Caregiver Decision-making:
Household Response to Child Illness

Hayley Pierce
Department of Demography and Sociology
2232 Piedmont Ave
University of California, Berkeley
Berkeley, CA 94720
hayleyp@berkeley.edu

Ashley Larsen Gibby
Department of Sociology
512 Oswald Tower
Penn State University
State College, Pennsylvania, 16801
agl132@psu.edu

Renata Forste
Department of Sociology
2025 JFSB
Brigham Young University
Provo, Utah 84602
renata_forste@byu.edu

Abstract

We draw upon a framework outlining household recognition and response to child illness proposed by Colvin and colleagues (2013) to examine factors predictive of treatment sought for a recent child illness. Based on multinomial analyses of Demographic and Health Surveys from 27 countries, we find the odds of seeking treatment to be low for women needing to obtain permission for healthcare. Not having a voice in healthcare decisions, as well as barriers to healthcare access, increase the odds that middle layer treatments (traditional healers, pharmacies, community health workers, etc.) are sought relative to formal biomedical treatment. Past experience with medical services such as prenatal care and a skilled birth attendant increase the odds that biomedical treatment for child illness is sought, as does knowledge or use of modern contraception. We conclude that women need both healthcare knowledge and the ability to make healthcare decisions in order to negotiate biomedical treatment, in addition to having resources to address the costs of travel and care.

Introduction

In response to the United Nation's Millennium Development Goals, various global efforts have been launched to reduce child mortality and improve child well-being. Included in these efforts have been strategies to end preventable diseases such as pneumonia, diarrhea, and malaria. Together, pneumonia and diarrhea account for almost 30 percent of child mortality worldwide, with two million deaths each year (WHO/UNICEF, 2013). Over a third of child deaths are also attributable to malnutrition, as it is the poor and undernourished in remote areas that are most susceptible to disease (WHO/UNICEF, 2013). Since 1990, all regions of the world have reduced under-five mortality by 50 percent or more except for sub-Saharan Africa and Oceania (UNICEF, 2013).

With the goal to end preventable deaths due to pneumonia and diarrhea by 2025, the World Health Organization and the United Nation's Children Fund (WHO/UNICEF) have proposed an integrated strategy emphasizing protection, prevention, and treatment to reduce pneumonia and diarrhea morbidity and mortality (WHO/UNICEF, 2013). Most of the steps outlined by the WHO/UNICEF (2013) strategy involve national policy, but the success of such policies ultimately begins in the home. Understanding decision-making surrounding the treatment of illness is critical to the success of global initiatives aimed at reducing preventable disease. To further such understanding, we adapt a framework proposed by Colvin and colleagues (2013) and analyze Demographic and Health Surveys from 27 countries to model household decision-making and treatment in response to child illness.

Child illness and mortality: Conceptual frameworks

The Global Action Plan for Pneumonia and Diarrhoea (GAPPD) outlined by WHO/UNICEF (2013) envisions three primary points of intervention: (1) *Protect* children by establishing good health practices from birth; (2) *Prevent* children becoming ill from pneumonia and diarrhea; and (3) *Treat* children who are ill from pneumonia and diarrhea with appropriate treatment. Although the GAPPD focuses primarily on interventions by governments and their partners to provide needed resources, the initial decisions regarding illness protection, prevention, and treatment take place at the household level as caregivers recognize illness and seek treatment for their children. To end preventable disease will require not only political will, but also changes at the household level. Further understanding of factors influencing illness treatment decisions is needed in part because the ability of caregivers to recognize and respond to illness varies by socioeconomic status, as well as other household and caregiver characteristics (Schellenberg et al., 2003).

Studies of child morbidity and mortality have drawn upon conceptual frameworks such as the model proposed by Mosely and Chen (1984), and the Andersen Behavioural Model (Andersen, 1995). Mosley and Chen (1984) outlined factors associated with child survival and defined five groups of proximate determinants including maternal factors, environmental contamination, nutrient deficiency, injury, and personal illness control. These factors linked socioeconomic determinants, as well as prevention and treatment, to illness and mortality. Andersen (1995) outlined a model for predicting healthcare utilization that examined three primary components: (1) factors predisposing individuals or populations towards service use, (2) factors enabling individuals or populations to use services, and (3) an individual or population's need for care. More recently, based on qualitative research in sub-Saharan Africa, a framework was proposed by Colvin and colleagues (2013) to model caregiver recognition and response to illness.

The Colvin et al. (2013) framework outlines household recognition and response to diseases such as diarrhea, pneumonia, and malaria. This framework defines four modes of response that begin with the recognition of disease symptoms inside the home, and moves to seeking treatment outside the home. The four modes include: (1) *caregiver(s) recognition and response*, including interpretation of kind, cause, and severity of illness, previous experience with illness, and child-rearing; (2) *seeking advice and negotiating access*, including family relationships and control over financial resources; (3) *using the "middle layer" between home and clinic* which includes the availability of providers (community health workers, midwives, traditional healers, etc.), access to credit, and receptiveness to local beliefs and concerns; and (4) *accessing formal biomedical services*, including access issues such as distance, cost, and the quality of relationships between patients and providers.

This model provides a framework for examining how caregivers recognize and respond to childhood illness and underscores the dynamic nature of treatment decisions made by caregivers. Past studies of illness response have primarily examined decision-making in one country (Thind and Andersen, 2003; Heuveline and Goldman, 2000; Schmeer, 2000; Pokhrel, 2007). However, to further global efforts to reduce child mortality and morbidity as outlined in the Millennial Development goals, we test this conceptual model on a cross-national scale. Drawing upon the Colvin et al. model (2013) we analyze response to child illness using Demographic and Health Surveys from 27 countries. We model factors associated with the modes of response in an effort to further delineate avenues to improved child health. Prior to our analysis, we review the relevant literature according to the four modes of response: caregiver recognition, advice seeking, middle layer, and biomedical treatment.

Caregiver recognition and response

Caregivers are usually the first responders to illness following recognition; they define what the illness is and decide the proper response, such as seeking input from friends and family, home remedies, traditional healers, or going to a medical health facility. Recognition is the first step in a child getting treatment – perceptions of caregivers, often mothers, contribute to timely and proper reactions (Othero et al., 2008). The ability of a caregiver to respond depends in part on the illness symptoms a child exhibits and their severity (Ellis et al., 2007; Hildenwall et al., 2007). Certain symptoms, such as fever, are easier to recognize than others (Nsungway-Sabiiti et al., 2004; Othero et al., 2008). In some cases a child may have multiple symptoms and the caregiver may prioritize the wrong response or not see the symptoms as serious enough to seek treatment (Ellis et al., 2007; Falade et al., 2005; Kamat, 2006; Pilkington et al., 2004). Caregiver understanding of the causes of illness also influences the types of treatment sought. In some communities, caregivers respond to what they consider supernatural diseases and responses include seeking help for both physical and bewitching causes (Pilkington et al., 2004).

Often symptoms are not static in their severity, which can influence caregiver response. Rather than a single decision, treatments often unfold through a series of evaluations of the child's condition. For example, as a child starts with a mild fever, medicine on hand or the village health center may suffice, but if symptoms grow worse or do not improve, caregivers are more likely to use hospitals and/or modern medication (Pilkington et al., 2004).

The ability of caregivers to recognize and respond to illness is associated with education, healthcare knowledge, and media exposure. Education can provide knowledge related to healthcare and it can transform attitudes, including greater acceptance of modern medical practices (Martin & Juarez, 1995; Vikram, Vanneman & Desai, 2012). Reproductive knowledge, such as modern contraceptive use, can improve child health and well-being as women space and limit their births, and avoid high-risk pregnancies (Gribble, Murray & Menotti, 2009; Adekanmbi, Kayode & Uthman, 2011, Finlay et al., 2011). Mass media exposure can also influence health knowledge and reproductive behavior, and the health decisions of women (Westoff & Koffman, 2011; Hayford, 2005; Sastry & Burgard, 2011). Thus, a caregiver's ability to correctly recognize and respond to illness is a critical first step in illness treatment.

Seeking advice and negotiating access

In many contexts, caregivers (often mothers) are not solely responsible for deciding the actions taken in response to illness. Instead, telling neighbors or informing family members such as in-laws and grandparents is considered an important first step or social obligation (Nsungway-Sabiiti et al., 2004). Family members other than the mother may be key decision makers. Mothers may need to seek advice or permission from grandmothers (Comoro 2003; Friend-du Preez, Cameron & Griffiths, 2009), mothers-in-law (Comoro et al., 2003; Ellis et al., 2007), and/or husbands or the male head of household (Falade et al., 2005).

Usually mothers are the primary caregivers to children, thus having to ask for permission or advice from others can slow down response times and be detrimental to child health. Moreover, there is more than the risk of treatment delay; in some cases key decision makers may be adverse to modern health care., thinking that taking a child to the hospital will result in death (Comoro et al., 2003). In some communities the norm is for the child to be taken to the mother-in-law first and then to the traditional healer or an older woman in the community (Ellis et al., 2007). Following these efforts, if a mother needs to take her child to a health facility, she may need to seek permission and finances from her husband or other male household members. This often takes more than one effort, requiring a mother to ask multiple times (Ellis et al., 2007). In many African cultures, men are the key financial decision makers and even joint decisions between partners are rare (Falade et al., 2005).

Thus, the ability of primary caregivers, particularly mothers, to make healthcare decisions on their own, as well as the autonomy to leave the home and seek outside care are critical to child survival and well-being (Vikram, Vanneman & Desai, 2012; Malhotra et al., 2012; Chakraborty & Anderson, 2011; Allendorf, 2010). In addition to having decision-making autonomy, access to household resources such as finances for travel or purchase of treatment are particularly important for medical care; hence, the association between parental socioeconomic status and child health is well supported (Frost, Forste & Haas, 2005; Abuya, Ciera & Kimani-Murage, 2012; Omariba, Beaujot & Rajulton, 2007). The availability of medical healthcare is influenced by both household residence and socioeconomic status (Abuya, Ciera & Kimani-Murage, 2012).

Using the "middle layer" between home and clinic

Caregivers often begin with home remedies and move on to other treatments if they prove ineffective. If the child's condition does not improve in a few days parents may seek treatment from others such as community health workers, traditional healers, or pharmacies (Ellis et al., 2007). These traditional birth attendants, healers, and health workers are considered a "middle layer" between home and clinic. They are beyond home remedies, but do not have the same drugs, training, and treatments that are offered in a biomedial health facility; such treatments are often chosen because they are less expensive. This middle layer is also very appealing when the causes of illness are perceived to be supernatural, such as evil spirits or witchcraft; in such cases, traditional healers are consulted to address supernatural causes (Friend-du Perez, Cameron & Griffiths, 2009).

Accessing formal biomedical services

Biomedical services are best able to treat child illness, but are often not the first place caregivers turn. Sometimes caregivers never go to a health center. Beiresmann and colleagues (2007) found that in rural areas of Burkina Faso, many ill children were never brought to a health facility because the family lacked money. Health facilities often have user fees that are more expensive than traditional remedies or treatments accessed in the middle layer (Chuma, Gilson & Molyneux, 2007; Friend du-Preez, Cameron & Griffiths, 2009). In addition to a lack of household resources, the quality of medical care available can influence the likelihood that caregivers will seek biomedical services (Friend du-Preez, Cameron & Griffiths, 2009; Kamat, 2006; Sharkey et al., 2012). Hence, barriers in accessing biomedical services include cost, distance, quality of care, and trust of the facility (Ahorlu, Koram & Weiss, 2007; Deressa, Ali & Hailemariam, 2009; Kamat, 2006).

The utilization of biomedical care such as prenatal care, delivery by a skilled birth attendance, and childhood immunizations, increases child health and survival (Cho, Song & Frisbie, 2005; Chen, Xie & Liu, 2007; Shad & Dwivedi, 2011; Blum, Sharmin & Ronsmans, 2006; Frankenberg, Suriastini & Thomas, 2005). Willingness to utilize biomedical healthcare is associated with maternal characteristics previously discussed such as education, exposure to mass media, and socioeconomic status (Kumar & Mohanty, 2011). In addition, if a health facility, healer, or any other treatment is successful, caregivers are more likely to use that agent again in the future (Friend du-Preez, Cameron & Griffiths, 2009). Thus, if caregivers have previous experiences with biomedical providers that are positive, they are more likely to seek such care again in the future. Thus, increasing access and utilization of biomedical care is essential to further reduce child morbidity and mortality, particularly in less developed countries (Thind and Andersen, 2003).

Drawing upon the framework proposed by Colvin and colleagues (2013), we examine the type of treatment sought following the recognition of child illness by mothers surveyed in 27 less developed countries. Our aim is to further understanding of illness treatment decisions that begin in the home and are vital to child survival. In particular, we model whether caregivers seek no treatment, middle layer treatment, or biomedical treatment in response to child illness. We examine how factors associated with maternal knowledge, maternal advice seeking and access, as well as past medical experience predict the type of treatment sought.

Data and Methods

We utilize data from the Demographic and Health Surveys (DHS) in 27 countries within sub-Saharan Africa, northern Africa and west Asia, central and south Asia, and Latin America and the Caribbean between the years 2006 and 2012 (see appendix). The DHS interviewed women between the reproductive ages of 15 and 49 in these regions. The surveys cover a wide range of topics including household characteristics, fertility, family planning, child mortality, maternal and child health, maternal and child nutrition, HIV/AIDS, and malaria.

Mothers were asked specific questions about child illness and treatment for children born up to five years prior to the survey. We utilize the child file that provides this detailed information for children 59 months of age and younger. In terms of illness, mothers were asked to identify if the child had diarrhea, a fever, or a cough in the past two weeks. We limit our sample to those children that were identified with these symptoms in order to predict the type of treatment sought. Thus, we are only partially able to predict the first mode of response to illness as proposed by Colvin et al. (2013) – we model illness response, but not illness recognition. In our models, recognition of illness was previous to obtaining information about treatment in the surveys.

We further limit our sample to countries that included questions regarding decision-making in the household, prenatal care, and exclude cases missing information on illness treatment. Our analysis is based on a sample of 49,928 children under age five with symptoms of diarrhea, cough, or fever in the two week period preceding the survey date.

Measures

Our outcome measure indicates the type of treatment sought following the recognition of child illness as reported in the survey. Mothers were asked to identify the place where treatment was sought for the recent episode of diarrhea, or fever/cough. The DHS Standard Recode Manual for DHS 6 (Measure DHS/ICF, 2013) provides summary measures that identify whether no treatment or advice was sought for diarrhea, or for fever/cough, and whether the child was taken to a medical facility for treatment for diarrhea, or for fever/cough. The Manual notes that the medical category includes being taken to all public sector facilities and all medical private sector facilities, except for pharmacies. We use these summary measures to identify no treatment sought and biomedical treatment, and include all other treatments (traditional healer, pharmacy, community health worker, etc.) as middle layer. Our treatment variable indicates what treatment was sought for diarrhea, or fever/cough in the past two weeks and is coded according to the following categories: (1) no treatment sought for illness symptoms, (2) biomedical treatment sought for symptoms, and (3) only middle layer treatment sought (no biomedical treatments) which includes pharmacy, traditional healer, etc.

Maternal measures related to healthcare knowledge include maternal age, education, exposure to media, and modern contraceptive intent. Age is measured in years. Education is based on an ordinal measure coded from 0 to 4 according to the following categories: (0) no formal education, (1) incomplete primary, (2) complete primary, (3) incomplete secondary, and (4) complete secondary. Media exposure is a summary measure that averages responses to questions regarding how often the mother reads a newspaper, listens to the radio, or watches TV – (0= not at all, 1=weekly, 2=daily). Modern contraceptive intent is a dichotomous measure coded 1 if the mother has used or intends to use modern contraceptive methods in the future, and coded 0 otherwise.

Measures of maternal advice seeking and resources include household decision-making, residence, and socioeconomic status. Respondents were asked about accessing medical treatment or advice for themselves and if certain factors were (0) no problem, (1) not a big problem, or (2) a big problem preventing them from accessing medical care. Factors measured include getting permission to go, getting money needed for treatment, and distance to the health facility. In addition, women reported whether or not others (husband or other relatives) made decisions about their own healthcare or whether the women had input. We include a dichotomous variable coded 1 if others made the decision, and 0 if the woman had input. Access and resources are measured by a dichotomous variable indicating whether the respondent lives in a rural (0), or urban (1) area, as well as by a wealth index. This wealth index is a composite measure of the household's living standard and is based on ownership of certain assets including a television or bicycle, materials used for housing construction, and types of water access and sanitation facilities.

Previous biomedical experience is measured by prenatal care, birth attendant, and child vaccinations. Prenatal care prior to the child's birth is measured by three dummy variables: no prenatal care, prenatal care from a nurse, or prenatal care from a medical doctor. The birth attendant is measured by dummy variables indicating: no attendant or attended by family members; other, non-medical attendants; nurse; or medical doctor. Finally, immunizations are measured by the total number of vaccines received by the child (coded from 0 to 7: dpt 1,2,3, polio 1,2,3, measles). Controls for region are also included and indicate if the country surveyed is in sub-Saharan Africa, central and south Asia, Latin America & the Caribbean, or north Africa and west Asia (see appendix). In addition, the year of survey is included as a control.

Given that our outcome is type of treatment sought and indicates the competing risks of seeking no treatment, middle layer, or biomedical treatment we estimate our models using multinomial logistic regression. We estimate the odds of seeking no treatment (versus biomedical) and seeking middle layer treatments (versus biomedical) for the child’s illness. We examine child characteristics, mother’s healthcare knowledge, maternal advice seeking and access, and past biomedical experience to predict type of treatment sought.

Results

Descriptive statistics are first presented for our predictive factors by the type of treatment sought, as well as for all children under age five in our sample (see Table 1). In the sample, 40 percent of the children received no treatment for their illness, 11 percent received a middle layer treatment, and 49 percent received a biomedical treatment. Children could have more than one illness symptom, but of those identified, fever and cough (50 to 60%) were more common than diarrhea (43%).

[Table 1 about here]

The average maternal age was about 28.5 years, and average education levels were relatively low – incomplete primary to primary school. Media exposure was less than weekly on average and about 72 percent of the children had mothers that reported use or intent to use modern contraception. Overall, descriptive statistics suggest that children with more educated mothers, mothers with greater media exposure, and a greater acceptance of modern contraception were more likely to receive biomedical treatment for their illness.

On average children's mothers reported that getting permission to seek healthcare was a problem, but that obtaining money and distance to facilities were even bigger problems to access care. Most of the children's mothers responded that they had some say in decisions regarding their own healthcare. Based on the descriptive statistics, mothers of children that received biomedical treatments were less likely to report permission, money, or distance problems relative to other mothers. They also were more likely to live in urban areas and to have higher socioeconomic status.

Of the children in the sample, 25 percent of their mothers received prenatal care prior to birth, and 20 percent had the birth attended by a medical doctor. On average children in the sample were 2 years old and had received 5.5 vaccinations by the survey date. A higher percentage of children that received biomedical treatment were also born with a doctor attendant, had mothers that received prenatal care, and received more vaccinations on average. To explore these relationships further, we turn to our multivariate models.

The columns presented in Table 2 indicate the odds of no illness treatment versus biomedical treatment in the first column, and the odds of choosing a middle layer treatment versus biomedical treatment in the second column. Child characteristics indicate that the older the child in months, the greater the odds mothers did not seek biomedical treatment relative to middle layer or no treatment. If the child had a fever, cough, or diarrhea the odds increased that they received biomedical treatment relative to either middle layer or no treatment. In particular, for children with fever, the odds of receiving biomedical care were 2.5 times greater than the odds of no treatment, and 1.8 times greater if they had diarrhea (1/.56 = 1.8). The odds of receiving biomedical treatment relative to middle layer were greater for fever (1/.63 = 1.6), than for cough (1/.83 = 1.2) or diarrhea (1/.82 = 1.2), but in all three cases, the odds of the child receiving biomedical treatment relative to middle layer were greater.

[Table 2 about here]

In terms of maternal knowledge, children with more educated mothers had higher odds of receiving biomedical treatment compared to no treatment or middle layer treatments. Media exposure had no association with middle layer treatment over biomedical, but greater exposure to media was associated with seeking treatment over no treatment. In addition, if the child's mother was accepting of modern contraception, the child had a higher odds of receiving biomedical treatment over other options.

If getting permission to seek medical treatment was reported as a problem for mothers, odds were higher that children received no treatment. If finances or distance were a big problem in accessing medical services, odds were higher that children received no treatment, or middle layer treatments rather than biomedical help. Particularly, if mothers had no voice in their own healthcare, the odds were 45 percent higher that children received middle layer rather than biomedical treatment. Urban residence increased the odds that children received middle layer treatments relative to biomedical. After controlling for money being a barrier to medical treatment, household wealth increased the odds of receiving middle layer treatment over biomedical treatment, but only after questions about money problems were included in the analyses (additional analyses available from authors). Excluding measures of money problems, greater wealth increased the odds of seeking treatment relative to no treatment, but was not predictive of the type of treatment received. Finally, past experience with medical doctors and nurses during prenatal care, birth, and vaccinations increased the odds that children received biomedical treatment for recent illness relative to no treatment or middle layer options.

Discussion

Building upon the framework proposed by Colvin and colleagues (2013) outlining household decision-making and illness response, we examined factors predictive of caregiver response to child illness. In terms of child characteristics, we found that caregivers were more likely to seek middle layer treatments for older children. In addition, children were more likely to receive biomedical treatment for fever in particular. Previous research suggests that fever is an easily recognizable symptom (Nsungway-Sabiiti et al., 2004) and may be perceived as more severe than cough or diarrhea.

In concurrence with past studies, we found that women with higher education and women willing to use modern contraception were more likely to seek biomedical treatment relative to middle layer or no treatment (Abuya, Ciera & Kimani-Murage, 2012; Frost, Forste & Haas, 2005; Sastry & Burgard, 2011). Media exposure increased the odds that mothers sought treatment, but did not increase the odds of accessing biomedical over middle layer treatments. It may be that media campaigns encourage illness response, but do not necessarily promote biomedical over middle layer types of treatment. The greater knowledge and acceptance of modern healthcare women have, the more likely they are to seek formal biomedical services in response to child illness (Vikram, Vanneman & Desai, 2012; Westoff & Koffman, 2011).

Following illness recognition in the Colvin et al. (2013) model is seeking advice and negotiating access to care. As with past research, we found that if women need to obtain permission for their own healthcare, they are unlikely to seek treatment in response to child illness (Comoro et al., 2003; Ellis et al., 2007); and if women have no say in their own healthcare, the odds are greater that if treatment is sought for an ill child, the child will receive middle layer rather than biomedical treatment. In some cultures where women do not make their own healthcare decisions, middle layer treatments may be sought because they cost less or because decision-makers oppose formal medical care (Comoro et al., 2003; Ellis, et al., 2007;Friend du-Preez, Cameron & Griffiths, 2009). Empowering mothers as caregivers so that they can make decisions and respond immediately to child health needs is necessary to further reduce child morbidity and improve well-being.

In addition to decision-making, if money and distance are big problems in accessing medical care, caregivers are more likely to respond to child illness with middle layer treatments or no treatment at all. Unlike previous studies, we did not find wealth predictive of biomedical treatment independent of problems associated with medical and travel costs (Abuya, Ciera & Kimani-Murage, 2012). However, whatever their wealth status, women need the ability to make decisions about healthcare and to negotiate biomedical treatment, including accessing resources to cover travel and medical costs. Reducing gender inequality and increasing women's access to household financial resources is necessary for women to respond to child illness and obtain the best care available.

Women living in urban areas are more likely to seek middle layer treatments, as opposed to biomedical treatment for child illness. This could be in part because middle layer treatments such as pharmacies and community health workers may be more accessible in urban areas, and generally provide services at a lower cost compared to biomedical care. These types of middle layer treatments may not be readily available to women in rural areas, which may limit their options to seek treatment (Abuya, Ciera & Kimani-Murage, 2012).

Finally, past experience with modern medical care such as prenatal care, having a skilled birth attendant, and getting immunizations is predictive of using biomedical services in response to future child illness. As highlighted in past research, accessing biomedical healthcare depends in part on the quality of care available and trust in those giving care (Ahorlu, Koram & Weiss, 2007; Deressa, Ali & Hailemariam, 2009; Kamat, 2006). Even women that had a birth attendant that was non-medical (other than family) were more likely to seek biomedical treatment for child illness over middle layer treatments. Positive experience with skilled medical care increases the likelihood that such treatment is sought in the future (Friend du-Preez, Cameron & Griffiths, 2009).

Our findings underscore the importance of caregiver decision-making, as well as caregiver access to resources for medical treatment. Global efforts have focused in particular on government and national partner interventions (WHO/UNICEF, 2013), but for such interventions to succeed, attention must be paid to the household level where health response is initiated. More especially, caregivers need to have the autonomy to make decisions regarding healthcare for themselves and family members –in addition to access resources to cover the cost of travel and care in health facilities. Finally, positive experiences with medical treatment are likely to encourage future use of formal biomedical care, even over middle layer treatments. Middle layer treatments in this study were more likely to be used when access to biomedical treatments were blocked. To determine whether middle layer choices are a prelude to biomedical use, or a feasible alternative when medical care is inaccessible needs further exploration.

Our study expands previous research modeling illness response in individual countries by applying a household response framework to 27 developing countries. However, our analysis is limited by cross-sectional data; longitudinal studies are needed to clearly examine household recognition and response to child illness as proposed by Covin et al. (2013). Longitudinal data would allow the study of response sequencing if caregivers seek multiple options in response to child illness. In addition, we are unable to model illness recognition as the first step towards illness response. Unlike the qualitative research conducted by Covin and colleagues (2013), the Demographic and Health Surveys do not examine how mothers recognize illness, only how they respond. Future research may also benefit from separating private from public biomedical facilities in an effort to further examine the types of treatment sought, particularly if studies suggest that such distinctions are important (Thind and Andersen, 2003).

However, even given these data limitations, our study provides a first step in modeling household decision-making and response to child illness in developing countries. This is an important step to further the understanding of mechanisms relevant to child health and well-being globally. To further reduce child morbidity and mortality and meet the UN Millennium Development Goals, global efforts need to recognize the importance of caregiver decision-making in response to child illness within households, in addition to national efforts to increase healthcare quality and access. Greater emphasis on Goal 3 – the promotion of gender equality and the empowerment of women—is a critical step in achieving further reductions in child mortality and morbidity.

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Table 1

Means of factors associated with treatment of child illness in past two weeks (n = 49,928)

Characteristic (range)	All children *100%*	No treatment *40%*	Middle layer *11%*	Biomedical treatment *49%*
Child characteristics				
Age in months (0 to 59)	25.9	27.0	27.2	24.8
Fever past two weeks (0,1)	.51	.42	.51	.59
Cough past two weeks (0,1)	.60	.58	.58	.62
Diarrhea past two weeks (0,1)	.43	.40	.44	.45
Mother's knowledge				
Age in years (15 to 49)	28.5	28.9	28.5	28.2
Education (0 to 4)	1.45	1.25	1.20	1.66
Exposure to media (0 to 2)	.66	.58	.61	.72
Intent to use modern contraception (0,1)	.72	.68	.67	.75
Maternal advice seeking and access				
Permission is a problem (0 to 2)	1.04	1.09	1.08	.99
Money is a problem (0 to 2)	1.48	1.55	1.52	1.41
Distance is a problem (0 to 2)	1.35	1.42	1.40	1.28
Others decide healthcare (0,1)	.38	.39	.48	.34
Urban residence (0,1)	.32	.28	.31	.36
Wealth index (-4.12 to 6.87)	-.14	-.24	-.15	-.07
Past medical decisions				
Child vaccines (0 to 7)	5.50	5.22	5.43	5.73
Prenatal care provider				
No prenatal care (0,1)	.11	.16	.12	.06
Nurse (0,1)	.64	.61	.67	.66
Doctor (0,1)	.25	.23	.21	.28
Birth attendant				
No attendant or family (0,1)	.18	.21	.23	.14
Other, non-medical (0,1)	.18	.23	.19	.13
Nurse (0,1)	.44	.39	.42	.49
Doctor (0,1)	.20	.17	.16	.24
Controls				
Region				
Africa (0,1)	.65	.68	.73	.62
Asia (0,1)	.05	.04	.06	.06
Latin America & Caribbean (0,1)	.21	.21	.17	.21
North Africa & Europe (0,1)	.09	.07	.04	.11

Source: Demographic and Health Surveys

Table 2

Multinomial odds of no treatment, or middle layer treatment versus biomedical treatment for child illness in past two weeks (n = 49,928)

	No treatment (versus biomedical)	Middle layer (versus biomedical)
Child characteristics		
Age in months	1.01***	1.01***
Fever past two weeks	0.40***	0.63***
Cough past two weeks	0.68***	0.83***
Diarrhea past two weeks	0.56***	0.82***
Mother's knowledge		
Age in years	1.01**	0.96
Education	0.93***	0.89***
Exposure to media	0.79***	0.95
Intent to use modern contraception	0.86***	0.85***
Maternal advice seeking and access		
Permission is a problem	1.06**	0.99
Money is a problem	1.16***	1.15***
Distance is a problem	1.07***	1.07**
Others decide healthcare	1.11**	1.45***
Urban residence	0.98	1.14**
Wealth index	1.01	1.05*
Past medical decisions		
Child vaccines	0.93***	0.96***
Prenatal care provider		
No prenatal care (reference)	----	
Nurse	0.49***	0.68***
Doctor	0.51***	0.81**
Birth attendant		
No attendant or family (reference)	----	
Other (non-medical)	1.08	0.80***
Nurse	0.74***	0.62***
Doctor	0.68***	0.63***
Controls		
Year of survey	1.03***	0.97**
Region		
Africa (reference)	----	
Asia	0.71***	0.99
Latin America & Caribbean	1.19***	0.79***
North Africa & Europe	1.06	0.48***

Source: Demographic and Health Surveys

$^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$

Appendix

Countries included in analyses

Country	**Survey year**	**Sample size**
Sub-Saharan Africa		
Benin	2011-12	1463
Burkina Faso	2010	2171
Burundi	2010	1913
Comoros	2012	814
Cote d'Ivoire	2011-12	1263
Ethiopia	2011	3184
Ghana	2008	979
Lesotho	2009	663
Malawi	2010	2172
Mali	2006	3043
Mozambique	2011	2331
Namibia	2006-07	1125
Niger	2012	1370
Rwanda	2010	1463
Senegal	2010-11	1372
Tanzania	2010	2453
Uganda	2011	1380
Zambia	2007	1959
Zimbabwe	2010-11	1509
North Africa & West Asia		
Egypt	2008	2176
Jordan	2012	2203
Central & South Asia		
Cambodia	2010	1410
Kyrgyz Republic	2012	409
Nepal	2011	819
Latin America & Caribbean		
Bolivia	2008	3893
Dominican Republic	2007	3865
Haiti	2012	2526
		Total 49,928