19 to 0.65)	0.00	0.56 (0.17 to 1.82)	0.34	0.97 (0.18 to 5.1)	0.97
Access to public infrastructure						
Water using from public sources	1.11 (0.85 to 1.45)	0.44	0.65 (0.4 to 1.06)	0.08	1.85 (0.66 to 5.15)	0.24
Use electricity	3.96 (2.06 to 7.62)	0.00	5.58 (2.13 to 14.62)	0.00	0 (0 to .)	0.99
No TV signal	0.76 (0.55 to 1.04)	0.08	0.93 (0.54 to 1.62)	0.80	0.37 (0.12 to 1.16)	0.09
No mobile signal	0.93 (0.65 to 1.33)	0.67	0.3 (0.17 to 0.52)	0.00	0.83 (0.24 to 2.85)	0.76
Travel time to the nearest health post (in minutes)	1.02 (1.01 to 1.02)	0.00	1 (0.99 to 1.02)	0.78	1.03 (1 to 1.05)	0.03
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 1)	0.00	1 (1 to 1.01)	0.25	0.98 (0.97 to 0.99)	0.01
Travel time to the nearest public hospital (in minutes)	1 (1 to 1)	0.56	0.99 (0.99 to 1)	0.00	1.01 (1.01 to 1.02)	0.00
Religion of the head (ref: Muslim & other religions)						
Orthodox Christian	3.06 (2.1 to 4.47)	0.00	3.67 (2.05 to 6.57)	0.00	1.2 (0.21 to 6.91)	0.84
Protestant	1.98 (1.14 to 3.44)	0.02	0.71 (0.3 to 1.65)	0.42	0.42 (0.1 to 1.72)	0.23
Regions(ref: SNNPR)						
Tigray	0.41 (0.23 to 0.76)	0.00	0.04 (0.01 to 0.13)	0.00	0.01 (0 to 0.15)	0.00
Amhara	4.28 (2.4 to 7.63)	0.00	1.08 (0.46 to 2.55)	0.86	0.11 (0.02 to 0.67)	0.02
Oromiya	3.2 (1.8 to 5.69)	0.00	1.06 (0.46 to 2.44)	0.90	0 (0 to .)	0.97
Pseudo R^2				0.1761		
N				1,537		

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5B: Probability of seeking care for diarrhea– Relative risk ratios based on multinomial logit specifications

VARIABLES	Health center		Private/ NGO clinic		Public/Private/ NGO hospital		Other care options	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head sex	1.1 (0.71 to 1.71)	0.67	1.29 (0.5 to 3.32)	0.60	1.87 (0.62 to 5.7)	0.27	1.03 (0.34 to 3.11)	0.96
Head age	0.99 (0.97 to 1)	0.14	1 (0.97 to 1.03)	0.89	0.99 (0.96 to 1.02)	0.41	0.95 (0.92 to 0.99)	0.01
Head's education (ref: no education at all)								
Informal education	1.55 (0.88 to 2.73)	0.13	1.06 (0.45 to 2.5)	0.89	1.55 (0.62 to 3.92)	0.35	6.45 (2.37 to 17.54)	0.00
Primary & higher	0.71 (0.5 to 1)	0.05	0.53 (0.29 to 0.95)	0.03	0.99 (0.49 to 2.01)	0.97	0.28 (0.11 to 0.72)	0.01
Household size	1.06 (0.97 to 1.16)	0.19	1.16 (1 to 1.35)	0.06	1.08 (0.9 to 1.29)	0.43	1.29 (1.06 to 1.57)	0.01
HH composition (ref: Prop. of male adults aged 16 to 64)								
Prop. of children aged under 6	0.64 (0.19 to 2.18)	0.47	0.45 (0.05 to 4.4)	0.49	0.43 (0.03 to 5.29)	0.51	0.58 (0.02 to 13.91)	0.74
Prop. of males aged 6 to 15	1.26 (0.38 to 4.15)	0.71	2.73 (0.34 to 22.16)	0.35	1.91 (0.17 to 21.88)	0.60	4.23 (0.24 to 74.55)	0.32
Prop. of females aged 6 to 15	1.05 (0.31 to 3.6)	0.93	1.53 (0.17 to 13.58)	0.70	1.23 (0.1 to 15.49)	0.88	1.83 (0.09 to 39.14)	0.70
Prop. of females aged 16 to 64	0.72 (0.21 to 2.47)	0.60	0.23 (0.02 to 3.1)	0.27	0.62 (0.04 to 10.35)	0.74	13.12 (0.55 to 312.47)	0.11
Prop. of elderly aged above 64	0.63 (0.16 to 2.54)	0.51	0.41 (0.03 to 6.4)	0.53	3.33 (0.23 to 47.51)	0.38	331.77 (14.61 to 7533.88)	0.00
HH health status (ref: Prop. of households with good SAH)								
Prop. of household with fair & low SAH	0.94 (0.62 to 1.42)	0.75	0.96 (0.39 to 2.35)	0.93	0.47 (0.17 to 1.31)	0.15	0.13 (0.03 to 0.65)	0.01
Consumption quintiles (ref: poorest quintile)								
2nd quintile	1.99 (1.32 to 3.01)	0.00	3.98 (1.74 to 9.11)	0.00	3.36 (1.05 to 10.78)	0.04	0.86 (0.32 to 2.28)	0.76
3rd quintile	2.23 (1.43 to 3.48)	0.00	3.7 (1.55 to 8.81)	0.00	4.8 (1.52 to 15.2)	0.01	0.8 (0.26 to 2.5)	0.70
4th quintile	2.57 (1.59 to 4.17)	0.00	4.2 (1.72 to 10.23)	0.00	8.62 (2.78 to 26.76)	0.00	0.82 (0.25 to 2.64)	0.74
Richest quintile	1.99 (1.19 to 3.33)	0.01	5.44 (2.14 to 13.81)	0.00	5.16 (1.53 to 17.37)	0.01	1.06 (0.35 to 3.19)	0.92
Trust in modern heath care (ref: disagree)								
Agree	0.39 (0.22 to 0.69)	0.00	0.99 (0.3 to 3.28)	0.99	0.54 (0.16 to 1.79)	0.32	0.08 (0.03 to 0.19)	0.00
Neither agree nor disagree	0.2 (0.1 to 0.43)	0.00	0.42 (0.09 to 1.99)	0.27	0.27 (0.05 to 1.49)	0.13	0.17 (0.05 to 0.63)	0.01
Access to public infrastructure								
Water using from public sources	1.08 (0.79 to 1.47)	0.65	0.74 (0.44 to 1.25)	0.26	0.47 (0.25 to 0.89)	0.02	0.63 (0.31 to 1.3)	0.21
Use electricity	3.83 (1.73 to 8.5)	0.00	1.81 (0.54 to 6.08)	0.34	6.23 (1.9 to 20.39)	0.00	3.75 (0.87 to 16.2)	0.08
No TV signal	0.47 (0.32 to 0.69)	0.00	0.48 (0.26 to 0.89)	0.02	2.14 (0.99 to 4.61)	0.05	0.4 (0.18 to 0.89)	0.02
No mobile signal	1.35 (0.87 to 2.09)	0.17	0.51 (0.27 to 0.96)	0.04	0.44 (0.21 to 0.92)	0.03	1.28 (0.52 to 3.16)	0.60
Travel time to the nearest health post (in minutes)	1.01 (1 to 1.02)	0.00	1 (0.98 to 1.01)	0.53	1 (0.99 to 1.02)	0.82	0.99 (0.97 to 1.01)	0.47
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 0.99)	0.00	1 (1 to 1.01)	0.39	1 (0.99 to 1.01)	0.83	1 (0.99 to 1.01)	0.67
Travel time to the nearest public hospital (in minutes)	1 (1 to 1.01)	0.03	0.99 (0.99 to 1)	0.01	1 (1 to 1.01)	0.32	1.01 (1 to 1.01)	0.01
Religion of the head (ref: Muslim & other religions)								
Orthodox Christian	2.45 (1.53 to 3.94)	0.00	1.82 (0.95 to 3.47)	0.07	0.72 (0.34 to 1.55)	0.41	0.36 (0.1 to 1.31)	0.12
Protestant	2.35 (1.29 to 4.26)	0.01	0.49 (0.2 to 1.21)	0.12	0.35 (0.09 to 1.37)	0.13	1.59 (0.46 to 5.57)	0.47
Regions (ref: SNNPR)								
Tigray	0.87 (0.45 to 1.67)	0.68	0.07 (0.02 to 0.28)	0.00	0.57 (0.14 to 2.4)	0.44	0.18 (0.03 to 1.17)	0.07

Amhara	4.98 (2.65 to 9.37)	0.00	1.38 (0.57 to 3.36)	0.48	3.01 (0.9 to 10.1)	0.07	1.28 (0.34 to 4.84)	0.72
Oromiya	10.47 (5.26 to 20.83)	0.00	3.73 (1.49 to 9.36)	0.01	3.72 (1.07 to 12.97)	0.04	0.31 (0.05 to 2.04)	0.22
Pseudo R^2							0.192	
N							1,523	

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5C: Probability of seeking care for malaria – Relative risk ratios based on multinomial logit specifications

VARIABLES	Health center		Private/ NGO clinic		Public/Private/ NGO hospital		Other care options	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head sex	0.84 (0.54 to 1.3)	0.43	1.63 (0.57 to 4.7)	0.37	2.1 (0.68 to 6.43)	0.19	1.28 (0.34 to 4.8)	0.72
Head age	0.99 (0.98 to 1)	0.18	1 (0.97 to 1.03)	0.80	1 (0.97 to 1.03)	0.89	0.99 (0.95 to 1.03)	0.49
Head's education (ref: no education at all)								
Informal education	1.14 (0.71 to 1.84)	0.59	0.4 (0.17 to 0.97)	0.04	0.58 (0.23 to 1.5)	0.27	0.4 (0.08 to 2.11)	0.28
Primary & higher	0.81 (0.58 to 1.14)	0.23	0.42 (0.23 to 0.75)	0.00	0.7 (0.35 to 1.42)	0.32	0.36 (0.13 to 1)	0.05
Household size	1.08 (0.99 to 1.18)	0.08	1.07 (0.92 to 1.25)	0.38	1.07 (0.89 to 1.28)	0.50	1.05 (0.81 to 1.37)	0.71
HH composition (ref: Prop. of male adults aged 16 to 64)								
Prop. of children aged under 6	1.1 (0.33 to 3.65)	0.88	1.43 (0.15 to 13.92)	0.76	2.21 (0.19 to 25.73)	0.53	102.09 (2.15 to 4839.41)	0.02
Prop. of males aged 6 to 15	1.82 (0.58 to 5.72)	0.31	2.33 (0.28 to 19.63)	0.44	2.15 (0.18 to 26.09)	0.55	92.38 (2.57 to 3319.86)	0.01
Prop. of females aged 6 to 15	0.86 (0.26 to 2.8)	0.80	1.17 (0.13 to 10.57)	0.89	0.45 (0.03 to 6.32)	0.56	4.52 (0.08 to 241.39)	0.46
Prop. of females aged 16 to 64	0.94 (0.28 to 3.13)	0.92	0.14 (0.01 to 2.2)	0.16	1.21 (0.08 to 18.12)	0.89	8.44 (0.14 to 494.04)	0.30
Prop. of elderly aged above 64	1.17 (0.31 to 4.48)	0.81	0.18 (0.01 to 4.22)	0.29	2.02 (0.14 to 28.7)	0.60	93.49 (2.11 to 4138.52)	0.02
HH health status (ref: Prop. of households with good SAH)								
Prop. of household with fair & low SAH	0.8 (0.53 to 1.19)	0.27	0.98 (0.4 to 2.4)	0.97	0.84 (0.32 to 2.19)	0.73	0.2 (0.04 to 1.14)	0.07
Consumption quintiles (ref: poorest quintile)								
2nd quintile	1.79 (1.2 to 2.67)	0.01	2.99 (1.36 to 6.58)	0.01	7.39 (1.47 to 37.25)	0.02	1.46 (0.44 to 4.85)	0.54
3rd quintile	1.62 (1.06 to 2.49)	0.03	2.51 (1.11 to 5.72)	0.03	11.48 (2.36 to 55.8)	0.00	1.6 (0.41 to 6.28)	0.50
4th quintile	2.7 (1.68 to 4.33)	0.00	2.91 (1.22 to 6.96)	0.02	28.87 (5.99 to 139.06)	0.00	3.41 (0.98 to 11.84)	0.05
Richest quintile	1.82 (1.11 to 2.98)	0.02	3.11 (1.25 to 7.72)	0.02	9.32 (1.78 to 48.69)	0.01	4.49 (1.3 to 15.53)	0.02
Trust in modern heath care (ref: disagree)								
Agree	0.4 (0.24 to 0.68)	0.00	2.73 (0.58 to 12.81)	0.20	0.98 (0.26 to 3.65)	0.97	0.09 (0.04 to 0.25)	0.00
Neither agree nor disagree	0.3 (0.15 to 0.64)	0.00	0.88 (0.13 to 5.92)	0.90	0.44 (0.07 to 2.77)	0.38	0.48 (0.13 to 1.87)	0.29
Access to public infrastructure								
Water using from public sources	1.02 (0.76 to 1.38)	0.88	0.71 (0.42 to 1.2)	0.20	0.34 (0.18 to 0.66)	0.00	0.99 (0.42 to 2.35)	0.99
Use electricity	2.34 (1.22 to 4.47)	0.01	2.38 (0.86 to 6.59)	0.09	3.68 (1.09 to 12.42)	0.04	0.94 (0.17 to 5.1)	0.95
No TV signal	0.59 (0.41 to 0.84)	0.00	0.54 (0.3 to 0.97)	0.04	2.14 (0.99 to 4.61)	0.05	0.67 (0.27 to 1.65)	0.39
No mobile signal	1.17 (0.78 to 1.77)	0.44	0.41 (0.22 to 0.76)	0.00	0.39 (0.19 to 0.83)	0.01	0.56 (0.2 to 1.55)	0.26
Travel time to the nearest health post (in minutes)	1.02 (1.01 to 1.02)	0.00	1.01 (0.99 to 1.02)	0.39	1 (0.99 to 1.02)	0.63	1 (0.98 to 1.02)	0.90
Travel time to the nearest health center (in minutes)	0.99 (0.99 to 0.99)	0.00	1 (1 to 1.01)	0.48	1 (0.99 to 1.01)	0.68	1 (0.99 to 1.01)	0.64
Travel time to the nearest public hospital (in minutes)	1 (1 to 1)	0.03	0.99 (0.98 to 0.99)	0.00	1 (0.99 to 1)	0.47	1 (0.99 to 1.01)	0.62
Religion of the head (ref: Muslim & other religions)								
Orthodox Christian	2.75 (1.77 to 4.27)	0.00	1.79 (0.96 to 3.37)	0.07	0.68 (0.32 to 1.44)	0.31	0.17 (0.02 to 1.51)	0.11
Protestant	1.97 (1.09 to 3.54)	0.02	0.54 (0.21 to 1.36)	0.19	0.26 (0.06 to 1.09)	0.07	0.91 (0.23 to 3.61)	0.89
Regions (ref: SNNPR)								
Tigray	0.8 (0.43 to 1.52)	0.50	0.06 (0.01 to 0.3)	0.00	0.73 (0.18 to 2.96)	0.66	0.57 (0.05 to 6.98)	0.66

Amhara	3.95 (2.17 to 7.21)	0.00	1.37 (0.56 to 3.35)	0.50	1.55 (0.46 to 5.28)	0.48	1.06 (0.24 to 4.62)	0.94
Oromiya	10.56 (5.37 to 20.77)	0.00	5.59 (2.2 to 14.23)	0.00	4.22 (1.23 to 14.4)	0.02	0 (0 to .)	0.98
Pseudo R^2						0.199		
N						1,507		

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health posts. Other care options include do nothing, traditional healers, religious healers, and pharmacies/drug stores.

Appendix 5D: Probability of seeking care for tetanus – Relative risk ratios based on multinomial logit specifications

VARIABLES	Private/ NGO clinic		Public/Private/ NGO hospital		Other care options	
	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value	RRR (95%CI)	*p* value
Head sex	2.3 (0.77 to 6.93)	0.14	1.51 (0.76 to 2.98)	0.24	0.82 (0.53 to 1.27)	0.38
Head age	1.01 (0.98 to 1.03)	0.60	1 (0.98 to 1.02)	0.92	1.02 (1 to 1.03)	0.02
Head's education (ref: no education at all)						
Informal education	0.57 (0.26 to 1.26)	0.16	1.26 (0.75 to 2.13)	0.38	0.98 (0.58 to 1.65)	0.93
Primary & higher	0.73 (0.42 to 1.26)	0.26	0.9 (0.56 to 1.46)	0.67	1.56 (1.11 to 2.2)	0.01
Household size	0.97 (0.83 to 1.12)	0.64	1 (0.89 to 1.13)	0.97	0.97 (0.89 to 1.06)	0.46
HH composition (ref: Prop. of male adults aged 16 to 64)						
Prop. of children aged under 6	0.29 (0.03 to 2.47)	0.26	3.51 (0.68 to 18.04)	0.13	1.7 (0.5 to 5.77)	0.40
Prop. of males aged 6 to 15	1.38 (0.2 to 9.69)	0.75	2.16 (0.44 to 10.67)	0.35	0.79 (0.24 to 2.57)	0.70
Prop. of females aged 6 to 15	0.77 (0.1 to 6.04)	0.81	1.96 (0.37 to 10.33)	0.43	0.94 (0.28 to 3.17)	0.92
Prop. of females aged 16 to 64	0.21 (0.02 to 2.7)	0.23	3.05 (0.5 to 18.53)	0.23	2.43 (0.71 to 8.27)	0.16
Prop. of elderly aged above 64	0.15 (0.01 to 2.98)	0.21	3.9 (0.63 to 24.12)	0.14	1.63 (0.41 to 6.45)	0.48
HH health status (ref: Prop. of households with good SAH)						
Prop. of household with fair & low SAH	1.07 (0.45 to 2.54)	0.89	0.99 (0.51 to 1.92)	0.98	0.96 (0.63 to 1.47)	0.86
Consumption quintiles (ref: poorest quintile)						
2nd quintile	1.35 (0.64 to 2.86)	0.43	1.81 (0.79 to 4.15)	0.16	0.45 (0.3 to 0.68)	0.00
3rd quintile	1.19 (0.54 to 2.62)	0.66	2.22 (0.97 to 5.06)	0.06	0.48 (0.31 to 0.73)	0.00
4th quintile	0.87 (0.38 to 1.98)	0.74	3.47 (1.55 to 7.75)	0.00	0.31 (0.19 to 0.5)	0.00
Richest quintile	1.34 (0.57 to 3.17)	0.50	2.95 (1.26 to 6.91)	0.01	0.45 (0.27 to 0.74)	0.00
Trust in modern heath care (ref: disagree)						
Agree	3.53 (1.03 to 12.15)	0.05	1.23 (0.64 to 2.33)	0.54	2.38 (1.41 to 4.01)	0.00
Neither agree nor disagree	2.43 (0.52 to 11.31)	0.26	0.59 (0.19 to 1.84)	0.36	4.9 (2.46 to 9.76)	0.00
Access to public infrastructure						
Water using from public sources	0.69 (0.43 to 1.12)	0.14	0.56 (0.37 to 0.84)	0.01	0.94 (0.69 to 1.28)	0.69
Use electricity	0.86 (0.33 to 2.21)	0.75	1.43 (0.76 to 2.69)	0.26	0.4 (0.2 to 0.81)	0.01
No TV signal	1.02 (0.58 to 1.77)	0.96	1.24 (0.8 to 1.94)	0.34	1.5 (1.04 to 2.16)	0.03
No mobile signal	0.39 (0.23 to 0.68)	0.00	0.76 (0.48 to 1.2)	0.24	0.85 (0.56 to 1.28)	0.43
Travel time to the nearest health post (in minutes)	0.99 (0.97 to 1)	0.07	1 (0.99 to 1.01)	0.53	0.99 (0.99 to 1)	0.07
Travel time to the nearest health center (in minutes)	1.01 (1 to 1.02)	0.01	1 (1 to 1.01)	0.38	1.01 (1 to 1.01)	0.00
Travel time to the nearest public hospital (in minutes)	0.99 (0.98 to 0.99)	0.00	1 (0.99 to 1)	0.17	1 (0.99 to 1)	0.01
Religion of the head (ref: Muslim & other religions)						
Orthodox Christian	0.55 (0.32 to 0.96)	0.04	0.16 (0.1 to 0.27)	0.00	0.29 (0.18 to 0.46)	0.00
Protestant	0.25 (0.1 to 0.62)	0.00	0.14 (0.05 to 0.39)	0.00	0.37 (0.2 to 0.66)	0.00
Regions(ref: SNNPR)						
Tigray	0.12 (0.03 to 0.47)	0.00	1.26 (0.44 to 3.61)	0.67	1.24 (0.65 to 2.35)	0.52
Amhara	0.32 (0.13 to 0.75)	0.01	0.93 (0.38 to 2.25)	0.86	0.17 (0.09 to 0.32)	0.00
Oromiya	0.47 (0.2 to 1.1)	0.08	0.59 (0.24 to 1.47)	0.26	0.1 (0.05 to 0.19)	0.00
Pseudo R^2				0.176		
N				1,545		

Notes: *** p<0.01, ** p<0.05, * p<0.1. The reference outcome is health centers. Other care options include do nothing, traditional healers, religious healers, pharmacies/drug stores and health posts.

Appendix 5E: Probability of seeking care for tuberculosis – Relative risk ratios based on multinomial logit specifications

VARIABLES	ARI/ Pneumonia		Diarrhea		Malaria		Tetanus		Tuberculosis	
	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value	OR (95%CI)	*p* value
Head sex	1.32 (0.93 to 1.89)	0.12	0.9 (0.65 to 1.26)	0.55	1.35 (0.99 to 1.86)	0.06	1.28 (0.94 to 1.76)	0.12	0.98 (0.68 to 1.41)	0.92
Head age	1.01 (1 to 1.02)	0.24	1.01 (1 to 1.02)	0.16	0.99 (0.98 to 1)	0.24	1 (0.99 to 1.01)	0.63	1 (0.99 to 1.02)	0.48
Head's education (ref: no education at all)										
Informal education	0.99 (0.7 to 1.41)	0.97	0.89 (0.64 to 1.24)	0.49	0.94 (0.68 to 1.28)	0.68	0.81 (0.59 to 1.11)	0.19	1.57 (1.12 to 2.18)	0.01
Primary & higher	0.78 (0.6 to 1.01)	0.06	0.66 (0.51 to 0.84)	0.00	0.66 (0.52 to 0.84)	0.00	0.81 (0.64 to 1.02)	0.08	1 (0.77 to 1.31)	0.97
Household size	0.97 (0.91 to 1.04)	0.41	0.99 (0.93 to 1.05)	0.72	0.92 (0.86 to 0.97)	0.01	0.9 (0.85 to 0.96)	0.00	0.95 (0.89 to 1.02)	0.15
HH composition (ref: Prop. of male adults aged 16 to 64)										
Prop. of children aged under 6	1.01 (0.39 to 2.62)	0.98	0.79 (0.32 to 1.93)	0.60	0.68 (0.29 to 1.62)	0.39	1.04 (0.45 to 2.43)	0.93	2.97 (1.15 to 7.63)	0.02
Prop. of males aged 6 to 15	1.19 (0.49 to 2.92)	0.70	0.8 (0.34 to 1.86)	0.60	0.77 (0.34 to 1.74)	0.53	1.24 (0.55 to 2.77)	0.61	1.33 (0.54 to 3.26)	0.53
Prop. of females aged 6 to 15	0.91 (0.36 to 2.32)	0.84	0.92 (0.38 to 2.21)	0.85	1.77 (0.78 to 4.05)	0.17	1.59 (0.69 to 3.65)	0.28	6.62 (2.63 to 16.69)	0.00
Prop. of females aged 16 to 64	1.23 (0.45 to 3.39)	0.69	1.04 (0.41 to 2.68)	0.93	1.01 (0.41 to 2.46)	0.99	1.24 (0.51 to 3.02)	0.64	1.23 (0.45 to 3.35)	0.68
Prop. of elderly aged above 64	1.09 (0.35 to 3.38)	0.88	0.85 (0.29 to 2.43)	0.76	1.06 (0.39 to 2.86)	0.91	1.13 (0.43 to 2.96)	0.80	1.84 (0.59 to 5.8)	0.30
HH health status (ref: Prop. of household with good SAH)										
Prop. of household with fair & low SAH	0.96 (0.68 to 1.36)	0.84	0.86 (0.61 to 1.2)	0.36	1.72 (1.25 to 2.36)	0.00	1.17 (0.86 to 1.61)	0.32	1.18 (0.83 to 1.69)	0.36
Consumption quintiles (ref: poorest quintile)										
2nd quintile	0.94 (0.68 to 1.29)	0.69	0.84 (0.61 to 1.15)	0.27	1.09 (0.8 to 1.47)	0.59	0.99 (0.73 to 1.32)	0.93	0.94 (0.66 to 1.35)	0.75
3rd quintile	0.81 (0.57 to 1.14)	0.22	0.93 (0.67 to 1.3)	0.67	0.84 (0.61 to 1.15)	0.27	0.65 (0.47 to 0.88)	0.01	0.91 (0.63 to 1.32)	0.62
4th quintile	0.65 (0.45 to 0.93)	0.02	0.84 (0.59 to 1.18)	0.32	0.55 (0.39 to 0.77)	0.00	0.52 (0.37 to 0.71)	0.00	0.83 (0.57 to 1.2)	0.32
Richest quintile	0.61 (0.41 to 0.91)	0.02	1 (0.69 to 1.45)	0.99	0.63 (0.44 to 0.9)	0.01	0.48 (0.34 to 0.68)	0.00	1.02 (0.67 to 1.54)	0.93
Trust in modern heath care (ref: disagree)										
Agree	1.47 (0.98 to 2.22)	0.07	1.46 (1 to 2.13)	0.05	0.83 (0.58 to 1.18)	0.30	0.82 (0.58 to 1.17)	0.28	1.7 (1.16 to 2.49)	0.01
Neither agree nor disagree	1.7 (0.98 to 2.96)	0.06	1.18 (0.7 to 1.99)	0.54	0.44 (0.27 to 0.72)	0.00	0.59 (0.36 to 0.98)	0.04	0.8 (0.45 to 1.42)	0.45
Access to public infrastructure										
Water using from public sources	0.76 (0.6 to 0.96)	0.02	1.01 (0.81 to 1.25)	0.94	0.76 (0.62 to 0.94)	0.01	0.79 (0.64 to 0.98)	0.03	0.92 (0.73 to 1.16)	0.46
Use electricity	0.63 (0.38 to 1.03)	0.07	0.65 (0.41 to 1.01)	0.06	1.1 (0.73 to 1.66)	0.64	0.67 (0.44 to 1.04)	0.08	0.95 (0.62 to 1.46)	0.82
No TV signal	0.72 (0.54 to 0.96)	0.03	0.48 (0.37 to 0.63)	0.00	0.5 (0.38 to 0.64)	0.00	0.55 (0.43 to 0.71)	0.00	0.46 (0.34 to 0.61)	0.00
No mobile signal	1.17 (0.86 to 1.6)	0.31	0.92 (0.69 to 1.22)	0.56	1.22 (0.93 to 1.6)	0.15	1.21 (0.93 to 1.59)	0.16	2.13 (1.58 to 2.88)	0.00
Travel time to the nearest health post (in minutes)	0.99 (0.99 to 1)	0.06	0.99 (0.99 to 1)	0.01	0.99 (0.99 to 1)	0.02	1.01 (1 to 1.01)	0.03	1 (1 to 1.01)	0.73
Travel time to the nearest health center (in minutes)	1 (0.99 to 1)	0.02	1 (1 to 1)	0.26	1 (1 to 1)	0.16	1 (1 to 1)	0.89	1 (1 to 1)	0.91
Travel time to the nearest public hospital (in minutes)	1 (1 to 1.01)	0.00	1 (1 to 1)	0.35	1 (1 to 1)	0.00	1 (1 to 1)	0.01	1 (1 to 1.01)	0.00
Religion of the head (ref: Muslim & other religions)										
Orthodox Christian	1.95 (1.43 to 2.65)	0.00	1.23 (0.93 to 1.63)	0.15	0.69 (0.53 to 0.91)	0.01	0.64 (0.49 to 0.84)	0.00	0.42 (0.32 to 0.56)	0.00
Protestant	0.94 (0.6 to 1.49)	0.81	1.05 (0.68 to 1.64)	0.81	0.76 (0.49 to 1.19)	0.23	0.69 (0.45 to 1.07)	0.09	0.64 (0.36 to 1.14)	0.13
Regions (ref: SNNPR)										
Tigray	0.29 (0.17 to 0.47)	0.00	0.66 (0.41 to 1.06)	0.09	0.49 (0.31 to 0.78)	0.00	0.45 (0.29 to 0.72)	0.00	0.41 (0.22 to 0.76)	0.01

Amhara	0.1 (0.06 to 0.17)	0.00	0.18 (0.11 to 0.28)	0.00	0.16 (0.1 to 0.25)	0.00	0.2 (0.13 to 0.31)	0.00	0.12 (0.06 to 0.21)	0.00
Oromiya	0.37 (0.23 to 0.6)	0.00	0.93 (0.59 to 1.45)	0.74	1.2 (0.77 to 1.87)	0.42	1.02 (0.66 to 1.58)	0.92	0.88 (0.49 to 1.57)	0.66
Pseudo R^2	0.081		0.063		0.064		0.052		0.088	
N	1,502		1,518		1,475		1,477		1,192	

Notes: *** p<0.01, ** p<0.05, * p<0.1. Except for the estimates in the last column, the modern health care option includes health posts, health centers, private clinics, mission/NGO clinics, public hospitals, private hospital, and mission/NGO hospitals. In the case of tuberculosis, health posts are not included as part of the modern care option.

Appendix 6: When to seek modern care – Odds ratios based on ordered logit specifications