Caregiver Decision-Making: Household Response to Child Illness in sub-Saharan Africa

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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. In particular, we model whether no treatment, middle layer treatment (traditional healer, pharmacy, community health worker, etc.), or biomedical treatment was sought for recent episodes of diarrhea, fever, or cough. Based on multinomial, multilevel analyses of Demographic and Health Surveys from 19 countries in sub-Saharan Africa, we determine that if women have no say in their own healthcare, they are unlikely to seek treatment in response to child illness. We find that women in sub-Saharan Africa need healthcare knowledge, the ability to make healthcare decisions, as well as resources to negotiate cost and travel, in order to access biomedical treatment. Past experience with medical services such as prenatal care and a skilled birth attendant also increase the odds that biomedical treatment for child illness is sought. We conclude that caregiver decision-making in response to child illness within households is critical to reducing child morbidity and mortality in sub-Saharan Africa.

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,

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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 (UNICE, 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 19 sub-Saharan African countries to model household decision-making and treatment in response to child illness.

Careseeking for child illness: Conceptual framework

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).

Following a systematic review of 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 in sub-Saharan Africa. 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 in sub-Saharan Africa, 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; Pokhrel 2007); however, given the high rates of child morbidity and mortality in sub-Saharan Africa (UNICE, 2013), we use nationally representative samples to explore careseeking behavior in 19 sub-Saharan African countries. Drawing upon the Colvin et al. model (2013) we analyze factors associated with the modes of response to child illness 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, using home remedies, going to 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 (Nsungwa-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 Gabon, sub-Saharan Africa, 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 and Juarez 1995; Vikram, Vanneman and 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 and Menotti 2009; Adekanmbi, Kayode and Uthman 2011; Finlay, Özaltin and Canning 2011). Mass media exposure can also influence health knowledge and reproductive behavior, as well as the health decisions of women (Westoff and Koffman 2011; Hayford 2005; Sastry

and Burgard 2011). In particular, Westoff and Koffman (2011) found that daily exposure to radio and television increased modern contraceptive use in sub-Saharan Africa. Exposure to media, therefore, is an important mechanism for disseminating healthcare knowledge. In sum, a caregiver's ability to correctly recognize and respond to illness is a critical first step in illness treatment and is associated with her knowledge of illness and modern healthcare.

Seeking advice and negotiating access

In Uganda, 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 (Nsungwa-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 et al. 2003; Friend-du Preez, Cameron and 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 averse to modern healthcare, thinking that taking a child to the hospital will result in death (Comoro et al. 2003). In Mali, sub-Saharan Africa, 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 Nigeria, as 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 mothers to make healthcare decisions, and to leave the home and seek outside care are critical to child survival and well-being (Vikram et al. 2012; Malhotra et al. 2012; Chakraborty and 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 and Haas 2005; Abuya, Ciera and Kimani-Murage 2012; Omariba, Beaujot and Rajulton 2007). Access to medical healthcare is influenced by both household residence and socioeconomic status (Abuya et al. 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. In Mali, 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). Community health workers, including traditional birth attendants, as well as other non-biomedical healers 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 biomedical 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 in South Africa, traditional healers are consulted to address supernatural causes (Friend-du Perez et al. 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. Beiersmann 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 and Molyneux 2007; Friend du-Preez et al. 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 et al. 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 and Weiss 2007; Deressa, Ali and 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 and Frisbie 2005; Chen, Xie and Liu 2007; Shah and Dwivedi 2011; Blum, Sharmin and Ronsmans 2006; Frankenberg, Suriastini and Thomas 2005). Willingness to utilize biomedical healthcare is associated with maternal characteristics previously discussed such as education and socioeconomic status (Kumar and Mohanty 2011). In addition, if a health facility, healer, or any other treatment is successful, caregivers in South Africa are more likely to use that agent again in the future (Friend du-Preez et al. 2009). If caregivers have previous experiences with biomedical providers that are positive and are more likely to seek such care again, then increasing the utilization of biomedical care should encourage future use.

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 19 countries in sub-Saharan Africa. Our aim is to further understanding of illness treatment decisions that begin in the home and are vital to child survival in this part of the world where rates of child mortality remain high. 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 19 countries within sub-Saharan Africa 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 32,627 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 the treatment 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) only middle layer treatment sought (includes pharmacy, traditional healer, etc.), and (3) biomedical treatment sought for symptoms.

Caregiver recognition and response—Based on the model by Colvin and colleagues (2013), we measure the caregiver's ability to recognize and respond to illness using measures associated with maternal healthcare knowledge. We include maternal age, education, exposure to mass media, and modern contraceptive intent as indicators of health or reproductive knowledge. Age is measured in years. Education is based on an ordinal measure coded from 0 to 2 according to the following categories: (0) no formal education, (1) incomplete primary to incomplete secondary, and (2) complete secondary and higher. Mass media exposure is a summary measure that averages responses to three questions asking how often the child's mother (1) reads a newspaper, (2) listens to the radio, or (3) watches TV. The scale for all three questions is 0= not at all, 1=weekly, 2=daily. Responses to these three questions were averaged to create a scale of media exposure from 0=not all, to 2=daily. The media measure only indicates the level of exposure to newspaper reading,

television watching, and radio listening – not the content of the media consumed. Modern contraceptive intent is a dichotomous measure coded 1 if the child's mother has used or intends to use modern contraceptive methods in the future, and coded 0 otherwise.

Seeking advice and negotiating access—The second mode in the Colvin et al. (2013) model is the caregiver's ability to seek advice and negotiate access to healthcare. Measures of maternal advice seeking and negotiating include women's autonomy to make healthcare decisions. 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 a say in her own healthcare.

Measures of the caregiver's ability to negotiate access include needing permission, as well as financial and distance concerns. In addition, urban/rural residence and socioeconomic status are indicators of the ability to acquire healthcare. Respondents were asked about accessing medical advice or treatment for themselves and if certain factors were (0) no problem, (1) not a big problem, or (2) a big problem preventing them from obtaining medical care. Factors measured include getting permission to go, getting money needed for treatment, and distance to the health facility. Residence is a dichotomous variable indicating whether the respondent lives in a rural (0), or urban (1) area. Socioeconomic status is measured by a wealth index that 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.

Accessing formal biomedical services—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).

Our sample includes children with symptoms of diarrhea, fever, or cough which may require different treatments. We, therefore, analyze our models separately by illness and control for the child's age in months. The analyses treat cases as illness events because children may have experienced more than one symptom. 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 mother's healthcare knowledge, maternal advice seeking and access, and past biomedical experience to predict the type of treatment sought.

Further, the DHS data are hierarchical in that children are nested within households, and households are within countries. Multi-level modeling is needed to adjust for the hierarchical nature of the data; to address this we utilize fixed effects models in STATA

(version 14) that adjust for both the nesting within households, as well as within countries. Prior to presenting our multivariate results, we present descriptive statistics of our predictors by the treatment sought.

Results

Descriptive statistics are first presented for our predictive factors by the type of treatment sought, as well as for all sampled children under age five (see Table 1). In the sample, 41 percent of the children received no treatment for any illness symptoms, 12 percent received at most a middle layer treatment, and 47 percent received a biomedical treatment. Children could have more than one illness symptom, but of those identified, fever and cough (56%) were more common than diarrhea (43%). More children on average receiving biomedical treatment had multiple symptoms, especially fever.

The average maternal age was about 28.7 years, and average education levels were relatively low – incomplete primary or secondary school (see Table 1). Media exposure was also relatively low (less than weekly on average); frequencies of the individual factors averaged to measure media exposure indicate that 24% of the children had mothers with no media exposure (newspaper, TV, or radio), only 1% had mothers that read a newspaper daily, 6% that watched television, and 19% that listened to the radio daily. About 68 percent of the children had mothers that reported modern contraceptive use or intent (see Table 1). Overall, descriptive statistics in Table 1 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 cost 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, most of their mothers (81%) received prenatal care prior to birth from a nurse, and only 6 percent had the birth attended by a medical doctor. On average children in the sample were 2 years old and had received 5.4 vaccinations by the survey date. A slightly higher percentage of children that received biomedical treatment were also born with a trained 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 presented separately by illness (diarrhea, fever, cough). In terms of child age, the older the child in months, the greater the odds mothers did not seek biomedical treatment relative to middle layer or no treatment. Measures of maternal

healthcare and reproductive knowledge indicate that older mothers were less likely to seek treatment for fever and cough relative to younger mothers. Children with more educated mothers had higher odds of receiving treatment, but there was no difference by maternal education in terms of seeking middle layer versus biomedical treatment. Patterns for media exposure were similar except that greater media exposure increased the odds that biomedical treatment was sought over middle layer treatments for fever. In addition, if the child's mother was accepting of modern contraception, the child had a higher odds of receiving treatment, but again this was not predictive of the type of treatment sought.

The problem of getting permission to seek medical treatment was not predictive of treatment options for any of the illness symptoms; however, if the child's mother did not have a say in her own healthcare, the odds the child received no treatment for diarrhea increased, as did the odds of receiving middle layer over biomedical treatment if treatment for diarrhea was sought. Not having a say in healthcare was detrimental to seeking treatment for diarrhea, but not predictive of treatment for fever, and only predictive of receiving any treatment for cough. In contrast, cost was predictive of seeking treatment for fever and cough, but not predictive of diarrhea treatment. If money was a big problem, the odds that children were not treated for fever increased, and the odds they received biomedical treatment over middle layer were reduced; cost was also a factor in receiving biomedical treatment over middle layer treatments for cough. Greater wealth increased the odds that biomedical treatments were sought over middle layer for both fever and cough. Distance was a factor inhibiting treatment for all three illnesses. In particular, if distance was a big problem, the odds were greater that children were not treated for diarrhea or fever, and distance was a factor predictive of receiving middle layer rather than biomedical treatments for all three symptoms.

Previous interactions with biomedical healthcare such as vaccinations, prenatal care, and having a trained birth attendant were all predictive of seeking biomedical treatment for diarrhea, fever, and cough. The pattern is similar for all three illness symptoms – previous relationships with biomedical care increased the odds that such treatments were sought for later child illness. The reverse was also found; the odds of no treatment for any of the three illness symptoms were greater for children with mothers that had a non-medical birth attendant.

Discussion

Since the implementation of the United Nations Millennial Development Goals, reductions in child mortality have been achieved globally, but sub-Saharan African countries continue to lag behind these trends (WHO/UNICEF 2010). Global policy efforts have focused on prevention and treatment, but pneumonia and diarrhea remain the primary killers of young children in Africa (WHO/UNICEF 2013). Both fever and cough are symptoms of pneumonia and are primarily treated with antibiotics that require biomedical access. In contrast, diarrhea treatment often utilizes oral rehydration salts that can be obtained from community health clinics, or even some pharmacies (WHO/UNICEF 2013). In an effort to further understanding of how caregivers respond to child illness, we focused our analyses on

the symptoms of cough, fever, and diarrhea which are symptoms of the primary child diseases in sub-Saharan Africa.

Building upon the household recognition and response framework proposed by Colvin and colleagues (2013), we examined factors predictive of caregiver response to symptoms of pneumonia and diarrhea. In order for caregivers to recognize and respond to symptoms of such illnesses, they need healthcare knowledge. In concurrence with past studies, we found that women with higher education, media exposure, and contraceptive use were more likely to seek treatment for child illness (Abuya et al. 2012; Frost et al. 2005; Sastry and Burgard 2011; Vikram et al. 2012; Westoff and Koffman 2011).

Our indicators of healthcare and reproductive knowledge were predictive of seeking treatment, but not the use of biomedical over middle layer treatments. Education and media exposure levels in our sample of sub-Saharan African mothers were relatively low and may be sufficient to promote seeking treatment, but not sufficient to encourage the utilization of biomedical treatments over middle layer treatments. In our sample, 44% of children had mothers with no education and 83% had at most complete primary schooling. Raising the level of education to completed secondary may be necessary to further promote biomedical treatments; further research is needed to determine such thresholds in sub-Saharan Africa. Current levels of maternal education and media exposure appear to be predictive of seeking treatment for illness, but not specifically biomedical treatment.

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 have no say in their own healthcare they are unlikely to seek treatment in response to child illness (Comoro et al. 2003; Ellis et al. 2007). In addition, cost and distance were big problems faced by caregivers in negotiating access to healthcare. Cost was particularly important in treating fever and cough, whereas distance was predictive of seeking biomedical care for diarrhea, as well as fever and cough. In some African cultures, 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 et al. 2009). Thus, maternal healthcare decision-making, as well as finances and physical access are necessary for caregivers to negotiate access to biomedical care for child illness in sub-Saharan Africa.

Finally, past experience with modern medical care such as prenatal care, having a skilled birth attendant, and getting immunizations was predictive of using biomedical services in response to 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 et al. 2007; Deressa et al. 2009; Kamat 2006). Positive experience with skilled medical care increases the likelihood that such treatment is sought in the future (Friend du-Preez et al. 2009). Given this pattern, we expect that increased biomedical access for early child health (prenatal care, trained birth attendant, and immunizations) will only increase the likelihood that children in sub-Saharan Africa continue to receive biomedical treatment for childhood illnesses in the future.

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. Caregivers need the autonomy to make decisions regarding healthcare for themselves and family members –in addition to 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, mainly due to cost or distance. To determine whether middle layer choices are a prelude to biomedical use, or a feasible alternative when medical care is inaccessible needs further exploration.

However, it should be noted that only 12% of children in our study received middle layer treatments, whereas some 40% received no treatment at all, and almost half received biomedical treatment – thus, biomedical or no treatment were the main responses. In addition, the ability of various factors in our analyses to predict treatment differed somewhat by illness symptoms. It may be that caregivers are more aware of home or middle-layer alternatives to treating diarrhea (such are oral rehydration packets), but not in treating cough or fever; or caregivers may be more likely to seek biomedical treatment for cough, and especially fever, because these symptoms are considered more severe than diarrhea. Further research is needed to better understand the treatment decision-making process, including how it varies by illness.

Our study expands previous research modeling illness response in individual countries by applying a household response framework to 19 countries in sub-Saharan Africa – a region where child mortality levels remain high. In addition, we provide a quantitative test of the model Colvin and colleagues (2013) developed from qualitative studies in sub-Saharan Africa. Our analysis, however, is limited by cross-sectional data; longitudinal studies are needed to fully test the Colvin (2013) recognition and response model. Longitudinal data would allow the study of response sequencing if caregivers seek multiple options in response to child illness. In addition, we were unable to model illness recognition as the first step towards illness response.

However, even given these data limitations, our study provides a first step in modeling household decision-making and response to child illness in sub-Saharan Africa. 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.

References

Abuya BA, Ciera J, Kimani-Murage E. Effect of mother's Education on child's Nutritional status in the slums of Nairobi. BMC Pediatrics. 2012; 12:80. [PubMed: 22721431]

Adekanmbi VT, Kayode GA, Uthman OA. Individual and contextual factors associated with childhood stunting in Nigeria: A multilevel analysis. Maternal & Child Nutrition. 2011; 9:244–259. [PubMed: 22004134]

Ahorlu CK, Koram KA, Weiss MG. Children, pregnant women and the culture of malaria in two rural communities of Ghana. Anthropology and Medicine. 2007; 14:167–181. [PubMed: 27268391]

Alldendorf K. The quality of family relationships and use of maternal health-care services in India. Studies in Family Planning. 2010; 41:263–276. [PubMed: 21465727]

Beiersmann C, Sanou A, Wladarsch E, De Allegri M, Kouyate B, Muller O. Malaria in rural Burkina Faso: local illness concepts, patterns of traditional treatment and influence on health-seeking behaviour. Malaria Journal. 2007; 6:106. [PubMed: 17686147]

Blum LS, Sharmin T, Ronsmans C. Attending home vs. clinic-based deliveries: perspectives of skilled birth attendants in Matlab, Bangladesh. Reproductive Health Matters. 2006; 14:51–60. [PubMed: 16713879]

Chakraborty P, Anderson AK. Maternal autonomy and low birth weight in India. Journal of Women's Health. 2011; 20:1373–1382.

Chen J, Xie Z, Liu H. Son preference, use of maternal health care, and infant mortality in rural China, 1989–2000. Population Studies. 2007; 61:161–183. [PubMed: 17558884]

Cho Y, Song S, Frisbie WP. Adverse birth outcomes among Korean Americans: the impact of nativity and social proximity to other Koreans. Population Research and Policy Review. 2005; 24:263–282.

Chuma J, Gilson L, Molyneux C. Treatment-seeking behaviour, cost burdens and coping strategies among rural and urban households in Coastal Kenya: an equity analysis. Tropical Medicine & International Health. 2007; 12:673–686. [PubMed: 17445135]

Colvin CJ, Smith HJ, Swartz A, Ahs JW, de Heer J, Opiyo N, Kim JC, Marraccini T, George A. Understanding careseeking for child illness in sub-Saharan Africa: a systematic review and conceptual framework based on qualitative research of household recognition and response to child diarrhea, pneumonia and malaria. Social Science & Medicine. 2013; 86:66–78. [PubMed: 23608095]

Comoro CN, simba SE, Warsame M, Tomson G. Local understanding, perceptions and reported practices of mothers/guardians and health workers on childhood malaria in a Tanzanian district -- implications for malaria control. Acta Tropica. 2003; 87:305–313. [PubMed: 12875923]

Deressa W, Ali A, Hailemariam D. Malaria-related health-seeking behaviour and challenges for care providers in rural Ethiopia: implications for control. Journal of Biosocial Science. 2008; 40:115–135. [PubMed: 17767791]

Ellis AA, Winch P, Daou Z, Gilroy KE, Swedberg E. Home management of childhood diarrhoea in southern Mali -- implications for the introduction of zinc treatment. Social Science & Medicine. 2007; 64:701–712. [PubMed: 17097788]

Falade CO, Ogundiran MO, Bolaji MO, Ajayi IO, Akinboye DO, Oladepo O, Adeniyi JD. The influence of cultural perception of causation, complications, and severity of childhood malaria on determinants of treatment and preventive pathways. International Quarterly of Community Health Education. 2005; 24:347–363.

Finlay JE, Özaltin E, Canning D. The association of maternal age with infant mortality, child anthropometric failure, diarrhea and anemia for first births: evidence from 55 low- and middle-income countries. BMJ Open. 2011; 2:e000226.

Frankenberg E, Suriastini W, Thomas D. Can expanding access to basic healthcare improve children's health status? Lessons from Indonesia's 'Midwife in the Village' Programme. Population Studies. 2005; 59:5–19. [PubMed: 15764131]

Friend-du Preez N, Cameron N, Griffiths P. *Stuips, spuits* and prophet ropes: the treatment of *abantu* childhood illnesses in urban South Africa. Social Science & Medicine. 2009; 68:343–351. [PubMed: 19028413]

Frost MB, Forste R, Haas DW. Maternal education and *child* nutritional status in Bolivia: finding the links. Social Science & Medicine. 2005; 60:395–407. [PubMed: 15522494]

Gribble JN, Murray NJ, Menotti EP. Reconsidering childhood under nutrition: Can birth spacing make a difference, An analysis of the 2002–2003 El Salvador National Family Health Survey. Maternal and Child Nutrition. 2009; 5:49–63. [PubMed: 19161544]

Hayford SR. Conformity and change: Community effects on female genital cutting in Kenya. Journal of Health and Social Behavior. 2005; 46:121–140. [PubMed: 16028453]

Heuveline P, Goldman N. A description of child illness and treatment behavior in Guatemala. Social Science & Medicine. 2000; 50:345–364. [PubMed: 10626760]

Hildenwall H, Rutebemberwa E, Nsabagasani X, Pariyo G, Tomson G, Peterson S. Local illness concepts -- implications for management of childhood pneumonia in eastern Uganda. Acta Tropica. 2007; 101:217–224. [PubMed: 17374351]

Kamat VR. "I thought it was only ordinary fever!" cultural knowledge and the micropolitics of therapy seeking for childhood febrile illness in Tanzania. Social Science & Medicine. 2006; 62:2945–2959. [PubMed: 16403595]

Kumar A, Mohanty SK. Socio-economic differentials in childhood immunization in India, 1992–2006. Journal of Population Research. 2011; 28:301–324.

Malhotra C, Malhotra R, Østbye T, Subramanian SV. Maternal autonomy and child health care utilization in India: results from the national family health survey. Asia-Pacific Journal of Public Health. 2012; 20:1–13.

Martín TC, Juárez F. The impact of women's Education on fertility in Latin America: Searching for explanations. International Family Planning Perspectives. 1995; 21:52–57. 80.

Measure DHS/ICF International. Standard Recode manual for DHS 6. Demographic and Health Surveys methodology. United States Agency for International Development (USAID). 2013

Nsungwa-Sabiiti J, Källander K, Nsabagasani X, Namusisi K, Pariyo G, Johansson A, Tomson G, Peterson S. Local fever illness classifications: implications for home management of malaria strategies. Tropical Medicine & International Health. 2004; 9:1191–1199. [PubMed: 15548315]

Omariba WR, Beaujot R, Rajulton F. Determinants of infant and child mortality in Kenya: an analysis controlling for frailty effects. Population Research and Policy Review. 2007; 26:299–321.

Othero DM, Orago AS, Groenewegen T, Kaseje DO, Otengah PA. Home management of diarrhea among underfives in a rural community in Kenya: household perceptions and practices. East African Journal of Public Health. 2008; 5:142–146. [PubMed: 19374313]

Pilkington H, Mayombo J, Aubouy N, Deloron P. Malaria, from natural to supernatural: a qualitative study of mothers' reactions to fever (Dienga, Gabon). Journal of Epidemiology & Community Health. 2004; 58:826–830. [PubMed: 15365107]

Pokhrel S. Determinants of parental reports of children's illness: empirical evidence from Nepal. Social Science & Medicine. 2007; 65:1106–1117. [PubMed: 17582668]

Sastry N, Burgard S. Changes in diarrheal disease and treatment among Brazilian children from 1986 to 1996. Population Research and Policy Review. 2011; 30:81–100. [PubMed: 21359099]

Schellenberg JA, Victora CG, Mushi A, de Savigny D, Dachellenberg D, Mshinda H, Bryce J. Inequities among the very poor: health care for children in rural southern Tanzania. Lancet. 2003; 361:561–566. [PubMed: 12598141]

Shah BD, Dwivedi LK. Causes of neonatal deaths among tribal women in Gujarat, India. Population Research and Policy Review. 2011; 30:517–536.

Sharkey AB, Chopra M, Jackson D, Winch PJ, Minkovitz CS. Pathways of care-seeking during fatal infant illnesses in under-resourced South African settings. Transactions of the Royal Society of Tropical Medicine and Hygiene. 2012; 106:110–116. [PubMed: 22136954]

Thind A, Andersen R. Respiratory illness in the Dominican Republic: what are the predictors for health services utilization of young children? Social Science & Medicine. 2003; 56:1173–1182. [PubMed: 12600356]

Vikram K, Vanneman R, Desai S. Linkages between maternal education and childhood immunizations in India. Social Science & Medicine. 2012; 75:331–339. [PubMed: 22531572]

Westoff CF, Koffman DA. The association of television and radio with reproductive behavior. Population and Development Review. 2011; 37:749–759. [PubMed: 22319772]

World Health Organization/United Nations Children's Fund (WHO/UNICEF). Countdown to 2015 decade report (2000–2010): Taking stock of maternal, newborn and child survival. Geneva, Switzerland: World Health Organization; 2010.

World Health Organization/United Nations Children's Fund (WHO/UNICEF). Ending preventable child deaths from pneumonia and diarrhoea by 2025: Executive summary. The Integrated Global

Action Plan for the Prevention and Control of Pneumonia and Diarrhoea (GAPPD). Geneva, Switzerland: World Health Organization; 2013.

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
		Total 32,627

Table 1

Means of factors associated with treatment of child illness in past two weeks (n =32,627)

Characteristic (range)	All children 100%	No treatment 41%	Middle layer 12%	Biomedical treatment 47%
Child characteristics				
Fever past two weeks	.56	.46	.57	.64
Cough past two weeks	.56	.55	.53	.57
Diarrhea past two weeks	.43	.40	.44	.46
Age in months (0 to 59)	25.57	26.55	26.67	24.43
Mother's knowledge				
Age in years (15 to 49)	28.71	29.06	28.60	28.44
Education (0 to 2)	.59	.50	.51	.68
Exposure to media (0 to 2)	.49	.43	.49	.54
Intent to use modern contraception (0,1)	.68	.63	.64	.73
Maternal advice seeking and access				
Permission is a problem (0 to 2)	1.09	1.15	1.09	1.04
Money is a problem (0 to 2)	1.50	1.57	1.51	1.43
Distance is a problem (0 to 2)	1.40	1.47	1.40	1.34
Others decide healthcare (0,1)	.48	.49	.57	.45
Urban residence (0,1)	.25	.21	.26	.28
Wealth index (−4.12 to 6.87)	−.11	−.21	−.12	−.02
Past medical decisions				
Child vaccines (0 to 7)	5.37	5.06	5.27	5.67
Prenatal care provider				
No prenatal care (0,1)	.12	.18	.12	.06
Nurse (0,1)	.81	.76	.81	.86
Doctor (0,1)	.07	.06	.07	.08
Birth attendant				
No attendant or family (0,1)	.17	.19	.22	.15
Other, non-medical (0,1)	.24	.30	.23	.20
Nurse (0,1)	.52	.46	.50	.58
Doctor (0,1)	.06	.05	.05	.07

Source: Demographic and Health Surveys

Table 2

Fixed effects, multinomial odds of no treatment, or middle layer treatment versus biomedical treatment by child illness

	Diarrhea (N=14,042)		Fever (n=18,258)		Cough (n=18,185)	
	No treatment (versus biomedical)	Middle layer (versus biomedical)	No treatment (versus biomedical)	Middle layer (versus biomedical)	No treatment (versus biomedical)	Middle layer (versus biomedical)
Child age in months	1.005 ***	1.007 **	1.009 ***	1.008 ***	1.013 ***	1.011 ***
Mother's knowledge						
Maternal age in years	1.004	.999	1.011 ***	.999	1.009 ***	1.000
Education	.893 *	1.043	.915 *	1.013	.886 **	1.035
Exposure to media	.846 **	.883	.851 **	.839 *	.892 *	.949
Birth control intentions	.801 ***	1.054	.886 **	1.008	.872 ***	.975
Advice seeking & access						
Permission is a problem	.964	.943	.972	.916	.973	.927
Money is a problem	1.056	.935	1.160 ***	1.154 **	1.060	1.161 **
Distance is a problem	1.092 *	1.274 ***	1.117 **	1.195 ***	1.073	1.142 *
Others decide healthcare	1.098 *	1.189 *	.979	1.062	1.094 *	1.091
Urban residence	1.093	1.026	.973	1.045	1.053	1.175 *
Wealth index	.984	1.036	.875 ***	.924	.889 ***	.976
Past medical decisions						
Child vaccines	.900 ***	.917 ***	.919 ***	.932 ***	.916 ***	.937 ***
Prenatal care provider						
No prenatal care (ref)	---	---	---	---	---	---
Nurse	.610 ***	.599 ***	.599 ***	.661 ***	.688 ***	.690 ***
Doctor	.596 ***	.528 ***	.512 ***	.667 **	.590 ***	.623 **
Birth attendant						
None or family (ref)	---	---	---	---	---	---
Other (non-medical)	1.162 *	.990	1.169 **	1.122	1.166 **	1.087
Nurse	.813 ***	.622 ***	.788 ***	.708 ***	.797 ***	.688 ***

	Diarrhea (N=14,042)		Fever (n=18,258)		Cough (n=18,185)	
	No treatment (versus biomedical)	Middle layer (versus biomedical)	No treatment (versus biomedical)	Middle layer (versus biomedical)	No treatment (versus biomedical)	Middle layer (versus biomedical)
Doctor	.762 *	.635 **	.719 ***	.577 ***	.726 ***	.653 **

Source: Demographic and Health Surveys

*
p < .05

**
p < .01

***
p < .001