

THE EFFECT OF COSTS ON HOUSEHOLD CHOICE OF MEDICAL CARE  
PROVIDER: AN ANALYSIS OF FOUR AFRICAN AND SOUTH ASIAN COUNTRIES

By

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To Ken, Kathleen, Vivi, and Amina for their love, support and guidance throughout my life and career. I could not have made it this far without you.

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## LIST OF ABBREVIATIONS

CHC	Community Health Centre
CL	Conditional Logit
DMC	Direct Medical Costs
DNMC	Direct Non-Medical Costs
GDP	Gross Domestic Product
GEMS	Global Enterics Study
HUAS	Healthcare Utilization and Attitudes Survey
IIA	Independence of Irrelevant Alternatives
IMC	Indirect Medical Costs
MNL	Multinomial Logit
NMNL	Nested Multinomial Logit
ORS	Oral Rehydration Solution
PHC	Primary Health Centre
RHC	Rural Health Centre
SC	Sub-Centre
TMC	Total Medical Costs
WHO	World Health Organization

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South Asian and sub-Saharan African governments face immense economic and social challenges along with fragmented and weak health care systems. These factors have caused health system performance to be among the worst in the world.

Understanding factors that influence patient and household health care decision-making and vary by medical provider are necessary conditions for determining which policies to target in order to improve system performance. Among such factors, this dissertation's primary objective was to examine whether and under what conditions out-of-pocket, transportation, time and total costs influenced households' choice of self, private informal, private formal or public care for childhood diarrheal illnesses. It specifically assessed cost-choice elasticities for these four choices as well as how they varied by household wealth.

This dissertation utilized household data from the Healthcare Utilization and Attitude Survey, a 2010 cross sectional survey examining childhood diarrheal illnesses from Gambia, Kenya, Pakistan and India. An economic model on household demand for medical care was developed and then operationalized through a series of multinomial nested logit models. Cross country findings indicated that all cost

categories generally influenced households' choice of medical provider, though they were largely cost inelastic. Results varied by wealth group, with poorer households more responsive to cost changes than wealthier families. As costs rose across external provider types, households were most likely to self treat rather than seek care. A significant share of households also sought informal care despite higher costs and worse clinical quality.

To improve access and stimulate demand for formal medical care, particularly among the poor, policymakers must focus on two areas: (a) reducing time and transportation costs across all providers, while eliminating user fees in the public sector; and (b) improve transparency of costs and quality to improve household decisions. Future work should consider alternative organizational and quality factors like workforce and supply availability, patient satisfaction, trust, flexibility and efficiency, as these may significantly impact household medical decisions

## CHAPTER 1 INTRODUCTION

### **Overview**

Middle and lower income countries are becoming increasingly aware of the important role that effective, efficient and equitable health care systems have on the economic and social well being of their populations – particularly vulnerable populations. According to Roberts et al (2008), the development of health care systems and subsequent reform efforts aim to achieve four performance goals: health status, financial risk protection, public satisfaction and equity (Roberts et al., 2008).

Health status refers to the assumption that despite the various means by which nations structure their health care systems, individual and population health is a necessary condition for maintaining strong economic and social development. Because health status is intrinsically important to all individuals, an adequate supply of health services is essential to achieve good health (Hsiao, 2008).

Financial risk protection aims to minimize the risk to individuals and households of incurring catastrophic or otherwise substantial costs – due either to lost productivity or direct spending -- as a result of poor health. Public satisfaction with the financing and delivery of care is also critical to the long run success and sustainability of any health care system, while a certain degree of equitable access to care across socio-economic or socio-cultural groups lies at the foundation of most systems (Hsiao, 2008).

The current situation in middle and lower income nations, particularly in sub-Saharan Africa and South Asia, is one in which governments face immense economic and social challenges along with fragmented and weak health care systems. Despite the dire need for health care systems that equitably and efficiently increase access to

quality health care, countries in both regions often lack the economic, technical, human and regulatory capacity to implement such systems and effectively reform their financing, payment and organizational structures. Consequently, health status of the population, financial risk protection, public satisfaction and equity in access to high quality, low cost health care are among the worst in the world.

Academics and policy makers have long acknowledged the need to understand both demand and supply side factors influencing patient and household health care decision making as a critical consideration in determining which financing, organizational, payment or regulatory mechanisms to target in order to improve health system performance goals (Grossman, 1972; Anderson, 2008; Culyer and Newhouse, 2000). More specifically, solving ongoing, health system problems requires that policymakers understand three areas. First, they must recognize which and to what degree different supply and demand side factors – either individual, household or market based – broadly encourage or inhibit patients from accessing and utilizing high quality health care services when needed (Jacobs, 2011). Next, policymakers must understand which and under what conditions these factors influence patients' choice of public, private formal and private informal health care providers as well as self care. Finally, by examining how quality, cost and access differ among public, private formal, private informal as well as self care and then comparing them with households decision patterns and rationale for making those decisions, policymakers can assess which financing, organizational, payment or regulatory systems should be reformed and how.

An ample body of literature on developing nations, particularly those in sub-Saharan Africa and South Asia, has addressed each of these three areas, to different

degrees and with different variables. More specifically and within the context of this dissertation, economists and health care researchers have spent the last four decades examining the impact of costs on access to, utilization of and demand for health care services (Grossman, 1972, Anderson, 2008, Culyer and Newhouse, 2000). The majority of this literature focuses on how costs broadly influence access to and utilization of health care services, with particular emphasis on the effect of direct out of pocket costs as a consequence of user fees or informal, under the table charges to patients and households (World Health Organization, 2011).

While important, this research offers limited information on specific household and provider behaviours on which governments may base health care policies. Yet papers often suggest broad and disparate policy solutions based on these results, such as the wide spread introduction of insurance, a reduction in user fees or improved education to combat information asymmetry (World Health Organization, 2011). Very few existing studies of countries in sub-Saharan Africa or South Asia have conducted household level analyses measuring the extent to which direct, out-of-pocket costs impact their behaviour and health system performance goals, and then used this information to offer specific policy mechanisms that may improve access to, costs of and quality of care. The small though still significant body of literature taking this route has often evaluated how direct, out of pocket costs influence patients' choice of health care provider or assessed how direct medical costs differ by provider type, but has rarely done both.

Health economists have further pointed out that total costs are not merely a function of direct, out of pocket spending but should also include direct non-medical

costs, such as transportation costs, as well as indirect costs, specifically the time costs and productivity loss of traveling to and waiting for a health care provider (Becker, 1965; Acton, 1973; Grossman, 1972). These costs have been studied less extensively than direct, out of pocket costs, with theoretical research being the primary focus and empirical research largely targeting how direct non-medical and indirect costs broadly influence access to and utilization of health care services (Acton, 1975; Culyer and Newhouse, 2000). This research also offers limited, household and country-specific information for policymakers looking to effectively target and reform different financing, organizational, payment or regulatory mechanisms.

The small body of empirical work on whether and under what conditions these costs influence patients' choice of health care provider is mostly qualitative rather than quantitative in nature. Studies that have empirically examined direct non-medical and indirect costs on provider choice have operationalized these variables as either distance or time but not in dollars or local currency (Gertler et al., 1987; Acton, 1975; Dor, 1987; Culyer and Newhouse, 2000). Moreover, no studies to date have assessed how direct non-medical and indirect costs differ by provider type.

### **Objectives**

The overarching goals of this dissertation are to explain how costs influence the performance goals of sub-Saharan and South Asian health care systems and provide recommendations as to which financing, organizational, payment or regulatory policy mechanisms should be considered to improve them. More specifically, the major objectives of this dissertation is:

1. To assess whether and under what conditions direct medical, direct non-medical, indirect and total costs influence households' choice of self, private informal, private formal or public care for childhood diarrheal illnesses.

2. To determine if and to what extent wealth influences the relationship between costs and households' choice of medical provider.

Related objectives are:

3. To measure how quality of care as well as direct medical, direct non-medical, indirect and total costs differ among households utilizing self, private informal, private formal and public care for childhood diarrheal illnesses.

This dissertation utilizes household survey data on childhood diarrheal illnesses from five different, developing countries in sub-Saharan Africa and South Asia: Gambia, Kenya, Pakistan, and India. Given the wide variation in severity of childhood diarrheal illnesses, its interconnectedness with household decision making and its high prevalence throughout all five nations, this dataset will allow a generalizable and comprehensive examination of the research questions (Black et al., 2003; World Health Organization, 2008). Furthermore, the cultural, geographical, economic and political differences among the four countries will (a) improve the generalizability of findings, (b) provide more in-depth information on the conditions in which costs influence households' choice of health care provider and thus (c) allow policymakers in these and other developing nations to better understand which policy mechanisms will impact health system performance goals under different environmental conditions.

### **Significance**

The significance of this dissertation can be summarized in three areas. First, no existing research has assessed how direct non-medical or indirect costs, as measured in dollars or local currency, influence households' choice of health care provider. This stems from the paucity of existing data in developing nations, which until now have not included these costs variables into an econometric model. Henceforth, no studies have modelled the behavioural impact of direct medical, direct non-medical and indirect

medical costs on households' choice of medical provider in the same equation. This dissertation will both expand the literature on direct non-medical and indirect costs as well as assess the variation in household health care decisions attributed specifically to direct medical, direct non-medical and indirect costs.

Further, no studies to date have categorized households' choice of medical providers as public, private formal, private informal and self-care. Many have broadly grouped health care providers as either public or private or in some cases informal or formal care; other papers include additional, more specific provider types, though these often consist of ambiguous categories such as pharmacies or health centres which may, depending on the country, be both public and private or formal and informal. By effectively categorizing and operationalizing provider choice into four distinct groups, this dissertation will offer a more insightful, comprehensive and generalizable analysis of different health care provider groups that are both important to households and have not yet been studied in depth.

This study will uniquely assess the interactive impact that wealth has on the relationship between costs and household medical behavior. It will offer both own and cross cost elasticities of demand by provider type, cost type and wealth group. In other words, results will assess the degree to which demand falls as costs rise for a given provider type, the degree to which demand rises for other provider types as this occurs, and the extent to which this happens by household wealth. These more in-depth findings will allow Gambian, Kenyan, Pakistani and Indian policymakers to tailor health care policies to specific populations.

This dissertation's related objectives also improve the depth and breadth of the primary research objective. Knowing how costs and quality differ among public, private formal, private informal and self-care will allow this dissertation to compare and contrast households' behaviour and perceptions with the actual costs and quality of medical care. In other words, if households perceive that costs are the highest and quality worst in the public sector, when in fact the opposite is true, education based policies could reduce information asymmetries and more effectively improve health system performance by stimulating demand for public care. On the other hand, if households are utilizing lower quality but less costly self treatment methods because costs are genuinely higher in the public sector, financing policies to reduce the cost of public care would more effectively improve health system performance.

## CHAPTER 2 COUNTRY BACKGROUNDS

### **Overview**

According to the World Bank, of the 1.35 billion people living on \$1.25 per day or less, 91% reside in sub-Saharan Africa and South Asia, with nearly all living without adequate food, water or housing (World Bank, 2010). Intense poverty has led both children and adults to be increasingly vulnerable to malnutrition and poor sanitation, which in turn elevates their susceptibility to gastrointestinal illnesses such as Hepatitis E and typhoid, as well as respiratory infections like tuberculosis (Kosek, 2003; Guerrant, 2002). Across the world 7.6 million children under the age of five die every year from preventable illnesses, with 40% of those resulting from diarrheal infections or malnutrition (Black et al., 2003; Edejer et al., 2005; Murray et al., 2007; Haines et al., 2007; World Health Organization, 2011). Roughly 70% of these 7.6 million deaths occur in sub-Saharan Africa and South Asia, with 17.5 and 11% of all children dying before the age of five, respectively.

The most compelling evidence that poorly constructed health care financing, organizational, payment, regulatory or behavioural systems catalyse and exacerbate poor performance can be found in rural areas of sub-Saharan Africa and South Asian nations where upwards of 80% of the population resides. Governments throughout both regions heavily finance health care through inefficient yet equitable general tax revenues, thus leading most publically provided services to be theoretically free from user fees and other cost sharing mechanisms; in practice, however, given poor regulation and weak payment schemes public providers often charge under the table fees for patients (Roberts et al, 2008; Preker, Scheffler and Bassett, 2007).

The supply of public providers ranges from small, local clinics run by minimally trained medical staff to large hospitals with many physician specialists and services. Severe shortages in the type and number of existing public providers frequently result in failures to meet patients' demand for medical care, while corruption among public officials has meant that money and power, not population need, drive where new facilities are built (Chopra et al., 2008).

Existing public health care providers are often located far from rural patients, and inadequate transportation, long distances and poor roads compound the economic burden to rural households by driving up time and transportation costs (Banerjee, 2004). Severe absenteeism by public health providers, a frequent shortage of medical supplies and inconsistent flow of electricity, sanitation or water increase the uncertainty of access, quality, availability and cost of medical care. The lack of available medical supplies and drugs often means that patients must seek and pay out of pocket for medications on the private market. The overall shortage of public providers means that functioning facilities are extremely crowded and often operate beyond capacity (Lehmann et al., 2008; Randon et al., 2010). Poor payment incentives and management and regulatory mechanisms promote absenteeism, inconsistent work hours, reduced provider morale and satisfaction as well as overall inefficiencies which are then passed on to patients through weak customer service and higher costs (Lehmann et al., 2008).

Failures throughout the public health system stimulate demand for and growth in the private health care sector, as well as drive households to self treat in the event of illness. The private health care sector can be broken into two components, formal and

informal care, with differences between the two being largely whether providers are formally trained, registered, accredited and/or working in the confines of a publically regulated health care system (Lehmann et al., 2008; World Health Organization, 2008). Generally speaking, while private health care providers appear more willing to meet some unmet patient demands, such as closer proximity, lower wait times, better customer service, greater trust and more flexible payment schedules, they leave other performance goals untouched. Notably, technical quality of care can be much more variable and less consistent than public care, and direct, out of pocket costs to patients are often much higher than public care (Ranson et al., 2010).

General experience across sub-Saharan Africa and South Asia suggests that wealthier households have the resources to seek and utilize better quality, formally trained health care providers in private and public sectors (Ranson et al., 2010). Poorer households, on the other hand, tend to substitute worse quality, informal providers or self-care for less accessible public health care providers (Ranson et al., 2010; World Health Organization, 2008; World Health Organization, 2011). These countries have developed two-tiered health systems, in which wealthier households utilize more and better quality care while spending much less as a portion of total income than their poorer counterparts; this behaviour in turn leads to better health outcomes and economic productivity (Onwujekwe et al., 2010). Without targeting the right financing, organizational, payment, regulatory or behavioural policy mechanisms, countries are left with weak health care systems and ultimately worse overall performance on goals such as equitable access to high quality care, financial risk protection and health status.

The rural, health care systems across sub-Saharan Africa and South Asian nations illuminate two glaring challenges for governments looking to improve their desired performance goals. First, complex relationships across financial, payment, organizational and regulatory structures only exacerbate on-going obstacles facing these struggling health care systems. Consequently, how to reform these systems to improve health care equity, financial risk protection, public satisfaction and health outcomes will be equally complex and interactive. Second, extremely limited economic, technical, human and regulatory capacity in these countries inhibits the extent to which comprehensive health care reform is possible and requires that any reforms be planned as efficiently, effectively and carefully as possible to achieve intended performance goals.

### **Gambia**

Given Gambia's historical low and volatile investment in health and health care between 1990 and 2006 (3.4% of total GDP and 5.6-13% of government expenditures), its health sector has lagged behind countries of similar economic background despite performing better than most other sub-Saharan African nations (World Bank, 2005). Performance goals such as health status remain largely stagnant, with under age five and infant mortality rates lingering around 110 and 92 per 1,000 live births since 2000, 25% of all children being malnourished and underweight while life expectancy remains only 53 years (World Health Organization, 2009). As is true for the entire region, malaria, diarrheal illnesses and acute respiratory infections account for the majority of all under-five mortality and morbidity. Health outcomes also vary considerably by region and socio-economic status, with lower income households experiencing greater

childhood diarrheal and respiratory cases, malnutrition, mortality and morbidity (World Health Organization, 2009).

The organizational structure of Gambia's health care system revolves around a traditional, private health sector and a formal, three tiered public health care system, with the primary level focusing on local, community clinics and village health centres, the secondary level comprised of minor and major health centres and the tertiary level being large, urban hospitals (World Bank, 2005). Four tertiary public and six private hospitals offer an array of surgical procedures and specialist physicians, nurses and other health professionals; because these facilities are rarely accessible for rural households, seven, major secondary centres attempt to bridge this gap and provide some surgeries and physicians to semi-urban and rural areas (World Health Organization, 2009). Moreover, 38 minor, secondary facilities are run by nurses, nurse midwives and community nurse attendants and act as the primary source for outpatient, child and maternal care services in the country. Roughly 500 community clinics, village health services and household medical units (those traveling to patients' homes) make up Gambia's primary health care system, which is located solely in rural areas, offers preventative and minor care and is operated by minimally trained, traditional birth attendants and village health workers (World Health Organization, 2009).

A smaller, private sector has emerged in Gambia, though households utilize public sector care more frequently than in other sub-Saharan African countries; evidence suggests that malaria, diarrhoea, respiratory infections and skin problems are the most common reasons that households seek all forms of public care (World Health Organization, 2009). Formal, private providers such as small, independent

practitioners, clinics and drug vendors do exist, though if households seek private care they are most likely to visit larger hospitals in urban areas or informal, traditional healers in rural areas as a gateway into the health care system. Few studies on the country's private, formal or informal health care sector are available, however, thus stimulating a need for work examining organizational components and interaction with households, among other aspects of the health care system (World Bank, 2005).

Gambia's dense population, small size and recent developments to public health infrastructure in lower income, rural areas ensure that physical access to basic health care services remains adequate, though disparities by income and region persist because health care providers are not evenly distributed across the country. According to a World Bank report, nearly 85% of households live within one hour of a primary, private or public health centre, while poorer and more remote, geographical households tend to live further away and require more time to access a health care provider (World Bank, 2005). These rural areas have poorly built roads and lack adequate transportation systems, given that taxis and buses may require significant wait times. Complicating these issues, the government allocates very few resources for reducing distance, improving transportation or expanding outreach care for patients (World Health Organization, 2009).

Organizational barriers to care instead stem from the health care system's poor payment and regulatory structures, which limit the supply of health care workers, drugs and other medical supplies; in turn such deficiencies have led to worse performance, notably wide variability in the quality of care provided, regional, geographic and income related access disparities and overall poorer health outcomes for underserved

populations (World Bank, 2005). With only one physician per 5,000 population, one nurse per 1,300 population and the total supply of health care workers declining from 1998 onward, Gambia has a severe shortage of health care professionals (World Health Organization, 2009). To ameliorate this problem, expatriates and foreign nationals account for roughly 91% of all physicians working in the public and formal, private sectors, with many Gambians -- particularly those like village health workers and nurse midwives who manage minor health care centres and local clinics -- moving internationally or to cities after being trained (World Bank, 2005).

While working conditions, social support and other intrinsic motivators contribute to outmigration, weak regulation and supervision coupled with stagnant, public sector salaries and poor financial incentives for rural health workers primarily drive this problem and are worse when compared to international standards (World Health Organization, 2009). Moreover, the inadequate stock of medical supplies and drugs in rural, poorer regions has been an issue for the most pressing diseases which require medications, such as malaria, childhood diarrheal and respiratory infections. While a strong, national emphasis on child health has ensured high utilization of primary, public care for these pressing illnesses, health system literature on Gambia cites drug, medical supply and workforce shortages as potential reasons for development in the private, informal sector and less than optimal use of formal, primary care (World Health Organization, 2009).

In Gambia's finance system, some smaller, community based insurance schemes, aimed at pooling financial resources and reducing the risk of catastrophic health care expenditures, have developed in rural communities in recent years;

however, no formal, private or social insurance mechanisms currently exist throughout Gambia (World Health Organization, 2009). Instead and as is true in other low income nations, the country's financing structure relies on local and federal government spending, which comprises around 46% of total health expenditures, with donors and households equally sharing the latter 54% (World Health Organization, 2009).

In Gambia, publically financed care comes from general tax revenue, thus implying that, with the exception of tertiary, large hospitals and some rural, village clinics, all publically provided care is theoretically free from consultation user fees and other cost sharing mechanisms – though informal payments likely exist (World Bank, 2005). However, since 1988 all public providers collect some user fees for medications which are used to acquire additional or new drugs. Because of its largely centralized health care system, however, financial resources collected through user fees and other revenue streams are siphoned to large, urban hospitals and major health centres (World Bank, 2005). Studies suggest that at least 50% of the government's total health care budget goes to tertiary care, while primary and secondary, public care receives the least funding (World Health Organization, 2009).

These financing decisions directly contribute to shortages in health personnel, drugs and other medical supplies throughout rural areas, which in turn impact performance goals like households' access to care, costs, public satisfaction and health outcomes (World Bank, 2005). For instance, several studies have linked these national financing decisions to rural, poorer households incurring at least twice the direct and indirect costs for public health care as their urban, higher income counterparts. This

further implies that health care makes up a significantly larger portion of poorer households' income than that of wealthier families (World Health Organization, 2009).

### **Kenya**

Kenya is a low income country in East Africa that has garnered international attention in recent years due to the development and reform of its health care system. Reforms have been largely in response to the democratization of its political system and a marked increase in disparities, particularly in access to health care services and health outcomes. Infant and child mortality rates across Kenya have risen since 1990, from 67 to 78 per 1,000 population and 98 to 114 per 1,000 population, respectively, while life expectancy has regressed to its 1962 level (Hsiao, 2007). The majority of childhood deaths stem from malaria, diarrheal illnesses and severe malnutrition. Despite reform efforts Kenya remains one of the most corrupt countries in the world, ranked 142 out of 163 nations, according to the World Bank (2006) given its weak judicial system (World Bank, 2006). Health system performance continues to suffer due to organizational, financing, payment and regulatory inefficiencies.

Kenya's federal government focuses on strategic planning, policy formulation, monitoring performance and resource mobilization across its health care system, while provincial and local governments are responsible for the provision of health care services (World Health Organization, 2009). The public health care system is structured as a six-tier model, with the first three tiers, community units, basic health facilities and health centres, offering a range of primary care and preventative services throughout rural areas. The fourth tier, which includes district health care facilities such as hospitals and health centres, are located in semi-urban areas and offer some complex curative services (World Health Organization, 2009). Fifth and sixth tiers are provincial

and national level hospitals, which, like those in other developing nations, provide specialty care, complex surgeries and exist only in urban cities.

According to the Ministry of Health (2002), publically provided services account for roughly 60% of all health care expenditures in Kenya with the rest being private, formal and informal care (Hsiao, 2007). Just over 53% of total expenditures come from district, provincial or national level hospitals; of this 53%, public and private hospitals make up 39 and 14%, respectively. Publically provided health centres, basic health facilities and rural community units make up another 10% of total expenditures, private clinics 10.5%, private drug stores 7.5% and informal, private providers 2% (Hsiao, 2007). It is thus important to recognize that public and private, formal care expenditures are evenly split across Kenya, while informal, private care makes up a small fraction of the total care provided.

Access to health care services remains a challenge, despite arguments from the Ministry of Health that the country has an adequate supply of health care facilities with 80% of all staff positions occupied (World Health Organization, 2009). First, inequities and disparities in the distribution of human resources, health care facilities, medical supplies and drugs remain a serious problem throughout Kenya. As is evidenced by the above breakdown in total expenditures, most resources are allocated to urban hospitals and away from rural, first and second tier facilities (World Health Organization, 2009). Second, many existing facilities are simply not functional given a lack of basic technical and administrative resources that facilitate transportation and communication.

Corruption and a lack of resources across national, provincial and district governments limit Kenya's capacity to regulate public and private health care providers

(World Health Organization, 2009). Despite acknowledging that the existing fee-for-service payment system must be changed to improve provider incentives, expand access to public health care services and reduce costs, resource limitations prevent this from happening and will take time to fix (Hsiao, 2007).

According to the World Health Organization, Kenya's recent reforms largely targeted its health care financing system (World Health Organization, 2007). General government tax revenue comprises 30% of total health care financing and has remained constant since 1994. While government health spending actually increased by 37% from 2002 to 2006, in relative terms the figure has actually declined as a proportion of total government spending and GDP (Hsiao, 2007). Despite poor regulatory mechanisms and the consequential existence of informal charges, user fees have been abolished in Kenya's public sector since the 1990s. Nonetheless, out of pocket costs for health care made up 53% of total health care financing in 1994. While the Ministry of Health cites that this figure has declined to 39% as of 2006, the World Health Organization suggests this figure is actually 47.5% (World Health Organization, 2009).

For wealthier households, private health insurance comprises around 10% of all health care financing. Recent reforms have attempted to develop a social health insurance mechanism to finance health care, but limited resource capacity, corruption and poor regulation has limited its reach to only those working in the formal sector and urban areas, or roughly 9.5% of Kenya's population (Hsiao, 2007).

### **Pakistan**

With India to the east and China to the north, Pakistan may be considered a South Asian country on paper, though geopolitically and culturally it is heavily influenced by the Islamic civilizations of its western neighbours, Afghanistan and Iran. Pakistan is

also geographically diverse, and its political and health care systems are heavily influenced by the British parliamentary and government run systems installed prior to independence in 1947 (World Health Organization, 2011). The constitution also delegates responsibility of implementing health care policies to provincial and local governments while the federal government plans, formulates, finances and provides some vertical health care programs like immunizations (World Health Organization, 2006).

Unfortunately, a lack of resources and an ineffective legal system have led to weak and corrupt governance as well as a poorly performing health care system. Many government policies benefit politicians, wealthy landlords or other civil servants, with the health care sector and other social services lacking adequate attention and funding (Ministry of Health, 2008). Pakistan performs poorly in the region on major health indicators with high fertility, infant mortality rates, child mortality rates (94 per 1,000) and maternal mortality rates (103 per 1,000), widespread malnutrition, low life expectancy and a double burden of communicable and non-communicable diseases (World Health Organization, 2006).

The public sector is organized as a four-tier health care system consisting of community or village facilities, primary care centres, referral care facilities and tertiary hospitals (Ghaffar, Kazi and Salman, 2000). Community facilities employ female health technicians, lady health workers and other minimally trained staff who provide preventative and basic maternal, child and family health services. These village facilities are located in rural areas and even offer home health visits to reach

households that may have trouble accessing the health care system (Ministry of Health, 2008).

At the next tier, primary health care centres include community health centres (MCH) and Basic Health Units that, at least technically, operate all day, six days per week and offer curative and antenatal care that is of higher quality and more intensive than those offered at community facilities (Ghaffar, Kazi and Salman, 2000). These centres may typically have 10 health professionals, including a primary care doctor, medical technician and other supporting nurse staff (Ministry of Health, 2008). Rural health centres (RHCs) are also included as primary health care centres, though they provide more comprehensive, outpatient and inpatient care. RHCs support 10-20 patients and employ approximately 30 staff, including a surgeon, primary care physician, medical officers, nurses and paramedics (Ministry of Health, 2008).

At the third tier, referral health facilities are located within urban areas and serve between 100,000 to 1,000,000 people, range from 40 to 150 beds and provide more advanced specialty care (World Health Organization, 2006). Finally, tertiary care hospitals provide some preventative and primary care, though they primarily offer the most complex, outpatient and inpatient care services in solely urban areas.

While access to public sector providers remains high for regional standards, only 20 to 30% of the population utilizes public health care, with the other 70 to 80% seeking private sector care; among the latter group, 40-45% utilize informal, private care (Ghaffar, Kazi and Salman, 2000). Some studies argue that equitable access to health care services is not a primary goal of federal and provincial governments and that the needs of rural, poor households are rarely considered during the planning and

development of public care facilities, as government allocates few resources towards improving transportation and reducing travel time for underserved populations (Ghaffar, Kazi and Salman, 2000).

Pakistan's formal, private health care sector includes hospitals, nursing homes, small clinics and individual practices. Private and public hospitals compete for patients as they are both located in urban areas and provide specialty care, surgical procedures and employ an array of physicians, nurses, inpatient and outpatient departments (Ministry of Health, 2006). Nursing homes tend to locate in urban or semi-urban areas and offer long term care to wealthier populations.

The quality, drug supply, type and number of providers in clinics and individual practices varies tremendously, with those in urban areas run by specialists and well-trained physicians; providers located in rural areas are more likely to offer worse quality, fewer services and employ minimally trained health care providers (World Health Organization, 2006). The existing literature acknowledges the strong presence of informal or non-qualified health care providers throughout Pakistan's rural areas in addition to homeopathic doctors scattered across the country (Ministry of Health, 2008). Some studies find that roughly 70% of the population utilizes formal, traditional medicine, with providers being integrated into Pakistan's health care system and operating mostly in rural areas (World Health Organization, 2006). However, little is known about the organization and delivery of health care services by informal, unqualified health care providers.

A number of workforce, equipment and supply limitations can be found throughout Pakistan's public health care sector and are driven by poor regulatory and

payment mechanisms. Historical evidence suggests that most public care providers also work in the private sector, given weak, government-based financial incentives and poor working conditions in public facilities, particularly in rural areas (Ghaffar, Kazi and Salman, 2000). Workforce imbalances have also plagued the health care system with an immense oversupply of physicians and undersupply of nurses and skilled birth attendants, the latter of whom are especially important in rural and underserved areas. Recent reforms have restricted public providers from working in the private sector, which has led physicians and nurses to quit their jobs and enter into private practice (World Health Organization, 2006).

Despite the public sector offering better and more stable, clinical quality of care, the population, particularly households in rural settings, utilize formal and informal, private providers more frequently. Private facilities often lack necessary equipment and tools to provide care, buildings are poorly maintained, and provider absenteeism remains a severe problem (Ministry of Health, 2008). Some studies have found that private health care centres in rural areas may be owned by physicians, but in practice unqualified health workers treat patients while physician owners are largely missing (Ghaffar, Kazi and Salman, 2000). Studies have also found that formal and informal, private providers frequently overcharge patients as well as stimulate greater demand for drugs and services than may be clinically necessary (World Health Organization, 2006).

Consequently, quality of care offered by formal and informal, private providers is highly inconsistent, with clinical performance and health outcomes being much worse for individuals utilizing these sectors (Ministry of Health, 2008). Provider behaviour

largely stems from weak regulation by federal and provincial governments, which is further driven by inadequate financial, technical and human resources.

Roughly 20-25% of Pakistan's health system financing comes from government tax revenues and external, donor funding such as the World Bank, with total health care expenditures being around 4% of GDP and government spending 2-3% of its total budget on health care (World Health Organization, 2011). At \$18 per capita, health spending is far below the \$34 per capita recommended by the World Health Organization (World Health Organization, 2006). Unlike many other South Asian and developing nations, user fees and other cost sharing mechanisms exist across all public care providers. Unfortunately corruption and poor regulation limit how effectively these resources are spent on improving the quality and delivery of care (World Health Organization, 2006).

Payment and financing of both formal and informal, private providers occur through a fee-for-service mechanism, with costs and quantity of services having risen dramatically due to poor government oversight (Ministry of Health, 2008). Studies note that private, social and community insurance schemes are limited throughout Pakistan, resulting in nearly 75% of national health care expenditures coming from out of pocket household spending (World Health Organization, 2006; World Health Organization, 2011).

### **India**

India has seen considerable economic growth in the last two decades, particularly since opening its markets to the global economy, with annual GDP growth of 6.6% and a per capita income that has risen from \$1,800 U.S. in 1999 to \$3,500 U.S. in 2010 (Rao, 2005). However, closer scrutiny shows that India's income inequities are

growing larger and the many of its 1.13 billion citizens are struggling to fend for life's most basic resources.

Of particular interest, the rural population suffers from increasingly widespread gastrointestinal illnesses (ie. diarrhoea, typhoid, Hepatitis E), coughing diseases (TB, measles) and infections (malaria) (Patil et al., 2002). However, the greatest drivers of mortality and morbidity, particularly among children, are due to malnutrition, poor sanitation and poorly treated maternal complications. At the same time, health spending as a proportion of total government expenditures fell from 3.29% in 1985 to 2.63% in 2005; this trend runs counter to the demands of India's health care system, which is extremely fragmented and underfunded (Patil et al., 2002).

Despite plans to raise national spending and increase its focus on the health sector, India's current spending on health care is inadequate for a developing to middle income country – particularly one that has become a major player in the world economy (Rao, 2005). Moreover, with only 27% of government health expenditures going to rural areas, where nearly 70% of India's population resides, health system performance in areas such as equity, financial risk protection, public satisfaction and good health outcomes are failing (Gudipati, 2006; Rao, 2005).

India's government has created a three tiered, organizational structure within the public health care sector. At the primary level, sub-centres (SC) are meant to exist in most rural villages and each supports roughly 5000 people (Bajpai and Dholakia, 2006). They are run by two village health workers, both minimally trained but theoretically able to communicate healthy behaviours and provide basic health services. Primary health centres (PHC) act as the second health tier, which provide care for six sub-centres but

in practice support roughly 48,000 people (Gudipati, 2006; Rao, 2005). Each has 15 workers on staff with four to six beds. PHCs are designed to provide more complex health services as well as preventative and primary care. They also act as gatekeepers for Community Health Centers (CHC), which are the largest and best staffed public health facilities (Banerjee et al., 2004). CHCs are built to provide care for eight PHCs but actually serve 120,000 people on average; they each have 30 beds and are run by a combination of 25 physicians, nurses and paramedics, such as primary care doctors, surgeons and other specialists (Gudipati, 2006; Rao, 2005).

The actual public health care system, however, remains inefficient and ineffective, in part due to a significant shortage of SCs, PHCs and CHCs. Estimates suggest that 12, 15 and 50% of these facilities are missing, respectively (Rao, 2005).

As such, open centres are extremely crowded and operate beyond capacity.

Operational facilities tend to locate in inconvenient locations far from rural villages, thus posing a problem for poor households who have difficulty accessing public facilities due to inadequate transportation, badly built roads and insufficient funds (Banerjee et al., 2004).

A large private formal and informal sector has developed to meet the population's demand for more accessible care that offers a wider selection of health care services at different costs (Rao, 2005). The private sector comprises over 80% of the total health care market – a much larger figure than most nations in this study and around the developing world – and includes traditional healers, pharmacies, drug vendors, independent medical providers, health clinics and even large hospitals throughout urban areas. According to Bloom et al. (2011), Cross and MacGregor (2010), Kanjilal et al.

(2008) and Chowdhurt et al. (2007), it is impossible to know the exact proportion of formal and informal medical providers working in the private sector, though most of these individuals are informally trained.

India's problematic regulatory and payment structures further complicate the shortage in public health care facilities and expansion of private providers (Gudipati, 2006). Often public facilities will physically exist, but they may be completely void of health care workers; if they are open, visiting times are inconsistent and unreliable (Bajpai and Dholakia, 2006; Banerjee et al., 2004). The reason for absenteeism varies according to the provider, but most physicians, nurses and even lower level health professionals practice in the private market during off hours due to inadequate supervision. With poor regulation and no accountability, it is impossible to ensure that providers act in the public's best interest (Bajpai and Dholakia, 2006).

The private sector offers higher salaries than the public sector and allows complete freedom of practice, thereby becoming the clear choice among doctors (Rao, 2005). Moreover, because many rural health facilities are located in unsafe areas with few career, family or social opportunities, public providers are reluctant to work in smaller, rural clinics like sub-centres and primary health centres (Gudipati, 2006). Public health centres, especially sub-centres, often lack medical supplies, electricity, telephones, water and sanitation, thus drastically hindering their ability to offer safe, medical care (Banerjee et al., 2004).

In the private sector, health care providers generally offer better access, availability and customer service, though studies show quality of care and medical costs are highly variable when compared with the public sector (Banerjee et al., 2004). Given

that private, formal and informal providers make up such a large share of the market, federal, state and local governments lack the technical, human and financial resource capacity to adequately regulate the quality and costs of this sector (Gudipati, 2006).

The financing of India's health care system also remains fragmented and complex. Federal, state and local governments finance the provision of public health care through general government tax revenues; because user fees and other cost sharing mechanisms for all publically provided health care services do not exist, this is theoretically how low income households, particularly in rural areas, finance and receive health care services (Rao, 2005; WHO, 2008). As with the other countries in this study, however, informal and under the table payments are extremely common in India. Specifically, providers may charge user fees for working after hours at a public health care centre or if medications are not available, patients must pay fees to get them on the private market (Bajpai and Dholakia, 2006). Evidence suggests that a highly decentralized government combined with limited resources prevent federal, state and local governments from effectively regulating this behaviour, implying that informal user fees are extremely common in rural areas and poor states (Rao, 2005).

India also offers an array of other financing mechanisms, with multiple community based schemes becoming increasingly common throughout rural areas and private insurance available to high income households, which offers more comprehensive benefits than government and community schemes yet costs significantly more (World Health Organization, 2002). Finally, the presence of informal, public user fees, high demand for expensive medications as well as services provided

on the private market mean that out of pocket payments remain a significant method by which Indian households, particularly the poor, finance health care.

## CHAPTER 3 EMPIRICAL EVIDENCE

This section will explore the empirical literature that drives this dissertation's primary research objective and hypotheses; namely, the impact of direct medical costs, direct non-medical costs and indirect medical costs on households' choice of health care provider. All three sections in this chapter begin by defining each respective cost type and examining their historical impact on demand for medical care. Subsequent analyses explore how these cost types differ among household and provider types, how costs influence households' choice of medical provider and ultimately the gaps in the literature that this dissertation aims to fill.

### **Direct Medical Costs and Provider Choice**

#### **Direct Medical Costs and Demand for Medical Care**

Direct medical costs are defined as out of pocket costs directly resulting from the provision of health care services. According to Asenso-Okyere and Dzator (1997), these can include the cost of drugs or medications, consultation, lab services, or other insurance based, cost sharing mechanisms like co-pays, co-insurance or deductibles. User fees are treated in the global health and financing literature as being the same as co-payments or consultation costs paid directly to a health care provider.

There is a large literature measuring the broad impact that direct medical costs have on patient and household demand for medical care, which in turn is critical towards understanding the relationship between direct medical costs and households demand for different health care provider types. Over the past 30 years, the consensus of empirical and theoretical evidence is that as direct medical costs rise, demand for medical care declines. The extent of this behaviour often varies, however, according to

the type of service, by income and by country. Urgent and necessary health care services tend to be cost inelastic, with changes in cost leading to proportionately smaller changes in quantity demand. Conversely, less urgent or non-essential health care services are often more cost elastic, such that changes in cost lead to relatively larger changes in quantity demand.

The literature on cost elasticity of medical care indicates that household demand for health care services varies according to country. Notwithstanding variation in cost elasticity by type of health care service, studies in developed economies find that the demand for health care is largely cost inelastic. However, evidence across developing nations indicates that this figure is likely much higher; while demand is still cost inelastic, households in low income countries are relatively more responsive to changes in direct medical costs. This is driven by much lower incomes, with roughly 40% of Gambian, Kenyan, Pakistani, Indian and Bangladeshi populations living on \$1.50 per day or less. Households living in poverty with no disposable income are thus likely, holding all other factors constant, to be more responsive to changes in cost for medical care than wealthy households. Greater household spending on medical care often means that these families forgo meals or incur debts that drive them further into poverty. According to the World Health Organization, the proportion of a developing country's households incurring catastrophic health expenditures, defined as spending more than 40% of total income on medical care, has been upwards of 11%, with most of these families being low income (World Health Organization, 2011). This figure would be higher, except that many poor families simply forgo medical care altogether and thus spend nothing.

As such, income also influences the degree to which changes in direct medical costs impact patient demand for medical care. Studies across lower, middle and upper income countries find that higher income households tend to be more cost inelastic for medical care than lower income households. Lower income households are more willing to reduce their utilization of medical care as costs rise, because they have fewer economic resources than their higher income counterparts. As medical costs rise, wealthier households will likely reduce their consumption of luxury goods while maintaining demand for normal or necessary goods like food, rent, education and medical care. Lower income households, however, are more inclined to substitute medical care for other normal goods as health care costs rise given the lack of income to spend on luxury goods.

## **Direct Medical Costs and Provider Choice**

### **General evidence**

During the 1980's a series of academic papers including policy briefs by the World Bank found that households in low income countries were incurring considerable out-of-pocket costs from private informal care providers. Under the premise that such households could and were willing to spend large amounts on direct medical costs, policymakers introduced user fees into the public health care sector as a means by which to increase revenue and recycle funds to improve quality of care.

In response to these reforms a number of empirical studies were conducted across and within developing countries to explore the impact of public user fees on households' choice of both public and private health care providers. Evidence across low and middle income countries broadly suggested that direct medical costs had a complex and rather mixed impact on households' choice of health care provider. More

specifically, basic regression studies during this period found that direct medical costs significantly influenced household choice of health care provider, with families utilizing providers who offered care at the lowest cost.

Among these studies, Gertler et al. (1987) and Dor et al. (1987) conducted both theoretical and econometric analyses in Peru and Cote D'Ivoire using data from private and public clinics and hospitals. They included travel time, direct out of pocket costs, income, age, gender and education as primary variables, noting that the small number of independent variables limited the extent of their findings. Results showed that increases in direct out of pocket costs decreased demand for public care and overall medical services despite broadly inelastic demand across households. Yet both studies and others conducted throughout Africa and South Asia (Chernichovsky et al., 1986; Mwabu et al., 1986) also discovered that poorer households were much more responsive and willing to change provider type as a consequence of increased public user fees than wealthier households. In short, as income increased, out of pocket costs became a much less significant factor influencing provider choice.

The impact of costs on household demand for care and provider choice appeared significant, though this relationship varied in strength depending on which other determinants were considered, such as quality of care, individual, household and other market level factors. Data limitations during the 1980s and through the present day, however, often prevented the inclusion of other variables. Moreover, no studies examining direct medical costs accounted for both direct non-medical (transportation) costs and indirect (wait and travel time) costs, thus making it impossible to determine the true impact of direct medical costs on provider choice. Most of this work only

examined public sector direct medical costs given the paucity of data on private formal and informal health care providers.

### **Shifting away from public care**

The World Health Organization, World Bank and other global agencies began advising governments to eliminate user fees and all cost sharing mechanisms from public health care providers, particularly for low income households. The evidence suggested that increased revenue and quality of care improvements did not offset the overwhelmingly large decline in demand from higher, direct medical costs. Yet very few governments responded to these recommendations by reducing public user fees; in fact, a recent study on 50 developing nations reported that only six country governments had, as of 2009, initiated policies eliminating public sector user fees, with the remaining countries still charging households for use of public medical services (Witter, 2009).

Research on this topic nonetheless continued throughout the 1990s. Much of this work focused on where households sought care as medical costs rose in the public sector. While evidence broadly suggested that household demand for public care declined while demand for private formal, private informal or self-care increased, the literature offered mixed findings and indicated that additional individual, household and market level factors, including time costs, transportation costs and quality of care likely determined the provider type that households chose to utilize.

In Uganda, Ndyomugeny et al. (1998) examined how direct medical costs in the public sector influenced household decisions to seek publically provided malaria care for children. They found that higher user fees and poor supply of medications were the primary reasons for avoiding public providers, particularly among low income families.

Qualitative surveys indicated that most low income households shifted demand to private, informal providers rather than private, formal ones. In fact, households surveyed explained that they would only seek public care as a last option when private informal and formal care was no longer available. The study did not include indirect medical costs, direct non-medical costs and did not empirically model households' choice of health care provider.

Another study in Uganda by Akin and Hutchinson (1999) explored whether out of pocket costs in the public sector deterred households from utilizing maternal and child health care at public facilities. They analyzed public hospitals and smaller clinics, private clinics and traditional care providers against a limited number of independent variables such as direct medical costs, education, income and availability of doctors. While they too found a decline in demand for public care as costs increased, results differed from Ndyomugeny et al. (1998) by suggesting that higher direct medical costs and worse perceived clinical quality drove households to seek private, formal providers that were further away. Their study supported findings by Mwabu and Mwangi (1986), which also discovered that households were more likely to either transition to private, formal care than private, informal care or simply not seek care. Households in their study perceived lower direct medical costs among public care to imply better quality, which in turn increased their likelihood of utilizing public providers.

In Zambia, Booth et al. (1995) found evidence that public providers allowed few exemptions for user fees but that poor households unable to pay in cash were allowed to pay by trading livestock or other resources. Despite flexible payment schemes, which are rare in the public sector, child outpatient care in public hospitals and clinics

declined by over 50% between 1989 and 1994 as direct medical costs rose. Many low income households either did not seek care or sought alternative forms of private care as a consequence of rising public costs; as such, health outcomes among children declined considerably over this period.

According to Bedi (2004), few other studies during the 1990s examined the impact of direct medical costs at public facilities on household provider choice. The study provided evidence from both Swaziland and Zimbabwe during the 1990's, which suggested that up to 30-40% of households using public health care providers transitioned to private providers, though they did not cite which type of private health care provider was chosen. Authors in most of these studies speculated that differences in whether households substituted public care for private formal, private informal or self-care likely depended on other factors such as quality of care, direct non-medical costs, indirect costs in addition to individual and household characteristics, particularly income.

### **Under-the-table direct medical costs and other barriers to public care**

Research during the 1980s and 1990s had found that direct medical costs in the public sector presented a significant barrier to health care for most households and that households often responded by either self-treating or transitioning into the private sector. New policies across some developing nations eliminating or reducing public sector user fees had finally been implemented; however, declining government revenue, increased health spending and poor regulatory capacity introduced new challenges during the 2000s that required governments to restructure how their health systems were financed. Specifically, governments faced rising cost pressures, while households still incurred financial barriers to public and private health care services. Most of the research during this decade both piggybacked on previous work as well as explored

reasons for continued financial barriers to care and other factors driving households into the private sector.

Studies (Palmer et al., 2004; Wilkinson et al., 2001; Mbugua et al., 1995; Xu et al., 2006) reported that the elimination of public user fees and direct medical costs initially increased utilization of public providers throughout Kenya, Uganda and South Africa though this utilization of public care stabilized and in some cases declined over time rather than continuing to increase. The literature offers three reasons for this phenomenon and explains why financial barriers to care persisted across developing populations. First, poor regulation encouraged public providers to ignore federal laws and instead charge informal or under-the-table user fees to increase profits. Evidence today indicates that throughout many countries, informal user fees comprise up to 90% of the total revenue for public services (Jowett and Danielyan, 2010; McCoy et al., 2008). Yet even in the absence of formal or informal user fees throughout the public sector, household preferences, better quality of care, lower direct non-medical and indirect costs were likely to drive households into the private sector. Finally, direct medical costs among private formal and informal providers were also extremely high, so households either made the choice to pay large out of pocket costs for better quality, closer or more convenient private care or – if out of pocket costs were too high – households simply did not obtain necessary medical care.

Morey et al. (2003) used a combination of qualitative and quantitative methods to explore Nepali households' willingness to pay for malaria care and determinants of their provider choice using age, gender, education, income, direct medical costs and direct non-medical costs, among other provider characteristics as primary independent

variables. They found that direct and direct non-medical costs were the most important factors influencing behaviour, particularly among poor families. Households were on average also more likely to seek care at private health care providers and indicated that quality of care was not an important factor influencing their decision. While the authors did not explain the degree to which the cost variables interacted and influenced household behaviour, they did suggest that informal user fees and long travel distances in the public sector heavily influenced their decision to utilize private providers.

A study by Ha et al. (2002) examined Vietnamese households' choice of public or private care for general outpatient care services, and included a much broader array of independent variables such as direct medical costs, income, age, gender, education, rural status, region and health insurance. Despite the country's large supply of public care providers, households qualitatively cited lower wait times, shorter distances and more flexible payment schedules as primary reasons for seeking care in the private sector. Empirical analyses showed that user fees were higher in the public than private sectors, in part due to informal or under-the-table fees. As such, a combination of direct medical, direct non-medical and indirect costs as well as quality of care factors all likely influenced households to seek private care, although the authors did not measure or differentiate between informal and formal providers.

According to Konde-Lule et al. (2010), Levesque et al. (2006), Prata et al. (2005), Bustreo et al. (2003) and Kiwanuka et al. (2008), households in Uganda and India, as well as other sub-Saharan Africa and South Asian countries have been utilizing private providers rather than technically free, public ones. The authors all cite direct medical costs as often being similar across public and private providers, indicating that patients

are incurring informal user fees in public facilities. However these papers do not explain whether rising costs in the public sector shift demand to private informal or private formal providers.

Work by Muela et al. (2000) qualitatively found that Tanzanian households were incurring significant out of pocket costs for private, informal care, because clinical quality was poor and patients often required multiple treatments before their health improved. Despite few official user fees in the public sector, households continued to visit informal providers. Two factors contributed to this behaviour. First, the authors indicated that private, informal providers offered patients more flexible payment schedules while only charging if treatments were successful, whereas public providers charged cash-based fees prior to treating patients. Patients also wrongly perceived public providers as charging greater fees than informal care providers, even though user fees were minimal and there was no evidence to support these assertions.

Among Nepali households driven into the private sector because of high out of pocket, public medical costs, Pokhrel and Sauerborn (2004) found that the direct medical costs of private care were equally as high, which in turn placed a tremendous economic burden on middle to lower income households. Examining the choice of public, private formal and private informal provider as driven by individual, household and health system variables, Pokhrel and Sauerborn (2004) found that only wealthier households (25%) tended to utilize private, formal care with all other households either continuing to utilize public care (50%) or driven to private informal care or self-health care (25%).

Habtom and Ruys (2007) reported that African households in Eritrea were quite responsive to changes in private, formal direct medical costs, though strong differences existed across income groups. After controlling for other individual, household and market level factors, poor households were relatively more likely to change health care providers as private, formal direct medical costs rose. When combined with scepticism, weak trust and poor perceived quality of public providers, low income groups were thus more likely to avoid public providers and instead transition to private, informal care or no care at all. Higher costs in the private, formal sector either did not impact wealthier families or drove them to utilize public providers.

Studies by Hill et al. (2003), Baume et al. (2000) and Malama et al. (2002) examined household utilization of care for childhood diarrheal and malarial illnesses, with results suggesting that most poor, Ghanaian and Zambian households sought informal drug vendors rather than public providers while another 20-36% of all households simply did not seek care for childhood illnesses. These families indicated that direct medical costs in both private and public sectors inflicted too great a financial burden to seek health care. Similarly, papers in Uganda and across sub-Saharan Africa (Konde-Lule et al, 2010; Filmer, 2005) surveyed households and found that those who sought private providers cited direct non-medical costs and clinical quality of care as more important determinants of their choice than direct medical costs. However, families with children experiencing diarrhoea who treated the illness at home cited direct medical costs as the primary barrier towards seeking public or private health care.

### **Insurance and direct medical costs**

Many recent papers have shown that health insurance, whether private, social or community level, can improve the likelihood that households utilize public health care

services, even in the presence of high informal or formal, public sector user fees. In their work on low income families in rural China, Qian et al. (2009) used cost, income, age, gender, occupation, education, health insurance, household size, severity of illness and distance to model household choice of public clinics, private clinics or self-treatment for general outpatient care. They reported that direct medical costs, direct non-medical costs and income were the strongest determinants of households' choice of medical care provider and that cost elasticity was higher for public providers than private formal or informal providers. Expanding community, private and social insurance coverage to this population both reduced the cost of public care and significantly increased their utilization of public providers.

Amaghionyeodiwe (2008) conducted a comprehensive study in which he modelled Nigerian households' choice of self-treatment, private informal, private formal and public care as a function of age, income, education, case severity, cost, transportation costs and quality indicators like drug and personnel availability. He found that both insurance and low direct medical costs were households' primary reasons for seeking public, outpatient care. Amaghionyeodiwe (2008) also found empirical evidence that middle and upper income households were more likely to transition to private, formal care as public direct medical costs rose, while poor households either transitioned to private informal care or did not seek any care. Ozawa and Walker (2011) used identical variables in Cambodia and found that insurance increased household utilization of public care providers through lower direct medical costs, though households were more likely to remain in the private sector if trust, flexibility, wait times and perceived clinical quality of care were better.

## **Direct Non-Medical Costs and Provider Choice**

The majority of research examining how costs impact demand for medical care and household choice of provider in developing nations has focused on direct medical costs. Direct non-medical costs represent patients and households' direct out-of-pocket costs of transport to or from a health care provider that does not include the direct cost of health care services. This may include the cost of gas, renting a vehicle, taking the bus, driving a car, any other mode of transportation or even lodging. The literature on direct non-medical costs is less extensive, particularly across Kenya, Gambia, India, and Pakistan, and focuses primarily on theoretical research. Existing empirical research primarily explores the broad impact of direct non-medical costs on utilization of care, while some studies analyze how such costs influence households' choice of medical provider. Unfortunately, these studies often lack adequate control variables, merge direct non-medical costs with indirect costs or measure direct non-medical costs by ways other than currency / dollar amounts.

In developing nations, the likelihood of incurring any direct non-medical costs is substantially less than in developed countries given that patients often walk, bike or take free public transportation to health care providers rather than drive and pay for gas. Although low in absolute terms, direct non-medical costs incurred by households may be extremely high relative to total income, particularly for rural and poor families. Most evidence across sub-Saharan Africa and South Asian nations suggests that direct non-medical costs represent a smaller portion of total costs than either direct medical or indirect costs, on average 10 to 15% of total costs, indicating that households are likely to incur substantial consultation or medication fees as well as travel and wait times (WHO, 2010). Walking or taking a local, public bus to the clinic may be free, but the

four hour travel time over gravel roads or mountains represents significant time costs and productivity loss for those seeking care. Once at the health care facility, the wait time for being seen can be extremely high, particularly among public health care providers.

Empirical research on direct non-medical costs suggests that households' access to and utilization of medical care are significantly influenced by the transportation costs of getting to a provider; all other factors held constant, patients will generally seek out providers who are closer and easier to access. For instance, studies by Konde-Lule et al. (2010), Chuma et al. (2007) and Ensor and Cooper (2004) found that higher direct non-medical costs acted as a barrier to health care utilization in Kenya, Uganda and other developing nations. All three studies were qualitative analyses or comprehensive reviews of the literature, and suggested that there exists a complex relationship among direct non-medical costs, direct medical costs, indirect costs as well as quality of care with regard to how they influence households' behaviour. Other papers by Thaddeus and Maine (1994), Lasker (1981) and Melnyk (1988) found similar results, specifically among children with diarrheal diseases in Nigeria, Tanzania and Ivory Coast. These studies both reviewed the existing literature and offered empirical evidence that direct non-medical costs were important determinants of household access and utilization of care, though the extent of their influence varied by country and region.

Unlike direct medical costs, there is paucity of empirical work exploring how direct non-medical costs such as transportation costs impact households' choice of health care provider. The existing research is further hindered because it controls for few other variables such as direct medical costs, individual, household and market level

factors. To date no papers have modeled direct non-medical costs while also controlling for indirect costs; instead, research has merged both cost types as a single variable or cited the potential impact of indirect costs on this relationship via qualitative surveys.

In most countries, evidence suggests direct non-medical costs to be much greater among the public sector than private, formal and informal providers. While public providers are technically well spread across rural and urban areas, most operational public facilities tend to be larger health centres and hospitals which are located away from extremely remote areas. Research examining the impact of direct non-medical costs on sub-Saharan and South Asian households' choice of health care provider indicates that as transportation costs rise, so too does household demand for private providers or self-treatment. According to empirical reviews of the literature by Noor et al. (2006), Gething et al. (2004) and Guargliardo et al. (2004), low income, poorly educated and maternally run households are more heavily impacted by rising, direct non-medical costs. These groups are more likely to self-treat or utilize private, informal providers when direct non-medical costs rise. However, households do not always seek the closest health care provider for a given illness. Factors such as quality of care, direct and indirect medical costs as well as case severity can drive patients and families to seek care that is further away or more costly to reach.

For instance, Amaghionyeodiwe (2008) reports that in qualitative surveys both direct and indirect medical costs were more important determinants of household behaviour than were direct non-medical costs. This was consistent with prior studies by Sauerborn et al. (1995), Frew et al. (1999) and Terra de Souza et al. (2000), which

found that in Burkina Faso, Brazil, the UK and Bangladesh direct non-medical costs represented 28, 25, 27 and 26% of total household costs, respectively. The studies could only speculate as to the degree to which these cost types interact and influence households' choice of public, private formal or private informal care.

Noorali et al. (1999) examined how distance as a proxy for direct non-medical costs influenced Pakistani households' decision to seek either public or private health care providers for their children's' diarrheal illness. Both independent variables were non-monetary measures with the authors also controlling for treatment cost, age, gender, severity and income. The study found distance to be a significant factor impacting households' choice of provider, though this relationship was contingent upon time and convenience variables such as road quality and a general lack of transportation. When distance to a private, formal provider increased to more than 5km, households more than doubled their utilization of public care providers. But when private, formal facilities were close and charged low user fees, households primarily visited them over public providers for their child's diarrheal illness. Direct medical costs and distance jointly influenced households' choice of provider, indicating that solely building additional, public health centres closer to households may not significantly increase their likelihood of choosing public health care. Instead, simultaneously reducing direct and indirect medical costs may be a necessary condition for improving the likelihood that households will utilize public care.

As discussed earlier, Qian et al. (2009) on low income families in rural China also found that, while direct non-medical costs had an impact on households' choice of health care provider, they were not the most influential factor. Direct medical costs and

quality of care, particularly reputation, clinical quality and patient satisfaction often influenced households to bypass closer facilities for those further away. Bhatia (1999) and Shenoy et al. (1997) further examined the impact of travel costs on South Asian households' choice of health care provider, finding that while travel costs had a significant effect, quality of care was a much more important determinant. Households often would travel longer distances and incur greater transportation costs in search of private, formal providers, under the assumption that they offered more flexible payment schedules, better customer service, technical care quality and shorter wait times than public providers.

A study by Akin and Hutchinson (1999) examined the impact of both direct medical and direct non-medical costs on Sri Lankan households' choice of public hospital, public clinic, private formal and informal care. Specifically, they were interested in factors that encouraged patients, particularly children with diarrheal illnesses, to bypass closer facilities and instead utilize those which were further away. Controlling for maternal education, age, income and quality of care variables like drug availability, number of doctors, opening hours and appearance, The study determined that public and private, informal providers were more likely to be bypassed for private, formal providers. While the latter may charge higher user fees and lead to greater direct, non-medical costs, households perceived private, formal facilities to offer better quality of care. While significant determinants of provider choice, direct non-medical costs were ultimately outweighed by quality. Ndyomugenyi et al. (1998) conducted a similar study in Uganda for general, outpatient services and found that both perceived

quality and direct medical costs outweighed direct non-medical costs as determinants of provider choice.

### **Indirect Medical Costs and Provider Choice**

Theoretical papers by Becker (1965), Grossman (1972) and Acton (1973a, 1973b, 1975) as well as empirical papers by Dor et al. (1987), Goldman and Grossman (1978) and Phelps and Newhouse (1974) introduced the concept of indirect medical costs, or the opportunity costs of time, spent utilizing medical care that could otherwise be allocated towards work or social activities. Indirect medical costs most often represent time spent traveling to a health care provider, waiting to be treated, obtaining medications and traveling back home. The opportunity costs of seeking medical care also include losses in productivity or leisure, both of which have significant economic value to individuals and households. In the case of child illnesses, indirect medical costs are only incurred by parental or household guardians who take these children to a health care provider (Asenso-Okyere and Dzator, 1997).

While direct medical and direct non-medical costs have been empirically and theoretically studied in relative depth, indirect medical costs are not well understood -- particularly across Gambia, Kenya, Pakistan, and India. A variety of theoretical studies have explored the impact of indirect medical costs on household access to and utilization of medical care, though very little empirical evidence exists. Even less evidence exists on how indirect medical costs influence households' choice of health care provider or even how such costs quantitatively differ among providers. This is largely due to a lack of data, because converting households' time and productivity loss into a dollar or local currency figure can be extremely difficult and rather subjective. The complexity of this issue has led researchers to apply three methods of measuring

indirect medical costs: (a) including these costs with direct non-medical costs, resulting in a single measure of “transportation costs,” (b) qualitatively surveying households and patients, asking them the extent to which indirect medical costs have altered their medical care behaviour and lives or (c) using travel or wait times.

### **Indirect Medical Costs vs. Other Costs**

Health economics theory predicts that as indirect medical costs increase, access to and utilization of medical care will decline. As with direct medical costs, the elasticity of demand for indirect costs varies according to service type, income and country. Dor et al. (1987), Goldman and Grossman (1978) and Phelps and Newhouse (1974) specifically noted that the elasticity of demand is likely to be much higher in developing countries where roads are poor, transportation is inadequate and the supply of providers and health care facilities fail to meet the population’s demand for medical care. These factors drive up indirect medical costs and significantly inhibit access to and utilization of care because households, particularly those in rural areas, may be required to spend a day or more seeking medical care.

This suggests that across sub-Saharan Africa and South Asia, indirect medical costs may represent a greater portion of total health care costs than either direct medical and direct non-medical costs. Pickering et al. (1986), Rutherford et al. (2010) and Thaddeus and Maine (1994) examined factors contributing to child mortality and health care demand in Gambia, Mali, Ethiopia, Zaire, Nigeria and other sub-Saharan Africa countries, and they found indirect medical costs, as measured by time, to account for 40 to 70% of total costs and significantly impacted households’ demand for medical care and patient mortality, particularly for childhood illnesses.

In a review of supply and demand side factors influencing developing country households' health care seeking behaviour, Ensor and Cooper (2004) reported that indirect medical costs were inversely related with demand for medical services and were markedly higher than direct medical costs, though opportunity and time costs varied in magnitude by income group. For instance in India, Uganda and Pakistan indirect medical costs were much lower for poorer than wealthier households in both absolute terms and relative to total costs, because higher unemployment rates among the poor meant fewer opportunity costs and lost productivity (Khan et al., 2002; Akin and Hutchinson, 1999; Bhatia and Cleland, 1999). Findings from Vietnam, Ghana, Pakistan and Uganda also support these results (Khan et al., 2002; Segall et al., 2000; Bosu et al., 1997). The varied effect of indirect medical costs by income helps explain the following findings, particularly if and where households are likely to seek medical care when indirect medical costs rise in the public sector and demand for public care declines.

### **Impact on Households' Choice of Provider**

The interaction among indirect, direct and direct non-medical costs, specifically the high proportion of indirect costs as a function of total costs, has been shown to influence households' choice of medical provider. Asenso-Okyere and Dzator (1997) qualitatively examined households' cost of seeking medical care in Ghana, finding that direct medical, direct non-medical and indirect costs represented 30, 10 and 60% of total costs, respectively. Among indirect costs, nearly 90% came from wait time at the health care facility with the remaining 10% being time spent traveling, though these figures were not evaluated in dollar amounts. Both direct non-medical and indirect costs increased in absolute terms and as a share of total costs for severe medical

cases, with patients and households traveling further to utilize health care providers that they perceived to offer better quality of care.

The authors reported that, when compared with private, formal and informal providers, public facilities were further away, overcrowded and led to worse patient satisfaction than those in the private sector. While public providers may offer better or more consistent clinical quality of care, households often abstained from utilizing public providers because of the comparatively higher indirect medical costs. Most importantly, even in the absence of public sector user fees or cost sharing mechanisms, households may avoid utilizing public providers given high, indirect medical costs.

Habtom and Ruys (2007) found that, while direct non-medical costs for public providers were less than for private ones in Eritrea, Africa due to closer proximity, high perceived indirect medical costs given large wait times caused families to forgo public care and instead seek private formal care. However, the authors found that households were not likely to transition to private, informal or self-care as indirect medical costs rose in the public sector. The authors also reported that indirect medical costs had a much greater impact on household decision making than direct, out of pocket medical costs. As was the case in Asenso-Okyere and Dzator (1997), families were less likely to utilize public care providers in the presence of no direct medical costs and high indirect medical costs. As wait time declined, households' demand for public medical care increased. While their results used a blend of qualitative and empirical models, the lack of currency as a measure of indirect, medical costs limited their results.

Ozawa and Walker (2011) and Lavy (1991) reported similar findings in Ghana and Cambodia, in qualitative assessments of factors influencing households' choice of

public, private formal or private informal providers. Specifically, time costs were the most influential factor, followed by both treatment and transportation costs. Among these three variables, households were more likely to shift demand from public to private formal care due to changes in indirect medical costs than either direct medical or direct non-medical costs. Households in their studies were also not likely to transfer to private informal or self-care.

A study by de Bartolome (1995) examined Brazilian households' choice of public and private providers for malaria care as a function of treatment cost, distance, household size, monthly health expenditures, age, gender and literacy. The results indicated that rural households were more likely to utilize private, formal providers over public ones. While private providers charged much higher user fees and other, direct out of pocket costs, they also offered greater drug supplies and were much closer to households. The study suggested that longer distances, a lack of public transportation as well as greater time spent accessing and waiting for public care were the primary causes for households' decision to seek private care. As direct non-medical and indirect costs declined, households' demand for public care rose; as households' wealth increased, they became more likely to utilize public care despite high direct non-medical and indirect costs. However, the study was limited by not using a specific measure of indirect medical costs or a dollar value for direct non-medical costs.

Several papers have explored and compared both cost elasticity of demand and time elasticity of demand for households across developing countries. Dzator and Asafu-Adjaye (2004) summarized most of the empirical literature on this issue, as well as conducted their own economic analysis, in which they examined Ghanaian

households' choice of public provider, private provider or informal drug vendor for child malaria care as a function of treatment costs, wait time, travel time, age, gender, severity, education and income. Results indicated that increases in treatment costs and travel times by 10% led to a decline in demand for public care by 2.1 and 3.6%, respectively; the same respective elasticities for informal drug vendors were .4 and 1.3%. The results suggested that households were more cost and time inelastic towards informal than public care, while they were also more responsive to changes in time costs than treatment costs. Dzator and Asafu-Adjaye (2004) cited similar findings from papers by Gertler et al. (1990), Lavy (1993), Mwabu (1994) and Bouldoc et al. (1996) that explored households' choice of medical care provider across Peru, Cote D'Ivoire, Kenya and Benin. In general, as treatment cost and time costs increased among public providers, household demand for private informal or self-care increased while demand for private formal care remain stagnant. Each of these papers was limited by not measuring time costs in currency but instead using wait and travel times; these studies also left out direct non-medical costs, using only treatment costs as a measure of direct medical costs.

### **Evidence from Study Countries**

#### **Gambia**

Only a handful of studies have been conducted on direct medical costs in Gambia. Broad utilization patterns among households seeking child health care appear to indicate that direct medical costs play a considerable role on choice of health care provider. However, unlike studies in Kenya and other sub-Saharan African nations, Gambian public health care providers appear to be widely utilized and charge no formal and few under-the-table user fees. A study by Clarke et al. (2003) examined factors

influencing whether children with malaria either were treated from home or visited private, informal care providers. The study found that 60% of all families self-treated by taking herbal remedies or antibiotics, with very few households seeking private, informal care and the remainder of families seeking either private, formal or public care. Once home treatments failed, 70% of all households sought public health care, with another 23% not seeking any care – a common finding among many Gambian studies. Among those seeking care, 78% did not incur any direct medical costs.

According to Clarke et al. (2003), qualitative surveys found that households initially did not seek formal care due to worse flexibility in payments, satisfaction, greater direct non-medical and indirect costs, among other access barriers. However, once treatments failed at home, families sought public care, because out-of-pocket costs were lower and drug supply greater than in the private sector. Given that private, formal providers were located nearby public providers, empirical models suggested that households sought the cheapest available care. While direct medical costs were not as important a factor as quality of care at influencing households' initial choice of health care provider, they and direct non-medical costs nonetheless played a significant role.

The results from Clarke et al. (2003) are similar to those of Wiseman et al. (2008), which found that 19% of Gambian children stayed at home for malaria and fever, none sought private, informal care and the remaining 81% used either public or private, formal care. Both studies found this to be much different than Kenya, where private, formal and informal care were the dominant sources for households. After empirically modelling the impact of direct medical costs, direct non-medical costs, and other individual, household and market level factors on public care vs. all other care

types, the study discovered that user fees, distance, income, gender and education significantly influenced households' choice of provider. Notably, lower direct medical costs were associated with greater utilization of public providers given the lack of formal or informal user fees, while lower education and greater direct non-medical costs were associated with increased use of private informal, formal or self-care. The study results suggest that long travel and wait times for public care could increase households' direct non-medical and indirect costs, thereby offsetting the positive impact that low direct medical costs have on households' likelihood of utilizing public providers.

## **Kenya**

The broader literature from other sub-Saharan Africa and South Asian nations provides an accurate guide to how direct medical costs influence Kenyan households choice of health care provider. Studies by Amin et al. (2003), Snow et al. (1992), Hamel et al. (2001), Molyneux et al. (1999) and Mwenesi (2004) found that, among households who sought diarrheal care for their children, many initially self-treated or used informal care providers given uncertainties over the severity of illness as well as the close proximity of services and low direct medical costs. These families typically sought medications or other home remedies from informal, drug vendors and extended family or community members. The decision to seek private, informal care providers was particularly strong among low income households, where out-of-pocket costs played a much greater role in health care decisions. According to Snow et al. (1992) and Amin et al. (2003), such households would only seek private, formal or public care if their child's diarrheal severity became considerably worse and the need for trained health professionals overwhelmingly apparent. Given the variable and generally poorer clinical quality of care provided by informal care providers, wealthier or more highly educated

households often bypassed the informal sector and instead sought out public care providers. While the literature found them to be further away and often more expensive than private, informal care, in part due to under the table user fees, households cited public providers as offering relatively higher quality while being much cheaper than private, formal providers.

A paper by Taffa and Chepngeno (2005) formally modeled direct medical costs, age, gender, maternal education, and illness severity as determinants of household choice of health care provider. Upon examining childhood diarrheal and fever cases in urban, Nairobi slums, the authors found that large out of pocket costs and income were the most significant factors influencing provider choice. Similar to the above papers, most mothers either waited at home for the illness to subside or sought private, informal care for local remedies or medications. As the illness worsened, households eventually sought public care rather than private, formal care, because direct medical costs were less. Despite higher out of pocket costs, mothers in the study were more willing to seek public care sooner for younger children.

These results are similar to a study by Nganda (2002), who examined costs throughout Nairobi's public health care sector. Using direct medical costs and other individual, household and market factors as control variables to model provider choice, the study found that while increases in public user fees of 40% led to reduced demand for public providers by 10%, demand for child health services did not decline. The paper argued that because children were more susceptible to rapid fluctuations in health status, mothers were less likely to forgo necessary child care in order to save money.

On the contrary papers by Mbugua et al. (1995) and Watkins (2001) ran similar models of provider choice and found that increases in Kenyan public sector user fees shifted demand for care to private formal and informal providers, though they did not examine the degree to which this occurred. Mwabu et al. (1993) discovered that demand for public care declined by 50% after large increases in public user fees, though the study did not indicate whether demand shifted to private formal, private informal or home health care.

Finally, Bedi (2004) conducted a comprehensive study on Kenyan public sector user fees, exploring the impact of public user fees, age, gender, drug availability and education on households' choice of private provider, public provider or self-care as well as utilization patterns. Descriptive results indicated that self and private, informal care comprised 32 to 80% of all care between 1994 and 1997, with remaining households utilizing public care more frequently than private, formal care. Moreover, out of pocket costs were highest among private, formal providers though drug supply and other quality of care metrics were worse among public providers. Econometric models indicated that greater direct medical costs in the public sector were associated with greater utilization of private, formal care, but no changes to informal or self-care. While both cost and drug supply elasticities of demand were  $-.08$  among public providers, the substitution elasticities among households who shifted their demand for care to private, formal providers were  $.1$  and  $.56$  respectively. In other words, while both direct medical costs and drug availability were key determinants of provider choice, households were relatively more likely to shift demand from public providers to private, formal care as a result of an inadequate supply of medications than higher costs, even though both were

inelastic. The study recommended that future research should model direct medical, direct non-medical and indirect costs as determinants of provider choice, and speculated that the impact of direct medical costs on household choice of public or private providers would likely change as resulting shifts in wait times or indirect costs were considered.

## **Pakistan**

The literature on Pakistan broadly suggests that households underutilize public medical providers and instead primarily seek care from private, formal and informal providers. A study by D'Souza (2003) found that between 78 and 93% of all households sought care from a private, formal provider with the remaining 7 to 22% utilizing public, private informal or self-treating for child diarrheal illnesses. Memon (2008) found these figures to be 68 and 32%, respectively. A number of qualitative studies and reports have cited greater provider and medical supply availability, poor communication, customer service, shorter wait times and closer proximity as reasons for seeking treatment in the private sector (Shaikh, 2005; Govt of Pakistan, 2000; World Bank, 1997; Khan, 1996; Aga Khan University, 2003; Stephenson, 2004). Poor households in Pakistan are also more likely to self-treat medical illnesses that present single symptoms, such as diarrhoea or fever, and only seek formal medical care once symptoms become more severe (Sadiq, 2002; Islam, 2001; Shaikh, 2005).

Empirical evidence from quantitative studies exploring the impact of direct and indirect medical costs on household choice of medical provider are both extremely limited and lack methodological rigor. Across Pakistan, India and Nepal studies have found that out of pocket costs represent up to 80% of total costs – though these studies fail to consider indirect medical costs (WHO, 2010). In these studies, direct medical

costs act as significant barriers to medical care and encourage low income households to self-treat or seek public care (Fatimi, 2002; Stephenson, 2004; Govt of Pakistan, 1993). Other studies have also found transportation costs to be a more significant barrier to care than in other developing nations (World Bank, 2002; Hunte, 1992). Beyond this no work has examined how such costs shift demand between provider types.

For instance, a recent study by Memon et al. (2008) utilized a logistic regression model to examine factors impacting households' choice of provider for child typhoid fever in rural Pakistan. They found that 65% of households primarily sought private, formal care due to closer proximity, while another 66% sought public care due to lower out of pocket costs. Multivariate models included out of pocket costs, distance, quality, drug availability and other household level characteristics. Only distance was significantly associated with the likelihood of utilizing private care, while cost and quality were the most important and significant factors associated with the utilization of public care. Results suggested that travel time and distance had the greatest overall impact on household decision making. Inappropriate model selection and not accounting for absent confounders, however, likely led to biased and questionable results.

As per the paper by Memon et al. (2008), indirect medical costs have only been measured through distance to medical providers, though studies indicate distance as a significant factor influencing household choice of medical provider (Islam, 2002; Govt of Pakistan, 2000; Fatimi, 2002; Stephenson, 2004). This coincides with high transportation costs, because poor roads and geographical barriers in rural, mountainous terrain make getting to a medical provider incredibly challenging.

Moreover, as women are not able to seek care without a male's permission, distance encourages a significant number of women and children needing care to instead self-treat (Shaikh, 2005).

## **India**

Empirical work in India suggests that the number of individuals seeking private medical care greatly outweighs those utilizing public providers, while lower income and poorly educated households more likely to either seek private, informal care or self treat. Studies find that, on average, 70% of individuals needing medical care seek either private formal or informal providers and roughly 20 to 25% utilize public sector providers (Rani, 2003; Bhatia, 2001). Meanwhile, the% of households self-treating illnesses has been shown to range from 10 to 40% of India's population (Bhatia, 2001). These utilization patterns vary considerably by geographical region – in some states such as Rajasthan, Arunachal Pradesh, Mizoram and Sikkim the figures on public vs private sector utilization are completely reversed from the national average.

Household choice for private over public care is due in part to the overwhelmingly greater availability of private providers across India, though household and cultural factors, quality of care and costs also play a crucial role in patient decision making. Yet before addressing the primary studies in India on this subject, it must be noted that due to India's size and diversity, results are hardly generalizable to the entire country. Bhatia and Cleland (2001) examined the impact of direct medical costs, distance, trust, quality of care as well as individual level factors on women's choice of medical provider – whether public, private or self care. They found that the number of households incurring any direct medical, direct non-medical and indirect costs was significantly higher for private than public providers; among those who incurred some costs, mean

direct medical, direct non-medical and indirect costs were all higher in the private sector. Despite greater costs and longer distances to private providers, nearly 80% of women utilized private care. Multivariate regression results thus suggested that greater trust in and perceived quality of care of the private sector had the most significant impact on provider choice.

Another paper by Ager and Pepper (2004) conducted qualitative interviews among rural households in Orissa, a state known for its high poverty rates and weak economic development. The authors reported that three factors appeared to account for the greatest variance in household choice of medical provider: reputation, direct medical costs and physical accessibility. Reputation was cited as the most important factor for households. Among those surveyed, user fees and co payments were higher in the private sector, though medications in the public sector were often much more expensive. Physical accessibility, a proxy for direct non-medical and indirect costs, was cited as a major reason for utilizing private care or self-treating. The lack of transportation, poorly built roads as well as long distances often made it impossible for households to access public care.

Finally, Borah (2006) applied a more rigorous mixed multinomial logit model to assess factors influencing household choice of public or private medical provider across rural areas of India. After controlling for individual and household characteristics such as case severity, geographical region, age, income and education, results indicated that both direct and indirect costs were significant determinants of provider choice. More specifically, cost elasticity of demand was higher for low income households and children than their counterparts. Households are also less willing to visit medical

providers that are further away or take longer to reach, though as case severity rises households are less sensitive to greater distance. Two limitations to the paper are that no variables measuring quality of care or provider characteristics are included in the model, the measurements for provider types were also limited to only public and private providers, and distance was the only proxy for direct non-medical and indirect costs.

### **Conclusions**

Empirical evidence across developing nations, particularly Gambia, Kenya, Pakistan, and India, suggests that direct medical, direct non-medical and indirect medical costs play a significant role in household choice of health care provider. Among total costs, indirect medical costs appear to have the greatest impact on households' choice of provider and comprise the greatest share of total costs in many studies, with households often citing indirect costs as being the highest among public providers and much less among private, formal and informal providers. However, results appear to vary by country given cultural and health system differences. Gaps in the literature also make this a difficult assertion to support without further research. The most critical of these is the way in which indirect medical costs are measured. As stated earlier, existing studies either (a) merge these costs with direct non-medical costs, resulting in a single measure of "transportation costs," (b) qualitatively survey households and patients, asking them the extent to which indirect medical costs have altered their medical care behaviour and lives or (c) use travel or wait times as proxies for indirect medical costs. The consequences of these methods are three fold. First, the use of proxies for indirect medical costs rather than converting measurements to local or international currency often leads to measurement error and biased assessments. Second, combining indirect with direct non-medical costs makes it

impossible to assess the variation in provider choice due solely to indirect medical costs. Finally, qualitative studies do not allow for concrete, empirical results necessary to determine the impact of indirect medical costs on households' choice of health care provider.

Conclusions from this literature review also indicate that direct medical costs account for a relatively large proportion of the variation in households' choice of medical provider, while direct non-medical costs account for very little variation. The specific impact of these costs on provider choice, however, varies by country in accordance with other determinants such as cultural factors and quality of care. More importantly, considerable gaps exist in the literature with respect to variables included in the empirical models. Absent indirect medical costs and other household and market factors, the significance of direct costs on provider choice is likely to be overinflated – though to what degree is uncertain. The lack of inclusive measures for provider type across all studies, notably public, private formal, private informal and self-care, further limit the impact of previous findings. These gaps will all be addressed in Chapter 5 of this dissertation.

A final issue to be discussed in greater depth throughout the subsequent chapter, there appears to be a significant interaction between income and direct medical, direct non-medical and indirect costs as they pertain to household choice of medical provider. The empirical evidence suggests that, all other factors held constant, poorer households will be much more cost elastic with respect to direct medical and direct non-medical costs than wealthier households. Conversely, evidence is mixed on how income influences the relationship between indirect medical costs and households' choice of

medical provider – though it appears that wealthier households are likely more responsive to changes in indirect medical costs. In other words, the impact of indirect medical costs on provider choice will be more significant for higher income households than for lower income households. As per above, these interaction terms are missing from most empirical studies; without applying model specifications that correct for unobserved confounding variables, the absence of these terms would bias and alter the significance of costs as they impact households' choice of medical provider.

## CHAPTER 4 ECONOMIC THEORY AND HYPOTHESES

This chapter first examines the theoretical, economic literature on how direct medical, direct non-medical and indirect medical costs influence households' demand for care. In line with other papers on this subject area, this dissertation models the demand for medical care as households' discrete choice of medical provider. Then the empirical and theoretical evidence are combined to develop hypotheses for the primary research objectives.

### **Economic Theory**

The theoretical, economic literature on how direct medical, direct non-medical and indirect costs influence households demand for medical care has historically been divided into two groups. The first primarily examines direct medical and direct non-medical costs as they influence demand for medical care which, in turn, impacts the health and utility of individuals and households. These models stems from Grossman's 1972 human capital framework. Over time researchers have altered the framework to varying degrees, taking into account the interaction effect that income or wealth has on the cost elasticity of demand for care. This group largely includes wait and travel times to seek medical care in utility models as an external and independent parameter, and does not consider their role in influencing total cost of and demand for care directly.

The other group, driven by Acton (1975) and Holtman (1972), views wait and travel times as opportunity costs that should enter the utility function through total costs and the demand for medical care. In other words, these authors have argued that time should enter the budget constraint in the same way as direct out of pocket costs, because time lost seeking medical care is income lost through lower productivity and

earnings. As cited in his 1973a and 1973b papers, however, Acton acknowledged that the basic structure of these models piggybacked off of Grossman's 1972 framework with respect to the demand for health. Acton's models are also simplified in order to effectively apply the theory to empirical models, most of which have data limitations. Thus the goal of this section on economic theory will be to outline and analyze these models in order to theoretically assess how direct medical, direct non-medical and indirect costs will impact households' demand for care.

### **Direct Medical and Direct Non-Medical Costs**

The theoretical, economic literature on how direct medical and direct non-medical costs influence households' demand for medical care stems from work by both Becker (1965) and Grossman (1972). Grossman's model was based on human capital theory and attempted to broadly derive an individual's demand for health and medical care (Becker, 1965; Lancaster, 1966). Unlike human capital, individuals demand health capital for two reasons. As a consumption good, poor health reduces an individual's utility and thus enters directly into the model as a preference. Health is also an investment good, as increases in health capital are essential towards maximizing an individual's work productivity via time spent effectively and efficiently working, which in turn influences earning potential. Grossman's model thus indicated that an individual or households' utility is a direct function of consumption and health, with health largely impacting wealth and income levels (Culyer and Newhouse, 2000). The quantity of medical care demanded, on the other hand, enters the utility function through its contribution to improving health and is in turn affected by the cost of medical care (Grossman, 1972).

Within this context, Grossman (1972) also established that the marginal product of health, that is the relative change in health per unit of medical care consumed, was significantly influenced by an individual's wage rate or income. Higher wage earners will value health more than those earning low wage rates. Because medical care is a primary means by which to improve health, individuals with higher wages or incomes should, given this logic, demand more medical care when sick than their poorer counterparts (Lindelow, 2005). On the other hand, Grossman carefully added that this relationship would, in practice, vary by specification, because better health and greater utilization of medical care also required more time. This could ultimately counterbalance or even negate the rise in demand (Grossman, 1972). To compare and better understand future models on time, costs and provider choice later in the chapter, Grossman's original model is shown below:

$$\text{Max } U = U(C_n, H_n) \quad (4-1)$$

$$\text{Subject to } C = C(X, TH, E) \quad (4-2)$$

$$H = H(M, TH, E) \quad (4-3)$$

$$T = T_n W + T_m L + T_a H + T_b \quad (4-4)$$

In Equation 4-1 of the utility maximization problem, U represents an individual's utility which is a function of both consumption goods, C, and health capital, H. Consumption goods in Equation 4-2 are a function of inputs for those goods, X, time and health spent, T\*H, as well as education. Similarly, health capital in Equation 4-3 is a function of medical care utilized, M, time and health spent in addition to education.

Equation 4-4 represents a final constraint to utility maximization, where total time,  $T$ , must equal the sum of  $W$ ,  $L$ ,  $H$  and  $T_h$ , or work, sick, health investments and leisure time, respectively.

Theoretical papers through the 1990's based their demand models from Grossman's 1972 paper, with most developing models of health care demand based on household choice of medical provider. These theoretical papers assessed how direct medical costs, direct non-medical costs and, to a lesser extent, income, impacted households' discrete choice of medical care provider. Many such papers tailored Grossman's 1972 model to consider special populations. For instance, Gertler et al. (1987) and Bedi et al. (2004) developed frameworks for households in developing nations while Blau (1996) modeled the demand for child health and health care. All three papers adapted a simpler framework than Grossman's model that accounted for limitations inherent in both populations such as behavioural patterns and the structure of low income health care systems. While Blau's 1996 paper adds value to the theoretical framework of this dissertation, it differs only slightly from models by Gertler et al. (1987) and Bedi et al. (2004) by accounting for indirect gains in utility. That is, Blau argued that parents aim to maximize their own utility by maximizing their child's health status, which is addressed by altering the constraints of the utility maximization problem.

Studies prior to Gertler et al. (1987) modeled households' demand for medical care as a discrete choice where direct medical costs, direct non-medical costs and income were independent of one other (Akin et al, 1981 and 1985; Musgrove, 1983; Mwabu, 1987). Gertler et al. (1987) argued, however, that these assumptions were far too restrictive, not consistent with the limited empirical evidence and, as suggested by

Grossman, ran contrary to utility maximization and human capital theory. As such, the functional form of Gertler's theoretical model included an interaction term for cost and income; their results suggested that direct medical costs and direct non-medical costs should influence households' demand for medical care, though cost elasticity would vary by income. The general model they used, and was subsequently applied by Mwabu et al. (1993), Bolduc et al. (1996) and Bedi et al. (2004), was as follows:

$$\text{Max } U_{ij} = U(H_{ij}, C_{ij}, T_{ij}) \quad (4-5)$$

$$\text{Subject to: } H_{ij} = H(X_i, Z_j) \quad (4-6)$$

$$C_{ij} = Y_i - P_j \quad (4-7)$$

$$\text{Max } U_{ij} = U(X_i, Z_j, Y_i - P_j, T_{ij}) \quad (4-8)$$

Equation 4-5 suggests that an individual *i* aims to maximize his or her utility from receiving medical care by provider *j*, which is a function of that individual's expected health outcomes, *H*, their consumption of non-health care related goods, *C*, and the indirect medical costs of seeking care from provider *j*, *T*. This maximization is conditional upon expected health being a determinant of that individual's characteristics, *X*, such as age, gender and race, along with the provider's characteristics, *Z*, which include quality of care. Finally, the consumption of all non-health related goods is defined as total income, *Y*, minus the direct medical and direct non-medical costs of seeking care from provider *j*. Note, however, that this does not include time costs. Equation 4-8 shows the individual's indirect utility function, with the constraints having been merged with the original utility function.

Both Gertler et al. (1987) and Bedi et al. (2004) further developed this model by specifying that income, direct medical costs and direct non-medical costs enter the utility function in quadratic or log form, while individual and provider characteristics enter in linear form. This would account for variations in cost elasticity of demand by household income and ultimately where and to what extent households choose different medical care providers.

### **Indirect Medical Cost Models**

Theoretical models on indirect medical costs began with Becker (1965), Leveson (1970), Holtman (1972) and, to a lesser extent, Grossman (1972), all of whom suggested that the wait and travel times required to access health care providers increased the opportunity costs for individuals and households, notably in terms of lost wages and leisure activities. Yet as mentioned above researchers incorporated wait and travel times into theoretical utility models in two, distinct ways. Grossman (1972), Musgrove (1983), Gertler et al. (1987), Mwabu (1987), Blau (1996), Bedi et al. (2004), among others modelled the wait and travel times to seek medical care as independent, non-monetary parameters to be included in an individual or household's utility function and thus did not consider them as directly influencing the demand for medical care services. In other words, changes in utility due to time spent seeking medical care was merely the disutility of traveling and waiting for services (Dor et al., 1987).

Continuing the seminal work on indirect medical costs by Becker (1965) and Holtman (1972), Acton (1973a, 1973b, 1975) argued for a different theoretical framework. Acton expressed wait and travel times as opportunity costs that should be expressed as a portion of the total cost of medical care and would enter the utility function through the consumption of both medical care and other goods (Dor et al.,

1987). In other words, he argued that time should enter the budget constraint as do direct out of pocket costs, because time lost seeking medical care is income lost through lower productivity and earnings. As such, time or indirect costs would also directly impact the demand for medical care.

As cited in his 1973a and 1973b papers, Acton acknowledged that his theoretical model stemmed from both economic frameworks by Becker (1965) and Grossman (1972). However, his was simplified in order to apply theory to an empirical model of Cote D'Ivoire households that had data limitations. Even though the economic model was based upon an individual's demand for a single provider, Acton (1975) also suggested that it could easily be applied to one's choice of multiple health care providers. In the model below, alternative health care providers would be defined as other goods and services consumed by households.

In the model, an individual aims to maximize utility,  $U$ , which is a function of medical services demanded,  $m$ , and the consumption of all other goods,  $X$ , subject to a budget constraint. More specifically,

$$\text{Max } U = U(m, X) \tag{4-9}$$

$$\text{Subject to: } (p + wt)m + (q + ws)X \leq Y = y + wT \tag{4-10}$$

where  $p = \text{out of pocket cost per unit of medical care}$

$w = \text{wage rate}$

$t = \text{time per unit of medical care}$

$m = \text{quantity of medical services demanded}$

$q = \text{cost per unit of } X \text{ or other consumption goods}$

$s = \text{time per unit of } X \text{ consumed}$

$Y = \text{full income}$

$y = \text{nonearned income}$

$T = \text{total time available}$

$P = \text{total cost per unit of medical care}$

The budget constraint explicitly states that spending on health care and other goods must be less than total income, where total spending is a function of quantity demanded of both out of both medical care and other consumption goods, the wage rate, out of pocket costs and time costs. Note that Acton (1973a) defines time costs merely as unearned income, or the wage rate multiplied by the time spent seeking medical care or consuming other goods. The model did not consider time costs such as leisure or time spent conducting household activities, the latter of which represents most households in lower income countries.

Optimality conditions indicate that out of pocket medical costs,  $p$ , and time costs,  $t$ , are both determinants of the demand for medical care. According to Acton (1973a, 1973b, 1975), the Lagrangian equations and resulting first and second order conditions suggest that if  $P$  represents the total cost per unit of medical care utilized, defined as

$P = q + t * w$ , then the out of pocket cost elasticity of demand for medical care is as

follows:

$$\varepsilon_{mp} = \frac{p}{P} * \varepsilon_{mP} \quad (4-11)$$

The time cost elasticity of demand would be as follows:

$$\varepsilon_{mt} = \frac{wt}{P} * \varepsilon_{mP} \quad (4-12)$$

Comparing both elasticity functions and then expanding on them from the original model yields  $\varepsilon_{mt} \begin{matrix} > \\ < \end{matrix} \varepsilon_{mp}$  as  $wt \begin{matrix} > \\ < \end{matrix} p$ . In other words as out of pocket cost, rather than time cost, declines, time cost elasticity of demand will become greater than the out of pocket cost elasticity of demand. Acton (1975) put this another way by saying that as direct medical and direct non-medical costs decline, individuals and households become increasingly sensitive to time cost as it pertains to their demand for medical care.

In the context of this dissertation and as applied to household choice of medical provider, because the out of pocket costs for medical care in the public sector are low, either due to the mandatory elimination of user fees or the presence of health insurance, household choice of public medical care will be much more responsive to changes in indirect medical costs. Conversely, in the private sector where direct medical costs are much higher while indirect medical costs often lower, the time cost will be more inelastic than the out of pocket cost for households. Household demand for private health care providers should theoretically be much more responsive to changes in direct medical or direct non-medical costs than indirect medical costs,

because out of pocket costs represent the largest share of total costs for these providers.

Acton (1975) also developed his theoretical model to address the relationship between income and indirect medical costs. Following Grossman (1972), Gertler et al. (1987) and Bedi et al. (2004), Acton (1975) theorized that individual and households' out of pocket cost elasticity of demand for medical care and choice of provider varied by wealth or income. Like Grossman, he predicted that the relationship between indirect medical costs and income would be complex and difficult to predict, because both income and substitution effects could offset one another. An increase in the wage rate acts as an income effect, whereby households will demand more medical care because they value health more. However, this inherently creates a substitution effect that decreases demand for care, because as wait and travel times rise, households earning greater wages will experience higher opportunity costs and productivity losses than those earning lower wages.

The consequence of these opposing forces depends on the relative time cost required to utilize medical care compared with the relative time cost required to purchase and consume other goods. As wages rise, households will demand more medical care only if indirect costs represent a greater proportion of total costs for consuming other goods than utilizing medical care. In other words,

$$\frac{ws}{(q + ws)} > \frac{wt}{(p + wt)} \quad (4-13)$$

For this dissertation there are several interesting points to take away from Acton's theoretical analysis. If wages are empirically operationalized as households'

income, households' income should influence the degree to which indirect medical costs impact the choice of medical provider. More specifically, higher income households will be more likely to demand a specific type of medical provider if indirect costs are a relatively smaller proportion of total medical costs. Lower income households will be more likely to demand a particular type of medical provider if indirect costs for that provider comprise a relatively greater proportion of total costs. Therefore, lower income households are more likely to demand public providers because of the relatively high indirect costs and low direct medical costs associated with utilizing them. Higher income households are more likely to utilize private, formal providers because of the relatively low indirect costs and high direct medical costs associated with utilizing them. It is important to note, however, that these models only consider indirect medical costs as unearned income from lost wages and do not consider leisure or domestic activities, both of which are extremely important among low income households across developing nations. Moreover, Acton's model does not explain why lower income households will often seek private, informal care or self-care over public and private, formal care – a behaviour that is likely driven by quality of care, trust, education and other household preferences.

### **Hypotheses**

The following are general hypotheses based on economic theory and the empirical evidence discussed in Chapter 3:

#### **Total Costs**

**H1:** Total costs will significantly impact households' choice of medical provider and will be negatively associated with the likelihood that households utilize public, private formal and private informal providers relative to self care in Gambia, Kenya,

Pakistan, and India. Poorer households will be more responsive to changes in total cost and wealthier ones.

### **Direct Medical Costs**

**H2:** Direct medical costs will significantly impact households' choice of medical provider and will be negatively associated with the likelihood that households utilize public, private formal and private informal care relative to self care across Gambia, Kenya, Pakistan, and India. Poor households will be more responsive to changes in direct medical costs than wealthy households, with the former demanding more self-care and the latter shifting demand between private formal or public care as direct medical costs rise.

### **Direct Non-Medical Costs**

**H3:** Direct non-medical costs will significantly impact households' choice of medical provider and will be negatively associated with the likelihood that households utilize public, private formal and private informal care relative to self care across Gambia, Kenya, Pakistan, and India. Poor households will be more responsive to changes in direct non-medical costs than wealthy households, with the former demanding more self-care and the latter not significantly changing demand as overall direct non-medical costs rise.

### **Indirect Medical Costs**

**H4:** Indirect medical costs will significantly impact households' choice of medical provider and will be negatively associated with the likelihood that households utilize public, private formal and private informal care relative to self care across Gambia, Kenya, Pakistan, and India. Wealthy households will be more responsive to changes in indirect medical costs than poor households, with the former shifting demand between

private formal or public care and the latter demanding more self-care as indirect costs rise.

## CHAPTER 5 STUDY DESIGN, DATA AND ECONOMETRIC METHODS

This chapter describes the study design, data and econometric methods used to address the research questions proposed by this dissertation. This study's primary objective is to model household behaviour by assessing whether and under what conditions direct medical, direct non-medical, indirect and total costs influence household choice of self, private informal, private formal or public care for childhood diarrheal illnesses. The secondary objectives are (a) to model households' perceptions of whether and to what degree direct medical, direct non-medical, indirect costs and total costs influence their choice of self, private informal, private formal or public care for childhood diarrheal illnesses and (b) to measure how direct medical, direct non-medical, indirect and total costs differ among households for self, private informal, private formal and public diarrheal care.

### **Data Sources and Survey Design**

This dissertation uses data from the Global Enterics Multi-Center Study (GEMS) on acute diarrheal care in four African and three South Asian countries: Gambia, Kenya, Mozambique, Mali, India, Pakistan and Bangladesh. Led by researchers at the University of Maryland and funded by the Gates Foundation, GEMS broadly aimed to assess the economic and clinical burden of diarrheal diseases in each of the seven countries. Data collected during this study should facilitate the guidance, development and implementation of vaccines, public health and health system measures across these countries. The ultimate objective of the GEMS study is to improve mortality and morbidity rates due to diarrheal illness across sub-Saharan Africa and South Asia.

The Global Enterics Multi-Center Study was a multi-centre, case control, cross sectional study that examined children between 0 and 59 months of age as well as their households. Each country's study site randomly sampled up to 880 children with acute diarrhoea (cases) and another 880 children without diarrhoea (controls). While the study aimed for a clustered, proportionate sample by capturing children from rural and urban areas as well as across geographical regions in each country; as such, most sampled households came from rural areas given that up to 70 or 80% of households in all seven countries reside in rural areas. GEMS specifically aimed to collect biological and clinical data from children with and without diarrheal illnesses as well as data on variations in diarrheal severity, household and individual characteristics, health care utilization behaviour, and the costs of diarrheal illness. To operationalize this study, both the University of Maryland and the Gates Foundation partnered with the following, international organizations: The World Health Organization, the Centers for Disease Control (US, Kenya, India), the Center for Vaccine Development (Mali), Medical Research Council (The Gambia), Manhica Health Research Center (Mozambique), the International Center for Diarrheal Disease Research (Bangladesh), National Institute of Cholera and Enteric Diseases (India), International Vaccine Institute (Korea) and Aga Khan University (Pakistan), among others.

Within the Global Enteric Multi-Center Study, each country's study site administered a Health Care Attitudes and Utilization Survey (HUAS) to participating households; this is the tool by which most data were collected and was validated by the World Health Organization. The HUAS was a 65 question survey broken down into 8 sections: child characteristics, household characteristics, perceptions of illness and use

of health care facility, diarrheal history, health care utilization, health care expenses, health care attitudes and attitudes about diarrheal illness. The Health Care Attitudes and Utilization Survey was a cross sectional data set conducted in 2010, asking households whether their child experienced diarrhoea and whether they sought medical care over a three month period for the illness, and was thus intended to capture a snapshot of individual, household, economic and clinical data. While the cross sectional nature of the data is a limitation of the study, a rich and unique data set captures information not previously available to researchers, and thus will contribute to the academic literature and be of considerable interest to policymakers.

The HUAS was administered only to adults in each household with total sample sizes of exactly 1200 children in Gambia, Kenya, Mozambique, Mali, Pakistan, India and Bangladesh. Because the HUAS was given to both case and control households, some children had acute diarrhoea while others did not. As the primary and secondary objectives of this dissertation are to assess utilization and cost patterns among households and children with acute diarrheal illnesses, data is included only for those households with children experiencing acute diarrhoea. As such the final sample size for the seven countries varied considerably and hence impacted which countries could be analysed in this dissertation.

As this dissertation will conduct separate analyses for each country, Mali, Mozambique, and Bangladesh will be left out of this study due to inadequate power. Given the number of covariates and primary independent variables included in the model, their sample sizes of 85, 77, and 190 would not permit conclusive and meaningful results. For this reason the dissertation will only include children with

diarrheal illnesses and their respective households from Gambia, Kenya, Pakistan, and India. Total sample sizes include 252 from Gambia, 271 from Kenya, 348 from Pakistan, and 217 from India. Though small in number, evidence suggests that these sample sizes will be adequate to maintain statistical power and effectively assess this dissertation's primary research question. Studies find that models require roughly 10 samples for every variable used, which in the context of this dissertation would require, at most, a sample size of 150. Nonetheless, these sample sizes certainly limit the extent to which results may be generalized across each country; this will be particularly true for India.

## **Model and Variables**

### **Research Models**

The primary research objective of this dissertation will involve two econometric models with variables cited in Table 5.1. The first will examine the impact of total costs on households' choice of medical provider controlling for other confounders and covariates; assuming that total costs are a significant determinant of provider choice, the second model will then examine the effect of direct medical costs, direct non-medical costs and indirect medical costs on household choice of medical provider, controlling for confounders and other covariates. The purpose of breaking this research objective into two parts is to better assess whether and to what degree costs influence households' health care seeking behaviour.

Most variables included in these models are highly generalizable to overall, medical care seeking behaviour in low income settings, as evidenced in Chapter three and will be further proven in Chapter five. It could be argued that, unlike many other medical conditions, child diarrheal illnesses uniquely require that parents make

decisions for their children. However, evidence has shown that households in low income settings – particularly collectivistic societies in sub-Saharan Africa and South Asia – often make joint medical care decisions and include entire families in the utilization process (WHO, 2011). As such, the following nested, conditional logit models depict this primary, study objective and its respective variables:

(5-1)

$$\begin{aligned}
 \text{Provider Choice} &= \beta_0 + \beta_1(\text{Total Costs}) + \beta_2(\text{Individual Characteristics}) \\
 &+ \beta_3(\text{Household Characteristics}) + \beta_4(\text{Provider Characteristics}) + \varepsilon \\
 \text{Provider Choice} &= \beta_0 + \beta_1(\text{Direct Medical Costs} + \beta_2(\text{Direct Non Medical Costs}) + \\
 &\beta_3(\text{Indirect Medical Costs}) + \beta_4(\text{Individual Characteristics}) + \\
 &\beta_5(\text{Household Characteristics}) + \beta_6(\text{Provider Characteristics}) + \varepsilon
 \end{aligned}$$

### **Dependent Variable**

The dependent variable in this study is the type of health care provider utilized by households. The four, different provider types are public providers, private formal providers, private informal providers and self-care. The health care and economics literature indicate that these are the four means by which households in Kenya, Gambia, Pakistan, and India seek medical care. The term “provider” in this dissertation refers to any medical professional and or health care facility that falls under these four categories. A provider is merely a medium through which health care is delivered.

Before defining and operationalizing these constructs, is imperative to note that a wide variation in the types of health care facilities and medical professionals can exist across countries within the public, private formal and private informal sectors. In other words, each of these broad provider types is defined somewhat differently in each

country (Bloom, 2001). While urban hospitals in one nation may operate within the confines of both public and private, formal sectors, in another they may only operate within the public, formal sector. The following section addresses these issues in order to validate how this paper operationalizes the construct for each type of health care provider.

Public health care providers are defined as providers or facilities operated by or under the control of federal, state or local governments. Public health care providers are perhaps the easiest type of health care provider to categorize, as they are consistently defined across countries. However, several caveats must be noted within the context of this dissertation. Health centres, hospitals and even clinics can be public or private throughout Gambia, Kenya, Pakistan, and India. However, larger private facilities tend to locate heavily in urban areas, while in rural communities most of these facilities are public. Private health centres, clinics and hospitals incur greater profits due to higher demand in urban areas, while such facilities are likely to operate at economic losses in rural areas given low density, poor populations. Larger public facilities, on the other hand, exist in rural areas as their mission is to improve access to underserved communities rather than maximize profit.

Private, formal providers include any private medical professionals or facilities that are formally trained, registered, accredited and/or working in the confines of the publically regulated health care system (Abuya et al, 2007; Peters, 2002; Ahmed et al., 2009; Waters et al., 2003; Shah et al., 2011). Private formal medical providers may be either for-profit or non-profit, though this dissertation will only consider for-profit providers given that they represent virtually all health care providers working in the

private, formal sector across Gambia, Kenya, Pakistan, and India (Konde-Lule, 2010; Filmer, 2005). As such, non-governmental organizations (NGO) will be excluded from the study. Private, formal providers may be independent practitioners, pharmacies, small clinics or large hospitals. Tawfik et al. (2006) and Pokhrel and Sauerborn (2004) reported that pharmacies are most often owned by private, formal providers. These include all medical shops that offer advice or sell drugs. Medications in the public sector are typically provided at health clinics, centres or hospitals; if public facilities lack an adequate supply of drugs, patients are almost always required to obtain them from private providers.

Conversely private, informal health care providers are defined as those individuals who are not formally trained, registered, accredited and or working in the confines of the publically regulated health care system (Abuya et al, 2007; Peters, 2002; Ahmed et al., 2009; Waters et al., 2003; Shah et al., 2011). Because they provide allopathic, medical treatment to patients, private informal providers do not include traditional yet formally trained medical practices like Ayurveda in India or Zhong Yao in China. Konde-Lule et al. (2010) and Filmer (2005) indicate that private, informal providers operate independently and offer specific services rather sporadically. They may include friends, traditional healers, drug vendors, village doctors or shop keepers that sell unlicensed medical products. While other terms can include traditional birth attendant, lady health worker, community health worker or pharmacy worker, the literature argues that these medical providers most often are formally trained.

According to Shah et al. (2011) traditional healers and other informal providers often use local medicines for specific and unique diseases that are “beyond the capacity

of formal providers to cure.” For this reason, private informal providers are more likely than other medical practitioners to induce demand for their services. Most of their revenue stems from the sale of medications and local remedies rather than consultation fees (Sharmin et al., 2009). If they do interact with private and public, formal providers, informal practitioners typically refer patients to private formal providers given their poor relationship with the public sector (Bloom et al., 2011).

Private, informal providers also receive training either through apprenticeship or short, educational experiences (Ahmed et al., 2009; Abuya et al., 2007). Iqbal et al. (2009) and Bloom et al. (2011) report that 74% of informal providers in Bangladesh received short courses in medicine, with the remainder learning through other, informal providers; informal providers maintain patient demand through their trust and relationships with local communities. Due to their distinct lack of formal training, the literature generally defines and operationalizes private, informal providers similarly across Gambia, Kenya, Pakistan, and India. While the literature often defines self-care as being a type of private, informal care, this dissertation will delineate these into two different provider types given the following rationale.

Self-care refers to any health care service that is provided from home and solely by the household. While the distinction between self-care and private, informal care is often blurred in the literature, this dissertation differentiates the two variables by suggesting that self-care implies not leaving the home for the utilization of medical care or dispensed drugs. Households who treat medical illnesses from home tend to refrain from utilizing private or public providers primarily due to high costs. Such households are often poorer and worse educated than those who seek out medical care. Thus this

paper anticipates a critical difference, driven by cost, between households who do and do not leave the house to utilize care or purchase medications.

Using the Healthcare Utilization and Attitudes Survey, this paper defines three of these health care provider types based on question 31, which asks “Where did you seek care for your child's diarrheal illness?” Potential answers include:

Public Providers: Public Hospital or Health Center

Private, Formal Provider: Licensed Practitioner or Private Doctor (Not at Hospital); Pharmacy

Private, Informal Provider: Traditional Healer; Unlicensed Practitioner; Village or Bush Doctor; Friend or Relative; Bought a Drug at the Shop or Market

The remaining health care provider type, self-care, will be operationalized based on question 29, which asks “Did you seek care for [Child's Name]'s diarrhoea outside of my home?” Self-care would then require the following response from households:

Self-Care: No

## **Primary Variables of Interest**

### **Direct medical costs**

Direct medical costs are defined as out of pocket costs directly resulting from the provision of health care services. According to Asenso-Okyere and Dzator (1997), these can include the cost of drugs or medications, consultation, lab services, or other insurance based, cost sharing mechanisms like co-pays, co-insurance or deductibles. User fees as cited in the global health and financing literature are identical to co-payments or consultation costs paid directly to a health care provider.

Using the Healthcare Utilization and Attitudes Survey, this dissertation operationalizes these costs based on question 42, which asks “What are you or your

household estimated out-of-pocket expenses for the following: (a) public hospital or health centre; (b) licensed practitioner, private doctor or pharmacy; (c) traditional healer, unlicensed practitioner, village or bush doctor, friend, relative or drugs from shop or market; (d) self-treatment from home?” While this survey question includes both a total summation of direct medical and direct non-medical costs, the final data set has values for direct medical costs only and direct non-medical costs only. This breakdown in costs was conducted by the Gates Foundation, University of Maryland and other partner organizations as the data was cleaned and households were asked how much of these costs were attributed to transportation. Direct medical costs are recorded in the data set as direct, out-of-pocket medical costs for utilizing a chosen health care provider. The data are expressed in U.S. dollars after being converted from local currency based on 2010 international exchange rates.

### **Direct non-medical costs**

Direct non-medical costs represent patients and households’ direct out-of-pocket, transportation costs of reaching a health care provider. This may include the cost of gas, renting a vehicle, taking the bus, driving a car or any other mode of transportation. The Healthcare Utilization and Attitudes Survey and this dissertation operationalize these costs according to question 42, which is cited above. Like direct medical costs, direct non-medical costs were distilled from direct medical costs as this data was cleaned and organized by the Gates Foundation, University of Maryland and other partner organizations. Direct non-medical costs are recorded in the data set as direct, non-medical costs for getting to and from a chosen health care provider. Direct non-medical costs are in U.S. dollars after being converted from local currency based on 2010 international exchange rates.

## Indirect costs

Indirect medical costs are defined as time costs that are spent utilizing medical care which could otherwise be allocated towards work or social activities. Indirect medical costs most often represent time spent traveling to a health care provider, waiting to be treated, obtaining medications and traveling back home. The opportunity costs of seeking medical care include losses in productivity or leisure, both of which have significant economic value to individuals and households. In the case of child illnesses, indirect medical costs are incurred by parental or household guardians who take these children to a health care provider (Asenso-Okyere and Dzator, 1997).

Using the Healthcare Utilization and Attitudes Survey, this dissertation operationalizes these costs according to questions 44 through 47. Questions 44 and 46 ask about the specific survey respondent, while questions 45 and 47 ask about other household members.

- 44: “Did you lose some earnings due to seeking or providing care during [Child’s Name]’s illness? If so, how much?”
- 46: “How much time have you spent taking care of [*Child’s name*] when otherwise you would have been doing productive unpaid activities, e.g. housework, taking care of other children, farming, studying or attending school?”
- 45: “Did other caregivers lose some earnings due to seeking or providing care during [Child’s Name] illness? If so, how much?”
- 47: “How much time have other caregivers spent taking care of [Child’s name] when otherwise they would have been doing productive unpaid activities, e.g. housework, taking care of other children, farming, studying or attending school?”

Questions 46 and 47 required that households choose a perceived monetary value of time lost to unpaid, household or personal activities which was measured in local currency. This method of measuring indirect medical costs presents significant

flaws, which will be address in the limitations section of this dissertation; however, the literature lacks evidence on best practice methods of measuring time costs associated with personal or leisure activities. Questions 44 through 47 were summed and then converted to U.S. dollars from local currency in accordance with 2010 international exchange rates.

### **Total costs**

Total costs were defined as the sum of direct medical, direct non-medical and indirect costs. This is consistent with the economics literature from the 1970's onward. In the data set, total costs are a summation of these costs in local currency, which were then converted to U.S. dollars based on 2010 international exchange rates.

### **Individual Level Variables**

#### **Age**

The literature suggests that age has a significant impact on households' choice of health care provider, largely because age loosely determines case severity and vulnerability (Waters et al., 2008; Rani, 2003; Levin et al., 2001; Ha et al., 2002). Children's health fluctuates much more rapidly than adults, and minor illnesses can quickly transition into life threatening conditions. In Gambia, Kenya, Pakistan, and India, this is particularly true for diarrheal diseases. Thus, households are more likely to seek health care providers closer to home rather than those further away. Habtom and Ruys (2007) found that children were more likely to utilize local health clinics or independent practitioners given the need for more timely treatments. Despite higher costs and often worse quality, these tended to be private providers. Most households simply cannot travel long distances to seek public care for their sick child. While

evidence indicates that in extreme circumstances households will travel long distances to seek public care, this behaviour occurs infrequently.

Greater age also tends to be correlated with greater utilization of formal health care services. Studies across sub-Saharan Africa (Amaghionyeodiwe, 2008; Damen, 2003) found this to be particularly true for hospitals and large health centres. The authors explain this finding by reporting that the elderly tend to require more complex, technical services than children or adults. Because most of this evidence holds for both public and private health care services, younger children are thus most likely to utilize private, informal care.

The Healthcare Utilization and Attitudes Survey and this dissertation operationalize age according to survey question 1, which states:

1: "Child's age stratum in months? (1) 0-11 months; (2) 12-23 months; (3) 24-59 months"

## **Gender**

While gender has been shown to influence households' choice of health care provider, this varies by country and geographical region (Morey et al., 2003; Waters et al., 2008; Ha et al., 2002; Levin et al., 2001). In many South Asian nations, including Pakistan and India, gender bias remains a severe problem with households spending more money and placing greater importance on males than females. This is most common among poorer, rural households where boys must work, support their families and pass on the household name. Parents must often make difficult decisions on whether and to what degree they should invest in children, particularly when a girl may be given away at marriage. According to Pokhrel and Sauerborn (2004), South Asian families incurred greater health care expenditures on males than females, utilized health

care more frequently and sought more formal sources of care than for girls. Similarly, Pillai et al. (2003) cited that gender influenced whether households sought either informal or formal care, though the study did not make distinctions between public or private care. On the other hand, other papers have found that once a decision to seek care was made, gender played no role in the choice of health care provider. The impact of gender on households' choice of medical provider appears less strong though still significant across sub-Saharan Africa countries (Waters et al., 2003).

The Healthcare Utilization and Attitudes Survey and this dissertation operationalize gender according to survey question 5, which states:

5: "Is the child a boy or girl? (1) Boy; (2) Girl"

### **Maternal education**

Maternal education is a particularly important factor influencing households' choice of health care provider, because mothers most frequently make decisions about where to seek care for the household and their children. Evidence across Africa and to a lesser extent South Asia indicates that as maternal education increases, so too does the likelihood of utilizing formal health care services (Lindelov, 2005; Habtom and Ruys, 2007; Amaghionyeodiwe, 2008). Among sub-Saharan African countries there is a particularly significant increase in the utilization of formal, private care rather than public care, while the utilization of private, informal or self-care has been shown to decline with maternal education (Waters, 2008; Nuwaha, 2006; Rutherford et al., 2010). In fact, studies in Eritrea, Nigeria, Mozambique and Ghana suggested that as maternal education rises, households tend to first seek private, formal care, then public care and finally private, informal care with self-care being a last resort option (Dzator and Asafu-Adjaye, 2004; Lindelov, 2005; Habtom and Ruys, 2007; Amaghionyeodiwe, 2008).

Studies from South Asia present mixed results with regards to where households seek care as maternal education rises. In India, Rani and Bonu (2003) reported that while demand for formal care rose while private, informal and self-care fell, that demand was stronger for private, formal rather than public care. On the other hand, a paper by Pokhrel and Sauerborn (2004) indicated that higher education was linked with greater utilization of public rather than private, formal care. It appears that these results may vary by country, depending on the relative distribution of public and private providers and cultural demand for that care type.

The Healthcare Utilization and Attitudes Survey and this dissertation operationalize maternal education according to survey question 11, which states:

11: “How far did you [the mother] go in school? (1) No formal schooling; (2) Less than primary; (3) Completed primary; (4) Post-secondary; (5) Completed secondary; (6) Religious education only”

### **Case severity**

The relationship between case severity and households' choice of health care provider has been widely studied across sub-Saharan Africa and South Asia. Studies in Gambia, Burkina Faso, Guatemala, Cambodia, Vietnam and Bangladesh indicate a significant association between these variables and overall utilization of medical care (Ha et al., 2002; Levin et al., 2001; Grossman, 1972; Goldman et al., 2002; Wiseman et al., 2008; Khun and Manderson, 2007). More specifically, during the early stages of illness households are more likely to seek care from private, informal providers or self-treat. This is particularly true for childhood, diarrheal illnesses. These sources can be inexpensive and widely available in rural areas, factors that decrease the direct, direct non-medical and indirect costs to households. As the severity of illness worsens,

households are more likely to seek formal sources of care and bypass closer providers (Ha et al., 2002; Konde-Lule et al., 2006; Marsh et al., 2004; Twebaze, 2001).

However, the evidence throughout sub-Saharan Africa and South Asia is mixed on what type of formal care households utilize as case severity worsens. Habtom and Ruys (2007) reported that in Eritrea, households with children were more likely to seek public health care providers than private formal providers. Akin and Hutchinson (1999) found similar results, while Konde-Lule et al. (2006), Rutebemberwa et al. (2009), Marsh et al. (2004) also cited an increase in utilization of public care throughout Kenya and Uganda. On the other hand, other authors found that private formal providers were more commonly utilized than public ones as severity worsened (Ozawa and Walker, 2011). One may speculate that public health care providers, particularly in rural areas, are located further from households yet provide more consistent, high quality care than their private counterparts.

The Healthcare Utilization and Attitudes Survey and this dissertation operationalize case severity according to the survey question “Mod\_Severe,” which states:

Mod\_Severe: (1) Moderate to Severe Diarrhea; (2) Had Diarrhea, though Not Moderate or Severe

## **Household and Provider Level Variables**

### **Cultural factors and beliefs**

Households' decisions to utilize private formal, private informal, public or self-care is largely driven by their belief and trust in those providers. Evidence suggests that this relationship is particularly strong for child health care services (Levin et al., 2001; Goldman et al., 2002; Rutherford, 2010). Parents must have confidence that providers

who treat themselves or their children will provide high quality care and will not induce demand for unnecessary services. From a societal perspective, trust in public or private health care providers is driven by national culture and history, which in turn influences how much faith households have in the public or private sector. Thus, Gambian, Kenyan, Pakistan, and Indian households will vary in the extent that culture, values and beliefs impact their demand for public, private or self-care. It is difficult, at the national or regional level, to hypothesize the direction of this relationship.

At the community or household level, faith in informal or formal providers will depend on local relationships with those providers, friends and other families. This is especially important for private, informal providers who attract patients primarily through their reputation in communities and word of mouth (Shah et al., 2011; Bloom et al., 2011). For instance, in a study by Ozawa and Walker (2011), Cambodian households had a more positive view of private informal providers, because they trusted their abilities, intentions, honesty and flexibility of payments. Households are more likely to utilize private, informal care if they are sceptical of western medicine and instead prefer traditional remedies. Conversely, other studies across sub-Saharan African and South Asia have found that households' are more likely to utilize private or public, formal providers due to greater trust and confidence. Households may also self-treat an illness if they have low faith in both the formal and informal health care systems.

Because cultural values and beliefs are intangible, there are limitations to including these as variables in an econometric model. Nonetheless, the Healthcare Utilization and Attitudes Survey and this dissertation operationalize these based on how

much households trust the formal medical system and western medicine. In accordance to question 64, this states the following:

“In your opinion, are vaccines safe and important for your child’s health?” (1) No;  
(2) Yes

### **Wealth**

A large number of empirical studies have explored the relationship between households’ income and their choice of health care provider, nearly all of which have found a significant relationship and suggest that lower income households are more likely than higher income families to either self-treat or seeking private, informal medical care providers. Conversely, higher income households are more likely to seek private, formal providers, while evidence is mixed on how income impacts the utilization of public providers.

Poorer households appear more cost-conscious and flexible about where they utilize medical care, presumably because costs spent on medical care represent a greater share of total income. As lower income households also tend to be less educated, they are more likely to self-treat illnesses or seek private informal care providers who are closer to home and have better relationships with households than do private formal or public providers. This has been supported by evidence in Tanzania (Manzi et al., 2005), Malaysia (Heller, 1982), Indonesia (Chernichovsky et al., 1986), Nepal (Pokhrel et al., 2005), Nigeria (Onwujekwe et al., 2011; Okeke and Uzochukwu, 2009) among other sub-Saharan African and South Asian nations (Bloom et al., 2011; Forsberg et al., 2011).

Conversely higher income families are more likely to seek private, formal providers than either self-treat illnesses or utilize private, informal providers for reasons

cited above. The evidence for this assertion has been reported in Mozambique (Lindelov, 2005), Vietnam (Ha et al., 2002), Tanzania (Manzi et al., 2005); Eritrea (Habtom and Ruys, 2007), Nigeria (Amaghionyeodiwe, 2008), Nepal (Pokhrel et al., 2005), including other sub Saharan African and South Asian nations (Bloom et al., 2011; Forsberg et al., 2011).

The literature offers mixed evidence on how income impacts utilization of public providers. Some studies find that when insured, poorer households are much more likely to seek publically provided health care services; without insurance, this group seeks public care less than self or informal care but more frequently than private formal care (Ha et al., 2002). Evidence also suggests that high income families are more likely to seek private formal care than public care, though this depends on region, country and even geographic area. Thus is it difficult to assess which income groups utilize public care more frequently and intensely (Forsberg et al., 2011; Bloom et al., 2011).

Of particular interest for this dissertation, studies across Latin America indicate that these trends may differ by age group, especially health care seeking behaviour for young children. Waters et al. (2008) reported that in several Latin American countries both poor and rich children with diarrheal illnesses were more likely to see formal public and private health care providers. Goldman et al. (2002) and Granich et al. (1999) cited similar findings in Guatemala and Mexico.

While the literature broadly utilizes household income, the Healthcare Utilization and Attitudes Survey and this dissertation operationalize this variable as self-reported household wealth, with the survey question “wiq” providing the following choices: (1) Poorest; Poor, (2) Middle, (3) Upper to Middle; Wealthiest. It was impossible to

determine how the Gates Foundation, University of Maryland and other study organizers calculated and measured each wealth category, and data on this variable was taken directly from the final data set. There are minor yet significant differences between wealth and income; wealth encompasses a broader range of assets such as livestock, houses and savings. Because households in developing settings often purchase medical care through loans, trading of livestock, or other assets, wealth is likely to have a greater impact on provider choice than income earned.

### **Interaction (costs \* wealth)**

Empirical evidence cited in Chapter 3 suggests that the impact of costs on households' choice of health care provider will vary by both income and wealth. Specifically, poorer households are likely to be more responsive to changes in out of pocket costs, notably direct medical and direct non-medical costs, than wealthier households (Chernichovsky et al., 1986; Mwabu et al., 1986; Ndyomugeny et al., 1998; Habtom and Ruys, 2007; Bedi, 2004; Noor et al., 2006; Gething et al., 2004; Guargliardo et al., 2004). Conversely higher income families are likely to be more responsive to changes in indirect medical costs than poorer households (Dor et al., 1987; Goldman and Grossman, 1978; Phelps and Newhouse, 1974; Khan et al., 2002; Akin and Hutchinson, 1999; Bhatia and Cleland, 1999; Ensor and Cooper, 2004).

If the relationship between costs and households' choice of medical provider varies significantly by wealth, the exclusion of an interaction term in both econometric models could lead all cost variables to have a non-significant impact on households' choice of medical provider. In this case, the average effect of cost on households' choice of provider would appear to be non-significant when in fact different wealth groups would be significant though in opposing directions. It is important to note,

however, that the relationship between costs and households' choice of health care provider should be negative for all wealth groups; this paper merely suggests that the slope or marginal change for this negative relationship may vary by wealth group.

Interpreting a non-linear interaction effect between costs and wealth is not the same as the marginal effect expected in a linear model. The sign, magnitude and significance of the beta coefficient will not explain the entire relationship or will simply offer an incorrect outcome. According to Ai and Norton (2003), interaction relationships could be significant and non zero even when the output beta coefficient is zero, as may be the case in an asymptotic curve, or vice versa. Similarly, the sign of the beta coefficient in such an example would not account for the contrasting positive and negative signs necessary to describe such a relationship. To correctly interpret non-linear interaction effects, Ai and Norton (2003) suggest computing the cross derivatives for both variables – a method that will be conducted in this dissertation via own and cross cost elasticities.

### **Quality of care**

It is important to recognize that differences exist between cultural factors and quality of care indicators as they impact households' choice of health care provider. Quality of care can be defined and operationalized in several ways, with the health care literature breaking this construct into either “clinical quality” or “subjective quality.” Clinical quality refers to the technical and medical skills provided that directly impact a patient's health outcomes. Personal quality refers to factors like patient satisfaction, wait time, provider communication, availability of medications, adequate staffing and facility cleanliness.

Evidence across sub-Saharan Africa and South Asian suggests that clinical quality of care is, on average, much better among public than private, formal and informal providers. Specifically, studies by Konde-Lule et al. (2010), Filmer (2005), Chakraborty et al. (2000), Onwujekwe et al. (2011) and Leonard et al. (2007) reported that in Uganda, Nigeria, Tanzania and India public providers offered the best technical quality to patients followed by private formal and then private informal providers. This occurs because the private sector lacks regulation, thus leading to wide variability in health care providers' clinical skills and medical training.

A great deal of evidence indicates that public providers offer better clinical quality of care for children suffering from diarrheal illnesses. Studies by Iqbal et al. (2009), Wachter et al. (1999), Tomson and Sterky (1986) and Syhakhang et al. (2001) found that in Nigeria, India, Bangladesh and Nepal 74 to 92% of private informal providers prescribed drugs that were ineffective with another 7% being harmful. Across Latin American and the Caribbean Waters et al. (2008) found that private providers were less likely to prescribe ORS diarrheal treatment while more likely to prescribe antibiotics and other medications, with the gold standard being ORS as the most cost effective treatment for child diarrheal illnesses. Other studies in Egypt, Nigeria, Bangladesh, Sri Lanka, Kenya, Uganda, Ghana and Yemen have found similar results despite the many households seeking private providers for childhood diarrheal care (Muhuri et al., 1996; Langsten, 1995; Igun, 1994; Bojalil et al., 1998; Russell, 2005; Abuya et al., 2007; Konde-Lule et al., 2006).

According to Peters (2002), Habtom and Ruys (2007) and Ozawa and Walker (2011), information asymmetry and poor education lead households often wrongly to

perceive that the private sector offers better clinical, diarrheal care. Empirical papers also suggest that personal quality of care factors have a strong influence on households' choice of health care provider and may even override cost as the most important determinant (Amaghionyeodiwe, 2008; Okello et al., 1998). For instance, Liu et al. (2006) found that Indian and Chinese households sought private care, because of lower wait times, cleaner facilities and positive staff attitudes. Ozawa and Walker (2011) reported that Cambodian households sought private care, because providers were friendly, more approachable and better listeners. Studies in South Africa, Tanzania, Sri Lanka, Nigeria and other African nations indicated that households perceived private providers to have better drug and staff availability as well as higher quality infrastructure, improved customer service and overall better reputation across local communities (Gilson et al., 2005; Russell, 2005; Lavy and Germain, 1994).

The Healthcare Utilization and Attitudes Survey and this dissertation operationalize quality of care based on survey questions “q31\_carequality,” 52 and 41. The first two measure subjective quality of care while the latter measures clinical quality of care. The dissertation will thus include both subjective and clinical quality of care variables into the research model, which are based on the following:

Q31\_carequality and 52: “What is your opinion of the care your child did / would receive for his or her diarrheal illness? (1) Excellent; (2) Good; (3) Fair; (4) Bad; (5) Don't Know”

41: “Did [Child's Name] receive any of the following to treat diarrhoea from the chosen health care provider? (1) Intravenous Fluids; Medicine by Injection; (2) ORS; (3) Zinc; Antibiotics; (4) No Treatment”

## Econometric Methods

### Model Specifications

The functional forms of this dissertation's econometric models are as follows:

(5-2)

$$\begin{aligned} \text{Provider Choice (Public, Private Formal, Private Informal, Self Care)} &= \beta_0 + \\ &\beta_1(\text{Total Household Costs}) + \beta_2(\text{Child's Age}) + \beta_3(\text{Child's Gender}) + \\ &\beta_4(\text{Child's Case Severity}) + \beta_5(\text{Maternal Education}) + \beta_6(\text{Household Income}) + \\ &\beta_7(\text{Cultural Beliefs}) + \beta_8(\text{Quality of Care}) + \beta_9(\text{Total Household Costs * Income}) + \varepsilon \end{aligned}$$

(5-3)

$$\begin{aligned} \text{Provider Choice (Public, Private Formal, Private Informal, Self Care)} &= \beta_0 + \\ &\beta_1(\text{Direct Medical Costs}) + \beta_2(\text{Direct Non Medical Costs}) + \\ &\beta_3(\text{Indirect Medical Costs}) + \beta_4(\text{Child's Age}) + \beta_5(\text{Child's Gender}) + \\ &\beta_6(\text{Child's Case Severity}) + \beta_7(\text{Maternal Education}) + \beta_8(\text{Household Income}) + \\ &\beta_9(\text{Cultural Beliefs}) + \beta_{10}(\text{Quality of Care}) + \beta_{11}(\text{Direct Medical Costs * Income}) + \\ &\beta_{12}(\text{Direct Non - Medical Costs * Income}) + \beta_{13}(\text{Indirect Medical Costs * Income}) + \varepsilon \end{aligned}$$

The dependent variable is an unordered choice function of four health care providers; in other words, households do not vary their choice of public, private formal, private informal or self-care in an ordered manner. Furthermore these models include variables that are both characteristics of the patient/household as well as characteristics of each medical provider type. Costs and quality represent characteristics that vary by provider type, while the remaining control variables such as age, income and case severity remain constant for each household. As such, conditional logit models (CL)

offer an advantage over unordered multinomial logit (MNL) models by satisfying the inclusion of both variable types (McFadden, 1981).

For a conditional logit model to be used, however, the Independence of Irrelevant Alternatives (IIA) assumption must hold. The IIA states that if one provider type were no longer available to households, families that originally utilized that provider type would distribute proportionately across the remaining providers. For instance, if private formal providers were no longer available to households, the resulting proportion of families who utilized private informal, public and self-care would remain constant. The IIA assumption precludes that no two health care provider types are closer substitutes for households than the other available types. In economic terms, the households' demand function for a health care provider is the probability that their derived utility from that provider is greater than any other provider type. Conditional logit models assume that the utility function for any households is uncorrelated and cross cost elasticities remain equal across alternative providers (McFadden, 1981).

To test whether the IIA assumption held in these econometric models, this dissertation conducted a Hausman McFadden specification test. The test was operationalized by first running a model that included all four provider choice variables and then four subsequent models that remove one of the choice variables. By assessing how much the beta coefficients for each independent variable vary across models, the Hausman McFadden test indicated whether or not the IIA assumption held. Upon finding which provider types fell into each nest, the Hausman McFadden test was again conducted within every nest to ensure that the IIA assumptions met.

Results suggested that the IIA assumption did not hold for Gambia, Kenya, Pakistan or India (the details of which will be presented in Chapter 6). As such the conditional logit model needed to be replaced with a more flexible, nested logit model (NMNL) which utilizes maximum likelihood simulations (Williams, 1977). The nested logit model offers several distinct advantages over alternative models. The primary advantage of nested logit models is that both multinomial and conditional logits can be conducted within and across nests, thus offering more in-depth analyses. The multinomial component determines whether and to what extent non-variant characteristics, such as income and age, impact households' choice of medical provider across any stage of their decision making process. Because the conditional component utilizes characteristics (ie. costs) that vary across medical providers, it can determine how these variables impact provider choice, households' non-proportional cross cost-choice elasticities, and the extent to which they vary across providers.

It should be noted that because households only utilize one provider type in this dissertation, costs and quality are not available for alternative provider choices. To estimate cost-choice elasticities, defined as the percent change in likelihood of choosing any provider type given a percent change in cost of a provider type, this dissertation imputed average cost and quality indicators for provider types that were not selected by a given household, thus indicating the theoretical cost and quality they would have incurred had they visited that provider type. For example, if household A sought private formal medical care, its direct medical costs would be known and recorded. However, the average direct medical cost for households seeking public, private informal and self

care would be imputed, suggesting that if household A had sought care elsewhere, they would have likely incurred its average, direct medical cost.

Despite these benefits, nested logit models also have several limitations, the most important of which is that nests are specified *a priori* via the model and not objectively chosen by the researcher. Without knowing precisely which choice variables belong in which nest, estimates are likely to be unreliable and biased. While the Hausman McFadden test reduces the extent of this problem, it does not completely eradicate it (Qian et al., 2009).

Some empirical papers have examined the impact of costs on households' choice of health care provider using alternative methods. Many apply either a simple unordered, conditional or multinomial logit model (Ha et al., 2002). These papers often lack methodological rigor and incorrectly rely on the IIA assumption (Qian et al., 2009). The majority of studies on this subject area have acknowledged that the IIA assumption is unlikely to hold using models that examine households' choice of health care provider (Wiseman et al., 2008; Dor et al., 1987; Qian et al., 2009; Lavy, 1994; Bedi et al., 2004). They, like this dissertation, first argue that inadequate scientific evidence exists to accurately hypothesize where households' demand would shift after eliminating any single, provider type. Existing evidence also finds that cross cost elasticities are not identical between providers, and as such households do not proportionately shift their demand to alternative providers as direct medical, direct non-medical and indirect costs change.

A review of the literature also suggests that mixed multinomial logit models (MMNL) may be a better option than nested logit models. However, these are largely

untested and uncommon in the health care economics literature (Qian et al., 2009; Morey et al., 2003; Bedi et al., 2004). For this reason there is some uncertainty whether and to what degree it would be effective for this dissertations' research question.

### **Selection Bias**

After developing this dissertations' econometric model, the analysis also corrected for selection bias. A strong case can be made that this paper's primary models do not include all potential confounding variables. Confounding variables are those which impact both the primary independent variables of interest, such as direct medical, direct non-medical, indirect and total costs, as well as the dependent variable or type of medical provider. If confounding variables are not included in these models, their dual effect on both independent and dependent variables is likely to bias the coefficients of each independent variable and lead to incorrect statistical results. A review of the empirical literature suggests that a number of confounding variables have not been included in the models due to data limitations. These include social support from the community as well as supply side factors like the number and type of providers in a market, size of health care facility, drug availability and even subjective quality indicators that could not be effectively operationalized by the existing data set.

Because nested logit models use maximum likelihood simulations, the models used in this dissertation naturally accounted for selection bias. However, an alternative method of correcting for selection bias – which was not applied in this dissertation – is using an alternate version of the Heckman Two Step Method while acknowledging that both propensity scores and instrumental variables could have been used. This methodology specifically considers unordered, nested logit models in which the IIA assumption does not hold and more than two choice variables exist (Bourguignon et al.,

2007). This is a unique method given that Heckman's model only allows for analysis on two choice variables.

Methodologically this technique occurs in two phases, just like Heckman's model. The first phase requires running probit or logit models on households' decision to seek care or self-treat, from one obtains the gammas ( $\gamma$ s). These values are then entered into either the pdf or cdf functions, defined as  $\frac{-f(Z^*\gamma)}{F(Z^*\gamma)}$  and  $\frac{-f(Z^*\gamma)}{1-F(Z^*\gamma)}$ , to obtain an inverse mills ratio. The inverse mills ratio is then inserted into the nested logit model for households' choice of medical provider. It is important to acknowledge that some of the control variables included in both original probit / logit model and nested logit model must be different in order to avoid multicollinearity.

### **Simultaneous Equation Bias**

It is critical to address the simultaneous equation bias in both provider choice models as a form of endogeneity. Simultaneous equation bias is a methodological issue that directly impacts the causal relationship between independent and dependent variables. It can be either hierarchical or non-hierarchical, with the latter being a feedback loop driven by a third variable. During a feedback loop, it is impossible to know whether the independent variable has a causal impact on the dependent variable or the opposite is true. Simultaneous equation bias may also be either recursive or non-recursive, with the former occurring when both the error terms for the independent and dependent variables are correlated.

A cursory examination of this dissertation's primary research objectives, notably whether costs influence households' choice of health care provider, suggests that simultaneous equation bias could be a methodological issue. Costs would likely impact

households' choice of provider, though the type of health care provider being utilized would also influence the costs that households incur. In practice, however, simultaneous equation bias was not likely as issue in this dissertation due to the time frame of this study. The cross sectional nature of this dissertation implies that households chose to utilize a medical provider at a given point in time based on a variety of factors such as costs. In this regard, the arrow can only point in one direction – that is from costs to provider choice. This has been widely cited in the literature (Acton, 1973; Gertler et al., 1987; Qian et al., 2009; Coffey, 1983).

### **Measurement Error**

Measurement error occurs in surveys when individuals must respond to questions without concrete or supportive data. More specifically, households are often biased in how they recall information, with these biases impacting the data collected by researchers. Statistically, measurement error occurs when the primary dependent variable, independent variable or control variables are correlated with the error term. Incorrect data collection may result in minor or significant biases in study outcomes depending on the magnitude of recall error by respondents and type of variables that experience recall bias. Measurement errors in the primary dependant variables will only lead to higher error term variance and thus inefficient results, though measurement errors in the primary independent variables will lead to biased beta coefficients or incorrect results.

For this dissertation, measurement error was likely to be a primary issue for direct medical, direct non-medical and indirect medical cost data, as the majority of households have not recorded these medical costs. Direct medical and direct non-medical costs were less likely to experience error than indirect medical costs, because

the latter are based on individual's estimated value of time and lost productivity. As such, rather than the error spread being simply larger and more variant (up and down on same regression line), the error likely experienced both more variance and shifted left or right. In other words, the cost coefficients would always be biased towards zero, leading to a flatter and insignificant regression equation for  $\beta$ . Fixing this problem required an instrumental variable, something that could not be obtained. It was therefore critical merely to address this issue and acknowledge its potential impact on this dissertation's results. One might argue that the stringent, reliable and valid process by which data was collected would limit this bias – but it certainly remains a problem.

Table 5-1. Dependent, independent, and control variables

Dependent Variable	Definition	Operationalization
<b>Type of Medical Provider</b>		
Public	Public Hospital or Health Center	1
Private Formal	Licensed Practitioner or Private Doctor (Not at Hospital);	2
Private Informal	Traditional Healer; Unlicensed Practitioner; Village or Bush	3
Self Care	Sought Care from Home	4
<b>Independent Variables</b>		
Direct Medical Costs	Household out of pocket costs directly resulting from the	U.S. Dollars
Direct Non-Medical Costs	Household out-of-pocket, transportation costs of reaching	U.S. Dollars
Indirect Medical Costs	Household time costs that are spent utilizing medical care	U.S. Dollars
Total Costs	Sum of direct medical, direct non-medical and indirect costs	U.S. Dollars
<b>Control Variables</b>		
Age	Child's Age in Months	1-60 Months
Gender	Child's Gender	(1) Male ; (2) Female
Maternal Education	Mother's Education	(1) No formal schooling, Religious (2) Less than primary ; Completed primary ;
Case Severity	Severity of Child's Illness	(1) Moderate to severe diarrhea ; (2) Had diarrhea but minor
Cultural Factors & Beliefs	Vaccine Safety and Effectiveness	(1) No ; (2) Yes
Wealth	Household Wealth Quintiles	(1) Poorest, Poor ; (2) Middle ; (3) Middle to Upper, Wealthiest
Wealth * DMC	Interaction of Wealth and Direct Medical Costs	See Above
Wealth * DNMC	Interaction of Wealth and Direct Non-Medical Costs	See Above
Wealth * IMC	Interaction of Wealth and Indirect Medical Costs	See Above
Subjective Quality of Care	Satisfaction with provider and treatment	(1) Excellent; (2) Good; (3) Fair; (4) Bad
Clinical Quality of Care	Clinical treatment of child diarrhea	(1) IV , Fluids ; (2) ORS , Zinc ; (3) Antibiotics ; (4) No Treatment

## CHAPTER 6 RESULTS

### Overview

This dissertation tested the Independence of Irrelevant Alternatives assumption that households' utility function was uncorrelated and cross cost elasticities remained equal across alternative providers. Results indicated that the IIA assumption did not hold, thus requiring this dissertation to determine medical provider nesting groups and conduct nested logit models. In Gambia, Kenya and Pakistan, Hausman and IIA tests revealed that nests should be broken down by "formal" and "informal" care providers, with the former including public and private formal medical providers and the latter including informal care providers or self care. This indicates that public and private formal providers were highly correlated alternatives among households seeking medical care; if either of these two choices were removed, households should proportionately shift their demand to the alternative provider type. Similar conclusions can be drawn from the "informal care" nest, whereby private informal care providers and self care were highly correlated alternatives among households. In other words, the IIA held within nests.

Data from India, however, suggested that nests be broken down differently into "self," "private" and then "public" medical care providers. Within each of these nests, self care and public care were single entities while private medical care consisted of formal and informal providers. While private formal and informal providers were highly correlated alternatives among households, public providers and self care were independent of any other choice. In other words, if public providers ceased to be an option for medical care, households would not proportionately shift their demand for

care to any other provider type. The same can be said of those self treating for diarrheal illnesses.

These nests are largely consistent with the empirical literature, particularly for Gambia, Kenya and India. Evidence from Chapter 3 suggests that Gambian households seeking medical care were most likely to visit public or private, formal providers but not informal providers. Upwards of 30% of households initially seeking private, informal care eventually did not seek any medical care thereafter. For Kenya, studies have found that although a majority of households seek either informal care or do not seek any care, wealthier households will alternate between public and private formal care. This suggests that nests may be driven by wealth differences among households. In India, nearly 75% of households utilize either private formal or informal medical care, with only 20% utilizing public care and another 10-40% not seeking any care. For a variety of reasons, India's nesting structure from this dissertation's sample is similar to what national studies have found - that households are likely to seek private or public medical care though not both.

Pakistan's nests, however, vary from what previous empirical evidence might predict. Existing studies suggest that upwards of 80% of all households utilize private formal care and up to 30% utilize private informal care. There exist a plethora of reasons for this behavior, as cited in Chapter 3, but public medical care is utilized much less frequently than private care. Results from this dissertation may either be due to its unique sample or, as discussed in Chapter 5, the limitations of letting a statistical model determine nests *a priori*.

Bivariate and multivariate results from this dissertation were defined as being significant at the  $p < 0.10$  level. While most results in this section were significant at or below the  $p < 0.05$  level, the level most commonly used in the literature, expanding the range of statistical significance was appropriate given the small sample sizes. The sections that follow present, by country, all analyses, which include descriptive statistics for independent and cost variables, bivariate analyses, multivariate analyses, and cost-choice elasticities.

## **Gambia**

### **Descriptive Statistics**

Sample descriptive statistics in Table 6-1 indicate that 20.5, 36, 24, 19.5% of Gambian households utilized private formal, public, private informal and self care, respectively. Among children with diarrheal illnesses, the mean age was 18.24 months while 57.94% were male. Nearly 78% of all mothers surveyed had only a religious education, while the remaining 23% had at most completed primary education. While more mothers seeking private formal care had a religious education than any other group, those self treating their child's diarrheal illness were most likely to have no formal education. Almost 82% of all households indicated that their child had moderate or severe diarrhoea, although only 69% of those self treating responded as such. Less than 1% of families cited vaccines as not important towards child health. While mean wealth across the entire sample was evenly distributed, there was significant disparity among provider types; specifically, around 60% of households seeking private formal care were either in middle to upper wealth groups while that figure was only 20% for those self treating. Interestingly only 16 and 23% of households said they had received excellent quality care from private formal or informal providers, respectively, compared

with 100% of households seeking public care. Only 10 and 12% of households seeking private informal care or self treating delivered ORS tablets, which is generally the ideal treatment for child diarrheal illnesses, relative to 53 and 60% of those seeking private formal and public care.

### **Cost Summary**

A summary of households' total, direct medical, direct non-medical and indirect medical costs for diarrheal care is presented in Table 6-2. Sample means for these cost categories across all Gambian households were \$3.89, \$0.88, \$0.35, and \$2.66, while the proportion of households incurring any costs were 83.33, 25.40, 14.68, 81.75%, respectively. Thus, indirect medical costs represented the greatest share of total medical costs.

For total medical costs, households that self treated incurred fewer total costs (\$0.86) and were less likely to incur any total costs (50%) on average than those seeking private formal (\$3.41; 85%), public (\$6.10; 98%) and private informal care (\$3.41; 87%). Given the existing literature, it was surprising that Gambian households seeking public care were most likely to incur some total costs and spent more overall for care. This may have been due to the fact that some households utilizing public care faced extremely high costs.

Across direct medical, direct non-medical and indirect medical cost categories, households utilizing public medical care were, on average, more likely to incur some costs than other provider types. Gambian households utilizing public providers appeared more likely than other provider types to incur rare yet catastrophic direct, direct non-medical and indirect medical costs.

For example, households seeking private formal, public, private informal and self care on average spent \$0.65, \$1.42, \$0.97, and \$0.02 on direct medical costs. Mean direct non-medical costs were \$0.35, \$0.57, \$0.24, \$0.05 for these provider types, respectively, while indirect medical costs were \$2.41, \$4.11, \$2.20, \$0.79. Households thus spent more on indirect medical costs than they did on direct and direct non-medical costs.

Moreover, roughly 21, 31, 35 and 8% of households incurred some direct medical costs when utilizing private formal, public, private informal, and self care, respectively. For direct non-medical costs these figures across those provider types were 11.5, 25.2, 11.6 and 2%, while for indirect medical costs they were 84.6, 96.7, 81.6, and 50%.

### **Bivariate Results**

Tables 6-3 to 6-6 indicate how costs statistically differ among Gambian households utilizing private formal, public, private informal and self care. Using a simplified nested logit model, these results compare the total, direct medical, direct non-medical and indirect medical cost of each provider type to a base group and assess whether and to what extent these costs were different from that group.

Table 6-3 suggests that households' total medical costs were not significantly different among households utilizing private formal, private informal or public medical care; however, households seeking these care types incurred significantly greater total medical costs than self treating households. At the  $p < 0.01$  level, households who self treated child diarrheal illnesses were 1.26, 1.67 and 1.65 times more likely to incur fewer, total medical costs than private formal, public and private informal care providers, respectively.

Gambian households' direct, direct non-medical and indirect medical costs also did not differ significantly among private formal, public and private informal care; yet all of these households faced significantly higher direct, direct non-medical and indirect costs than those who only self treated. At the  $p < 0.05$  level, households who self treated were 1.84, 1.96 and 1.89 times more likely to incur fewer, direct medical costs than private formal, public and private informal care providers, respectively. At the  $p < 0.10$  level, households who self treated child diarrheal illnesses were 1.62, 2.87 and 2.54 times more likely to incur fewer direct non-medical costs than private formal, public and private informal care providers. At the  $p < 0.05$  level, these figures were 1.63, 2.33, and 2.31 for indirect medical costs, respectively. Inconsistencies in results between Table 6-1.2 and those in Tables 6-3 – 6-6 are due to households seeking public care who experienced rare though abnormally high out-of-pocket, transportation and / or time costs.

### **Multivariate Results**

Outputs from Gambia's multivariate, nested logit models are presented in Tables 6-7 and 6-8. Recall that the first multivariate model only examined total medical costs and its wealth interaction effects, while the second model included direct medical, direct non-medical and indirect medical costs as well as their wealth interaction effects. However, these figures are all included in Table 6-7 to simplify the presentation of results. Table 6-7 is broken into three sections. The first and third sections show independent variables that vary by provider type, thus including each cost category, its respective wealth interaction effect, as well as quality of care.

Within the first section, beta coefficients and the p-values for each cost category indicate the probability of choosing a different of medical provider, irrespective of type,

as costs change. In Table 6-7, total medical costs, direct medical costs, and indirect medical costs were significant at the  $p < 0.05$  level, suggesting that they all had a significant impact on households choice of medical provider. As total medical costs rose by 10% for any given medical provider, the likelihood of choosing that provider type declined by 6.3%. As direct medical costs rose by 10% for any given medical provider, the likelihood of choosing that provider type declined by 2.3%. As indirect medical costs rose by 10% for any given medical provider, the likelihood of choosing that provider type declined by 3.3%. Direct non-medical costs did not have a significant impact on households' choice of medical provider.

The first section of the model also presents results for wealth interaction effects. Total medical costs, direct medical costs and indirect medical costs impacted households' choice of medical provider differently according to wealth group. These interaction effects were significant at the  $p < 0.01$  level. Interpreting beta coefficients for these interaction effects will be more effective in the section titled "Cost-Choice Elasticities." Once again, direct non-medical costs had no significant interaction effect with wealth.

The third section of Table 6-7 includes clinical quality of care indicators, specifically how they vary by provider type. In each results column, beta coefficients and p-values indicate how likely a given provider type is to administer fluids, antibiotics or no treatment, relative to ORS tablets, when compared with alternative providers. Because ORS tablets are the gold standard for diarrheal treatment, results make it possible to assess each provider types' clinical quality of care. Accordingly, private formal providers were 1.13 and 1.14 times more likely than private informal providers

and self-treating households to administer ORS tablets than fluids, respectively; these were both significant at the  $p < 0.05$  level. Public providers were .74 and .89 times more likely to administer ORS tablets than private informal providers and self treating households, though these were only significant at the  $p < 0.10$  and  $p < 0.05$  level. There was no significant difference in treatment patterns between private formal and public providers or between private informal providers and self treating households.

Public providers were 1.22 and 1.38 times more likely than private informal providers and self treating households to deliver ORS tablets than antibiotics, respectively; these were significant at the  $p < 0.01$  level. Private formal providers were also 1.06 times more likely than private informal providers or self care families to deliver ORS than antibiotics, though this was only significant at the  $p < 0.10$  level. There was no significant difference between private formal and public providers or between private informal providers and self-treating households. Interestingly, among all provider choices none was significantly more likely to administer ORS tablets than offer no treatment for diarrheal illness.

The second section of Table 6-7 examines independent variables that impact households' decision to seek formal care (private and public formal) relative to informal care (private informal and self care). These control variables were chosen at this decision making stage in part due to existing empirical evidence as well as their role as household or individual level characteristics. Among them, child gender, maternal education, child age, and case severity did not significantly influence this choice, though wealth and cultural beliefs did have an impact. At the  $p < 0.01$  level, as households went up one wealth category they had 51% greater odds of seeking formal medical care; at

the  $p < 0.10$  level, households who believed in the effectiveness of child vaccines had 229% greater odds seek formal care.

### **Cost-Choice Elasticities**

Table 6-1.8 extends the results in section one of Table 6-7 by presenting own and cross cost elasticities of demand for each cost category, wealth group and provider type. Only results for total medical costs, direct medical costs, and indirect medical costs are reported, because they had a significant impact on households' choice of medical provider and had a significant interaction effect. For example, using total costs for private formal providers among low wealth households, the own-cost elasticity was -0.60 while cross cost elasticities for public, private informal and self care were 0.00, 0.30 and 0.30, respectively. An own-cost elasticity of -0.60 implies that a 10% increase in the total cost of private formal care led to a 6% decline in the likelihood of utilizing private formal care and an increase in the likelihood of utilizing the other forms of care by 0%, 3% and 3%, respectively.

With respect to total costs, own-cost elasticities for private formal, public, private informal and self care were nearly all cost inelastic and varied from -0.30 to -1.05. By provider type, households were more responsive to changes in the total cost of public providers than any other provider type, with their elasticities being -1.05, -0.36, -0.72 for upper, middle and lower wealth households. Households seeking private formal providers were the least responsive to changes in total costs, of which cost elasticities were -0.82, -0.30, -0.60 for upper, middle and lower wealth households. This trend was consistent across all wealth groups. By wealth, high wealth households were more responsive to total costs changes (less cost inelastic) than low wealth households, followed by middle wealth families. The one exception was for self care, where low (-

0.90) wealth households were less cost inelastic than middle (-0.39) or upper (-0.78) wealth families.

By provider type, cross cost elasticities were highest for private informal and self care as total costs increased for private formal and public care. In other words, households were most likely to choose either private informal and self care as private formal or public care became more costly. Conversely, as the total cost of private informal and self care increased, cross cost elasticities were highest for private formal and public care – ie. households were most likely to utilize private formal and public care. These results were consistent across wealth groups.

Regarding direct medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and ranged from -0.18 to -0.66. There were no trends in cost elasticity across provider types; instead, own-cost elasticities varied considerably by wealth group. High wealth households were surprisingly more responsive to changes in direct medical costs (less cost inelastic) than low wealth households, followed by middle wealth families.

When examining cross cost elasticities by provider type, a rise in direct medical costs of private formal and public care resulted in households of all wealth levels being more likely to utilize either private informal and self care. Yet as direct medical costs of private informal and self care increased, households were most likely to utilize private formal and public care rather than informal or self care. These results were consistent across wealth groups.

For indirect medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and varied from -0.15 to -0.63. There were

no trends in own-cost elasticities by provider type; instead, own-cost elasticities varied considerably by wealth group. As with total and direct medical costs, high wealth households were less cost inelastic and more responsive to changes in time costs than low wealth households, followed by middle wealth families.

With respect to cross cost elasticities, trends existed across provider type but not wealth group. As indirect medical costs increased for private formal and public care, households of all wealth levels were generally more likely to utilize private informal or self care. Conversely, as time costs of private informal and self care rose, demand was generally stimulated for private formal and public care.

## **Kenya**

### **Descriptive Statistics**

Descriptive statistics for Kenyan households are presented in Table 6-9. Roughly 28.7, 27.6, 20.3, and 23.2% of Kenyan households utilized private formal, public, private informal and self care, respectively. Among children with diarrheal illnesses, the mean age was 16.63 months while 55.72% were male. Mothers seeking private formal and public care were more highly educated than those seeking private informal care or self treating; these results are relative, however, given that nearly 96% of all mothers surveyed had at most completed primary education. Almost 66% of all households indicated that their child had moderate or severe diarrhoea, although only 43% of those self treating responded as such. Even though more households seeking private informal and self care cited vaccines as being unimportant to child health, this comprised – on average - only 1% of all Kenyan households.

About 40% of households seeking private formal or public care were in the top two wealth quintiles, while that figure was only 35 and 30% for those seeking private

informal care or self treating. Despite greater inequity than among Gambian households, there were few other patterns for wealth groups by provider type. Only 49% of households said they had received excellent quality care from private informal providers compared with 70% utilizing private formal care and 100% utilizing public care. 75% of public providers administered ORS tablets, whereas 63, 12 and 0% of private formal providers, private informal providers and self treating households followed suit.

### **Cost Summary**

A summary of households' total, direct medical, direct non-medical and indirect medical costs for diarrheal care are presented in Table 6-10. Sample means for these cost categories across all Kenyan households were \$7.79, \$0.70, \$0.32, and \$6.78, while the proportion of households incurring any costs were 88.90, 48.71, 17.71, 76.01%, respectively. Indirect medical costs accounted for the majority of total medical costs, with direct and direct non-medical costs being similar and rather small

For total medical costs, households that self treated incurred fewer total costs (\$1.95) and were less likely to incur any total costs (17.5%) on average than those seeking private formal (\$10.68; 99%), public (\$9.88; 96%) and private informal care (\$7.94; 93%). Households seeking private formal care were more likely to incur some total costs and spent more overall for care, followed by public care and then private informal care.

Among direct medical costs, Kenyan households seeking private formal care were on average more likely to incur some direct medical costs (83.3%) and spent more (\$1.27) on average than for public providers (54.6%, \$0.72), followed by private informal providers (43.6%, \$0.63) and self care (3.17%, \$0.01). Households utilizing private

formal care were more likely to experience catastrophic out-of-pocket costs than other provider type.

Kenyan families utilizing public care were most likely to incur some direct non-medical costs (36%) and spent more on transportation costs (\$0.60) than any other provider type. Private formal providers were the next highest (19.23%, \$0.43), followed by private informal providers (9%, \$0.09) and finally self care (1.6%, \$0.04).

Households seeking private formal or public care appeared more likely to incur very high transportation costs than other provider types.

For indirect medical costs, roughly 92% of Kenyan households seeking private formal care faced some time costs while incurring, on average, \$8.97. These figures were 98.7% and \$8.55 for households utilizing public care, respectively. However, households seeking private formal care were more likely than those seeking public care to incur very high time costs. Mean indirect medical costs for private informal care and self treatment were \$6.83 and \$1.90, respectively, with 89% and 17.5% of those families incurring some time costs.

### **Bivariate Results**

Tables 6-11 to 6-14 compare total, direct medical, direct non-medical and indirect medical costs of each provider type to a base provider group and measure whether and to what extent these costs were different from that group. Table 6-11 indicates that households' total medical costs were not significantly different among households seeking private formal, private informal or public medical care; yet, all of these households incurred significantly greater total medical costs than those who self treated. At the  $p < 0.01$  level, households who self treated child diarrheal illnesses were .35, .27

and .22 times more likely to incur fewer total costs than private formal, public and private informal care providers, respectively.

In Table 6-12, direct medical costs were significantly highest for private formal care, followed by public, private informal and then self care. Households utilizing private formal medical care incurred .35, 1.55 and 11.50 times greater direct medical costs than public providers, private informal providers, and self care patients; these were significant at the  $p < 0.05$  and  $p < 0.01$  levels, respectively. Out-of-pocket medical costs for public care were 1.03 times higher than private informal care ( $p < 0.05$ ) and 10.89 times higher than self care ( $p < 0.01$ ). Households paid significantly greater out-of-pocket costs for private informal care than self care. These results are consistent with descriptive statistics presented in Table 6-10.

In Table 6-13, direct non-medical costs for public providers were significantly greater than any other provider type, followed by private formal care, private informal care and finally self care. Specifically, household transportation costs for public providers were .33, 1.67, and 12.43 times greater than private formal, informal and self care; these were significant at the  $p < 0.05$  and  $p < 0.01$  levels. Transportation costs were 1.20 and 10.51 times higher for private formal than informal or self care, respectively, at the  $p < 0.05$  and  $p < 0.01$  levels. Finally, households incurred 9.38 times greater direct non-medical costs for private informal care than self care. These outcomes were also similar to descriptive statistics from Table 6-10.

In Table 6-14 indirect medical costs were highest for public care, followed by private formal, informal and then self care. Time costs for public care were 1.69, 4.33 and 10.87 times higher than private formal, private informal and self care; these were

significant at the  $p < 0.10$ ,  $p < 0.05$ , and  $p < 0.001$  levels. There was no significant difference in time costs between private formal and private informal care, though these were both 8.55 and 6.38 times higher than self treatment and were significant at the  $p < 0.01$  level. The results for indirect medical costs were slightly different from descriptive statistics in Table 6-10, perhaps because some households utilizing private formal care experienced rare yet exceedingly high time costs. On average, these families incurred costs similar to those seeking informal care yet less than those utilizing public care.

### **Multivariate Results**

Outputs from Kenya's multivariate, nested logit models are presented in Tables 6-15 and 6-16. In the first section of Table 6-15, beta coefficients and the p-values for each cost category indicate the probability of choosing different medical providers, irrespective of type, as costs change. In Table 6-15, direct medical costs and indirect medical costs were significant at the  $p < 0.05$  level, while direct non-medical costs were significant at the  $p < 0.10$  level – suggesting that they all had a significant impact on households choice of medical provider. Surprisingly, total medical costs were not significant at even the  $p < 0.10$  level – a finding that will be discussed in depth later in the chapter. As direct medical costs increased by 10% for any given medical provider, the likelihood of choosing that provider type declined by 1.80%. As indirect medical costs rose by 10% for any given medical provider, the likelihood of choosing that provider type declined by 1.90%. An increase in direct non-medical costs for any provider type by 10% led to a 4.70% decline in the likelihood of utilizing that provider type.

Results for wealth interaction effects were similar, such that direct medical costs, direct non-medical costs and indirect medical costs impacted households' choice of

medical provider differently according to wealth group. Direct and indirect medical cost interaction effects were significant at the  $p < 0.05$  levels, respectively. Those for direct non-medical costs were also significant but at the  $p < 0.10$  level. Once again, total medical costs were not significant at the  $p < 0.10$  level. Wealth interaction coefficients will be interpreted in the following discussion on cost elasticities.

Clinical quality of care coefficients and p-values are presented in the third section of Table 6-15, with self care having no household data to analyze. Public providers were 12.96 and 13.80 times more likely than private formal and informal providers to administer ORS tablets than fluids, respectively; these were significant at the  $p < 0.10$  and  $P < 0.05$  levels. Private formal providers were 4.50 times more likely to administer ORS tablets than private informal providers, with it being significant at the  $p < 0.10$  level.

Private informal providers were 8.97 and 8.17 times more likely than private formal and public providers to deliver ORS tablets than antibiotics, respectively; these were significant at the  $p < 0.10$  level. There was no significant difference between private formal and public providers. Similarly, private formal, public and private informal providers did not vary significantly with respect to delivering ORS tablets relatively to offering no treatment.

The second section of Table 6-15 examines independent variables that impact Kenyan households' decision to seek formal care (private and public formal) relative to informal care (private informal and self care). Child gender, maternal education, child age, and case severity did not significantly influence this choice, though wealth and cultural beliefs did have an impact. At the  $p < 0.10$  level, as households went up one wealth category they had 59% greater odds of utilizing formal medical care; at the

$p < 0.01$  level, households who believed in the effectiveness of vaccines had 753 times greater odds of utilizing formal care.

### **Cost-Choice Elasticities**

Table 6-16 extends the results in section one of Table 6-15 by presenting own and cross cost elasticities of demand for each cost category, wealth group and provider type. Direct medical, direct non-medical and indirect costs are presented, because they had a significant impact on households' choice of medical provider and varied by wealth group. Total medical costs elasticities are not presented due to their insignificance in the Table 6-15 multivariate model.

Regarding direct medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and ranged from -0.06 to -0.36. By provider type, households were generally less cost inelastic and most responsive to changes in the out-of-pocket costs of public and self care. By wealth group, low wealth households were more responsive to changes in direct medical costs (less cost inelastic) than high wealth households, with middle wealth families being the least responsive. The one exception was for public medical care, where high wealth households were far more responsive and less inelastic (-0.30) than middle (-0.06) or lower (-0.12) wealth families.

While cross-cost elasticities for direct medical costs did not vary significantly by household wealth, they did vary by provider type. As direct medical costs rose for private formal providers, demand from households of all wealth levels was most likely to increase for self treatment. Households were also likely to demand for self care as out-of-pocket costs increased for public and private informal providers. As out-of-pocket costs of self care increased, most families were likely to utilize private informal care.

With respect to direct non-medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and ranged from -0.15 to -0.60. By provider type, households were more cost inelastic and less responsive to changes in direct non-medical costs for public providers than private formal or informal providers. By wealth group, low wealth households were more responsive to changes in transportation costs (less cost inelastic) than high wealth households, with middle wealth families being the least responsive.

While cross-cost elasticities did not vary significantly by household wealth, they once again varied by provider type. As transportation costs increased for private formal providers, households of all wealth levels were most likely to exclusively utilize self treatment. As these costs increased for public and private informal providers, households were also most likely to self treatment. As out-of-pocket costs for self care increased, demand from families was most likely to rise for private formal, public and private informal care.

For indirect medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and varied from -0.06 to -0.36. By provider type, households were more cost inelastic and less responsive to changes in indirect medical costs for public providers than private formal or informal providers. By wealth group, low wealth households were less cost inelastic and more responsive to changes in time costs than high wealth households, with middle wealth families being the least responsive.

Cross cost elasticities did not vary by household wealth but did by provider type. As indirect medical costs increased among private formal, public and private informal

providers, households of all wealth levels were most likely to self treatment rather than seek external care. Conversely, as the indirect medical cost of self care increased, household demand for private formal, public and private informal care was equally likely to rise.

## **Pakistan**

### **Descriptive Statistics**

Descriptive statistics for Pakistani households are presented in Table 6-17. Data indicates that 46.5, 22.4, 11.5, and 19.5% of households utilized private formal, public, private informal and self care, respectively. The mean age for children in the sample was 17.31 months while 51.15% were male. Roughly 77, 86, 82 and 83% of mothers seeking private formal, public, private informal and self care had either no education or only a religious education; interestingly, only 4.3 and 5.1% of mothers who utilized private formal and public care had a post-secondary education compared with 10 and 7.2% of those who sought private informal care or self treated. Almost 84% of all households indicated that their child had moderate or severe diarrhoea, with 70% of families who self treated responded as such.

Higher than in Gambia or Kenya , 7.89% of all Pakistani households did not believe that vaccines were effective (figures were not available for households who self treated). This ranged from 8.64% for those seeking private formal care to 5.00% for those seeking private informal care. As expected, households with higher maternal education were also more likely to believe in the effectiveness of child vaccinations. About 43% of households seeking private formal or private informal care were in the top two wealth quintiles, while that figure was only 32 and 41% for those seeking public medical care or self treating. Conversely, over 50% of households utilizing public care

were in the poorest two wealth quintiles compared with 40, 37 and 40% among those seeking private formal, informal and self care. While only 12 and 42% of households said they had received excellent quality care from private formal or private informal providers, 100% of those utilizing public care responded as such. 60% of public providers administered ORS tablets, whereas only 56, 29 and 34% of private formal providers, private informal providers and self treating households administered them.

### **Cost Summary**

A summary of Pakistani households' total, direct medical, direct non-medical and indirect medical costs for diarrheal care are presented in Table 6-18. Sample means for these cost categories across all Pakistani households were \$8.18, \$2.11, \$0.24, and \$5.82, while the proportion of households incurring any costs were 84.48, 59.20, 11.49, 79.02%, respectively. Indirect medical costs accounted for the majority of total medical costs, followed by direct medical costs and then direct non-medical costs.

Among total costs, households that self treated incurred fewer total costs (\$1.47) and were less likely to incur any total costs (23.53%) on average than those seeking private formal (\$10.58; 99.38%), public (\$8.48; 98.72%) and private informal care (\$9.25; 97.50%). Households seeking private formal care were more likely to incur some total costs and spent more overall for care, followed by private informal care and then public care.

Households seeking private informal care were on average more likely to incur some direct medical costs (75%) and spent more (\$3.10) on average than for private formal care (74%, \$2.89), followed by public care (69.2%, \$1.77) and self care (2.94%, \$0.06). Households seeking private formal care, however, were more likely to experience catastrophic direct medical costs than any other provider type.

Pakistani families utilizing private informal care also spent more on direct non-medical costs (12.50%, \$0.51) than for any other provider type. However, private formal providers were more likely to incur some transportation costs (16.05%, \$0.22) than other providers. Public providers witnessed the next highest direct non-medical costs (10.26%, \$0.38), followed by self care (1.47%, \$0.01). Maximum direct non-medical costs for public care were much higher than for all other provider types.

Roughly 93% of Pakistani households seeking private formal or public care incurred some indirect medical costs, on average, \$7.47 and \$6.32 respectively. These figures were 90% and \$5.63 for households utilizing private informal care as well as 22% and \$1.41 for those self treating. Families utilizing private formal care were most likely to incur exceptionally high time costs.

### **Bivariate Results**

Tables 6-19 to 6-22 compare total, direct medical, direct non-medical and indirect medical costs of each provider type to a base provider group and measures whether and to what extent these costs were different from that group. Table 6-19 indicates that households' total medical costs were significantly greatest for private formal care, followed by private informal care, public care and then self care. Specifically, total households costs for utilizing private formal care were .02, .32 and 1.57 times higher than these provider types, respectively, and were significant at the  $p < 0.10$ ,  $p < 0.05$  and  $p < 0.01$  levels. Private informal providers had .16 and 1.36 times greater total costs than public ( $p < 0.10$ ) and self care ( $p < 0.01$ ), while public providers were .88 times more costly than self care. These results are consistent with descriptive statistics in Table 6-18.

Outcomes for direct medical costs are presented in Table 6-20 and are also consistent with descriptive statistics presented in Table 6-18. While private formal and

informal care resulted in the highest out-of-pocket costs for households, they were not significantly different from one another at the  $p < 0.10$  level. Households utilizing private formal medical care incurred .83 and 7.10 times greater direct medical costs than public providers and self care; these were significant at the  $p < 0.01$  level. Direct medical costs for private informal care were .79 and 7.06 times higher than public and self care. Public medical providers cost patients 6.26 times more out-of-pocket than households who self treated and were significant at the  $p < 0.01$  level. Direct non-medical costs, as presented in Table 6-21, were not significantly different between private formal, public, private informal or self care.

In Table 6-22, indirect medical costs for private formal and public providers were significantly greater than any other provider type though not significantly different from each other. Households utilizing private formal medical care incurred .40 and 1.25 times greater indirect costs than public providers and self care; these were significant at the  $p < 0.10$  and  $p < 0.01$  levels, respectively. Indirect medical costs for private informal care, also significant at the  $p < 0.10$  and  $p < 0.01$  levels, were .37 and 1.20 times higher than public and self care. Time costs were .85 times higher for public medical care than self care.

### **Multivariate Results**

Outputs from Pakistan's multivariate, nested logit models are presented in Tables 6-23 and 6-24. In the first section of Table 6-23, beta coefficients and the p-values for each cost category indicate the probability of choosing different medical providers, irrespective of type, as costs change. In Table 6-23, total medical costs were significant at the  $p < 0.01$  level, direct non-medical costs and indirect medical costs at the  $p < 0.05$  level, and direct medical costs at the  $p < 0.10$  level – suggesting that they all had some

significant impact on households choice of medical provider. As total medical costs increased by 10% for any given medical provider, the likelihood of choosing that provider type declined by 0.90%. As direct medical costs increased by 10% for any given medical provider, the likelihood of choosing that provider type declined by 1.20%. An increase in direct non-medical costs for any provider type by 10% led to a 4.60% decline in the likelihood of utilizing that provider type. As indirect medical costs rose by 10% for any given medical provider, the likelihood of choosing that provider type declined by 1.50%.

Results for wealth interaction effects were similar, such that total medical costs, direct medical costs, direct non-medical costs and indirect medical costs impacted households' choice of medical provider differently according to wealth group. They were all significant at the  $p < 0.05$  levels, respectively. Wealth interaction coefficients will be interpreted in the following discussion on cost elasticities.

Clinical quality of care coefficients and p-values are presented in the third section of Table 6-23. Public providers were 3.81, 2.33 and 3.54 times more likely than private formal providers, private informal providers and self treating households to administer ORS tablets than fluids, respectively; these were significant at the  $p < 0.10$  and  $P < 0.05$  levels. Private informal providers were 1.47 times more likely to administer ORS tablets than private formal providers, with it being significant at the  $p < 0.10$  level. There was no significant difference in behavior between self treating households and private formal providers.

Public providers were 2.00 and 1.91 times more likely than private informal and self treating households to deliver ORS tablets than antibiotics, respectively; these were

significant at the  $p < 0.10$  and  $p < 0.05$  levels. There was no significant difference in this treatment behavior between private formal providers, private informal providers and self treating households. Self treating households were 1.43, 2.00 and 1.76 times more likely to provide no treatment than ORS tablets when compared with private formal, public and private informal providers.

The second section of Table 6-23 examines independent variables that impact Pakistani households' decision to seek formal care (private and public formal) relative to informal care (private informal and self care). Child gender, maternal education, and child age did not significantly influence this choice, though wealth, case severity, and cultural beliefs did have an impact. At the  $p < 0.01$  level, as households went up one wealth category they had 59% greater odds of seeking formal medical care. At the  $p < 0.10$  level, they had 51% greater odds of utilizing formal care if households believed their child's case of diarrhea was severe. At the  $p < 0.10$  level, households who believed in the effectiveness of vaccines had 80% greater odds of utilizing formal care.

### **Cost-Choice Elasticities**

Table 6-24 extends the results in section one of Table 6-23 by presenting own and cross cost elasticities of demand for each cost category, wealth group and provider type. All cost categories are presented, because they had a significant impact on households' choice of medical provider and varied by wealth group.

Regarding total medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and ranged from  $-0.06$  to  $-0.30$ . By provider type, households were generally less cost inelastic and most responsive to changes in the total cost of private formal care. Pakistani households were the least responsive to changes in the total costs of public care. There were no consistent trends

in own-cost elasticity by wealth group. There were also no trends in cross-cost elasticities by wealth group or provider type, other than that households were most likely to utilize private informal or self care as the cost of private formal or public care rose. In other words, households were not likely to switch between private formal and public medical care as total costs changed.

With respect to direct medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and ranged from  $-.06$  to  $-0.15$ . There were no definitive trends by either provider type or wealth group. For cross-cost elasticities, there were consistent trends by provider type but not wealth group. Specifically, households were most likely to utilize self care and private informal care as the out-of-pocket costs for private formal and public care rose.

For direct non-medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and ranged from  $-0.15$  to  $-0.63$ . There were no trends in own-cost elasticities by provider type. By wealth group, however, poor households were more responsive to changes in transportation costs of public and self care; higher wealth households were more responsive to changes in these costs for private formal and informal care.

Cross-cost elasticities for direct non-medical costs varied significantly by provider type and household wealth. As transportation costs increased for private formal and public providers, households of all wealth levels were more likely to utilize private informal care or self treatment. The opposite was true as transportation costs for self and private informal care rose. By wealth group, low wealth households were most

likely to utilize self care or public care as direct non-medical costs rose elsewhere. High wealth households instead were most likely to demand private formal or informal care.

For indirect medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and varied from -0.06 to -0.21. By provider type, households were the most cost inelastic and least responsive to changes in the indirect medical cost of public care. Pakistani households were most responsive to changes in the indirect cost of private formal care. There were no consistent trends in own-cost elasticities by wealth group.

Cross-cost elasticities for indirect medical costs varied significantly by provider type and household wealth. As time costs increased for private formal and public providers, households of all wealth levels were likely to demand private informal care or self treatment. The opposite was true as time costs for self and private informal care rose. By wealth group, low wealth households were most likely to utilize self care or public care as time costs rose elsewhere. High wealth households instead were most likely to demand private formal or informal care whenever possible.

## **India**

### **Descriptive Statistics**

Descriptive statistics for Indian households are presented in Table 6-25. Data indicate that 34.1, 17.5, 20.7, and 27.6% of households utilized private formal, public, private informal and self care, respectively. The mean age for children in the sample was 17.11 months while 45.62% were male. Very few households had only a religious education, though a much higher% of households who sought public care or self treated (40 and 42, respectively) had no education compared with only 19 and 22% for private formal and informal providers, respectively. Interestingly, nearly 32% of mothers

seeking public care for their child had a post-secondary education or higher – a much greater figure than for any other provider type. About 68% of all households indicated that their child had moderate or severe diarrhoea, with only 45% of families who self treated responding as such.

Data was not available on vaccine belief for self treating households, though 100% of families who sought medical care believed vaccines were important to child health. Around 40% of households seeking private formal were in the highest two wealth quintiles compared with 42% of those utilizing public care, 11% seeking private informal care and 45% not seeking any treatment. Conversely, 45% of the latter households were in the two poorest wealth quintiles compared with 27% of those seeking private formal care, 47% public care, and 33% private informal care.

Among households seeking some form of medical care, 16% of those utilizing private formal care believed it was of excellent quality compared with 10% of those seeking public care and 100% of those seeking private informal care. 60% of public providers administered ORS tablets, whereas only 51, 13 and 25% of private formal providers, private informal providers and self treating households administered them.

### **Cost Summary**

A summary of Indian households' total, direct medical, direct non-medical and indirect medical costs for diarrheal care are presented in Table 6-26. Sample means for these cost categories across all Indian households were \$5.86, \$2.93, \$0.39, and \$2.52, while the proportion of households incurring any costs were 70.05, 59.45, 38.71, 49.31%, respectively. Unlike in Gambia, Kenya and Pakistan, indirect medical costs accounted for a smaller proportion of total medical costs than direct medical costs, though both were greater than direct non-medical costs.

Among total costs, households that self treated incurred fewer total costs (\$0.08) and were less likely to incur any total costs (5.00%) on average than those seeking private formal (\$10.11; 97.30%), public (\$4.69; 84.21%) and private informal care (\$7.56; 88.89%). Households seeking private formal care were more likely to incur some total costs and spent more overall for care, followed by private informal care and then public care.

Households seeking private formal care were also, on average, more likely to incur some direct medical costs (97.50%) and spent more (\$6.09) on average than for private informal providers (77.78%, \$3.30), followed by public providers (57.89%, \$0.99) and self care (0%, \$0.00). Households seeking private formal care were more likely to experience catastrophic out-of-pocket costs than for any other provider type.

Indian families who utilized private formal care also spent more on direct non-medical costs (48.65%, \$0.69) than for any other provider type. However, private informal providers were most likely to incur some transportation costs (88.89%, \$0.58). Transportation costs were less for public providers (21.05%, \$0.23) than both private provider types, followed by self care (0%, \$0.00). Households seeking private formal care were more likely to incur very high transportation costs.

Roughly 67% of Indian households seeking private informal care incurred some indirect medical costs while incurring, on average, \$3.67. These figures were 74% and \$3.47 for those utilizing public care, 62 and \$3.32 for private formal care, and 5% and \$0.08 for those self treating.

### **Bivariate Results**

Tables 6-27 to 6-30 compare total, direct medical, direct non-medical and indirect medical costs of each provider type to a base provider group and measures whether

and to what extent these costs were different from that group. Table 6-27 indicates that Indian households' total medical costs were significantly greatest for private formal and informal care, followed by public care and then self care. Total household costs for utilizing private formal care were .22 and 1.44 times higher than public providers and self treating households, respectively, and were significant at the  $p < 0.01$  level. Private informal providers had .23 and 1.53 times higher total costs than public and self care at the  $p < 0.01$  level, while public providers were .97 times more costly than self care. These results are largely consistent with descriptive statistics presented in Table 6-26. The lack of statistical difference between private formal and informal care likely stems from the rare yet catastrophic total costs some Indian households face when seeking private formal providers.

Outcomes for direct medical costs are presented in Table 6-28 and align well with results in Table 6-26; households incurred the highest highest out-of-pocket costs when utilizing private formal care, followed by private informal care, public care and then self care. Households utilizing private formal medical care experienced .12, .94 and 7.89 times greater direct medical costs than private informal providers, public providers and self treating households, respectively; these were significant at the  $p < 0.05$  and  $p < 0.01$  levels. Direct medical costs for private informal care were .77 and 5.88 times higher than public and self care and were also significant at the  $p < 0.05$  and  $p < 0.01$  levels. Public medical providers cost patients 1.67 times higher out-of-pocket costs than households who self treated.

In Table 6-29, direct non-medical costs, which made up a small fraction of total costs, were significantly greatest for private formal and informal providers even though

both care types were not significantly different from one another. Public medical care resulted in the next highest transportation costs for households, followed by self treating families. Indian households who sought private formal care experienced .57 and 1.38 times higher direct non-medical costs than public providers and self care at the  $p < 0.01$  level. These figures were .80 and 1.44 for private informal providers, respectively. Families incurred .89 times higher transportation costs when seeking public care instead of self care. Variation in direct non-medical costs was much greater for private formal providers than any other provider type.

In Table 6-30, indirect medical costs for private formal, private informal and public care were not significantly different from one another. However, all of these households incurred significantly higher time costs than households who self treated. Households utilizing private formal, private informal and public medical care experienced 1.28, 1.31 and 1.22 times greater indirect costs than self treating households; these were all significant at the  $p < 0.01$  level.

### **Multivariate Results**

Results from India's multivariate, nested logit models are presented in Tables 6-31 and 6-32. In the first section of Table 6-31, beta coefficients and the p-values for each cost category indicate the probability of choosing different medical providers, irrespective of type, as costs change. Indirect medical costs were significant at the  $p < 0.05$  level, while total, direct and direct non-medical costs were significant at the  $p < 0.01$  level – indicating that all cost categories had a significant impact on households choice of medical provider. As total medical costs rose by 10% for any given medical provider, the likelihood of choosing that provider type declined by 4.32%. As direct medical costs rose by 10% for any given medical provider, the likelihood of choosing

that provider type declined by 10.30%. As direct non-medical costs rose by 10% for any given medical provider, the likelihood of choosing that provider type declined by 8.00%. An increase in indirect medical costs for any provider type by 10% led to a 5.50% decline in the likelihood of utilizing that provider type.

Results for wealth interaction effects were similar, such that total, direct, direct non-medical, and indirect medical costs impacted households' choice of medical provider differently according to wealth group. These interaction effects were significant at the  $p < 0.05$  and  $p < 0.01$  levels, respectively. Wealth interaction coefficients will be interpreted in the following discussion on cost elasticities.

Clinical quality of care coefficients and p-values are presented in the third section of Table 6-31. Public providers were most likely to deliver ORS tablets relative to fluids, followed by private formal providers, private informal providers, and self care households. Public providers were 4.06, 8.75 and 11.80 times more likely than private formal providers, private informal providers and self treating households to administer ORS tablets than fluids, respectively; these were significant at the  $p < 0.05$  and  $P < 0.01$  levels. Private formal providers were 7.73 and 6.65 times more likely to administer ORS tablets than private informal providers or self care patients and were significant at the  $p < 0.05$  and  $p < 0.01$  levels. There was no significant difference in these treatment patterns between private informal providers and self treating households. Among all provider choices, none were significantly more likely to administer ORS tablets than to prescribe antibiotics or provide no treatment.

The second section of Table 6-31 examines independent variables that impacted households' decision to seek private care (private formal or informal), public care, or self

care. Gender and case severity did not significantly impact households' decision to seek private medical care, public medical care or self-treat. However, higher educated households were significantly more likely to seek private medical care than public care or self-treat. At the  $p < 0.05$  level, as household education increased one unit, households had 714 and 2500% fewer odds of utilizing public care or self treat than seek private care, respectively. As child age increased, families were significantly more likely to seek public medical care or self treat than seek private care. At the  $p < 0.05$  level, each month a child got older, parents had 9 and 12% greater odds of taking him or her to a public provider or self treat than seek private care. Finally, higher wealth households were significantly more likely to seek private medical care than public care or self-treatment. At the  $p < 0.10$  level each unit increase in household wealth led to 900 and 769% greater odds of them utilizing private care than public or self care, respectively.

### **Cost-Choice Elasticities**

Table 6-32 extends the results in section one of Table 6-31 by presenting own and cross cost elasticities of demand for each cost category, wealth group and provider type. Total, direct medical, direct non-medical and indirect cost categories are presented, because they all had a significant impact on households' choice of medical provider at either the  $p < 0.01$  or  $p < 0.05$  level.

With respect to total costs, own-cost elasticities for private formal, public, private informal and self care ranged from cost inelastic to elastic, varying from -0.36 to -1.14. By provider type, households were more responsive to changes in the total cost of public providers than any other provider type, with elasticities of -.51, -.45, -1.14 for upper, middle and lower wealth households, respectively. Households were the least

responsive to changes in total costs for private informal providers, of which cost elasticities were -0.36, -0.48, -0.63 for upper, middle and lower wealth households. By wealth group, low wealth households were the most responsive to changes in total costs for all providers than middle or upper wealth households.

Trends in cross cost elasticities existed, to some extent, both by provider type and wealth group. As total costs changed for private formal and public providers, households' cross cost elasticities were highest for self care. In other words, families were most likely to utilize self care as the total cost of private formal and public providers rose. As the total cost of self care rose, low wealth households were most likely to demand public care while high wealth families were more likely to demand private formal care.

Regarding direct medical costs, own-cost elasticities for private formal, public, private informal and self care varied significantly, ranging from cost inelastic (-.11) to elastic (-1.65). By provider type, families were most responsive and largely cost elastic to changes in public medical and self treatment costs. By wealth group, low wealth households were the least responsive to changes in direct medical costs (-0.11) for private formal providers than middle (-0.90) and high wealth (-1.02) households. For public care, private informal care and, to a lesser extent self care, poorer households were instead more responsive than middle and upper wealth families to changes in direct medical costs. No trends in own-cost elasticities existed by wealth group.

Trends in cross cost elasticities for direct medical costs existed by wealth group but not provider type. Among low wealth families, cross cost elasticities were certainly higher for public care and self care than any other type. In other words, as the direct

medical cost of care increased, poorer households were likely to utilize either public or self care. High wealth households were more likely to utilize either private formal or self care.

With respect to direct non-medical costs, own-cost elasticities for private formal, public, private informal and self care were nearly all cost inelastic and ranged from -0.48 to -1.02. By provider type, Indian households who sought private informal providers were the most cost inelastic and least responsive to changes in transportation costs. By wealth group, low wealth households were the most responsive to changes in direct non-medical costs for all provider types.

Cross cost elasticities for direct non-medical costs only varied by wealth group. Among low wealth families, cross cost elasticities appeared higher for public care and self care than any other provider. This suggests that as direct non-medical costs rose, poorer households were likely to utilize either public or self care. Conversely, high wealth households were more likely to demand private formal and self care as costs increased elsewhere. Cross cost elasticities for private, informal care were generally smaller than other provider types.

For indirect medical costs, own-cost elasticities for private formal, public, private informal and self care were all cost inelastic and varied from -0.33 to -0.69. By provider type, Indian households were the most cost inelastic and least responsive to changes in indirect medical costs for private informal providers. By wealth group, low wealth households were less cost inelastic and more responsive to changes in indirect medical costs than either high or middle wealth households.

Cross costs elasticities for indirect medical costs once again varied by wealth group but not provider type. For low wealth households, cross cost elasticities were higher for public care and self care than any other provider type. As direct non-medical costs increased for any provider type, poorer households were more likely to utilize either public or self care. Conversely, high wealth households were most likely to choose private formal and self care as costs increased elsewhere.

### **Summary and Hypotheses**

#### **Gambia**

Descriptive cost models indicated that Gambian households utilizing public providers (a) were more likely to incur some total medical, direct medical, direct non-medical and indirect medical costs and (b) faced higher total, out-of-pocket, transportation, and time costs on average than households who sought private formal care, private informal care or self care. However, in the bivariate models there was no statistically significant difference in total costs, direct medical costs, direct non-medical costs or indirect medical costs among households utilizing public, private formal or private informal providers. Instead only families who self treated incurred significantly lower costs than all three provider types. Such contrasting evidence was likely due to the rare yet catastrophic out-of-pocket, transportation and time costs incurred by households seeking public medical care.

These results both support and contradict the existing empirical literature from Gambia. As expected, households who treated their child's diarrheal illness at home were poorer, less educated and had less severe diarrheal cases than those seeking external medical care and should have spent less time traveling or waiting for medical care, paying for transportation or facing fewer out-of-pocket costs than any other

provider type. Because previous studies have suggested that public and private providers are equidistant from most households, it is understandable that direct non-medical costs were not significantly different among provider types. Yet it was surprising that private formal or informal providers (a) did not charge statistically higher direct medical costs or (b) did not cause households to incur significantly fewer indirect medical costs than public providers.

Multivariate cost analyses and cost elasticity results found that, as hypothesized, total, direct and indirect cost categories both influenced households' choice of medical provider and varied significantly by wealth group. Households were, on average, more responsive to changes in indirect medical costs than direct costs and definitely more responsive to changes in indirect medical costs than direct non-medical costs.

Furthermore, Gambian families were the most responsive to changes in the total, direct and indirect cost of public medical care and the least responsive to such changes in private formal care. Wealthier households were, as hypothesized, more responsive to changes in time costs than poorer families; yet contrary to hypotheses, they were surprisingly more responsive to changes in out-of-pocket costs. Finally, changes in costs meant that households were most likely to alternate between formal or informal care. This findings was somewhat contradictory to hypotheses in Chapter 4.

These results offer several interesting conclusions: (a) wealthy households are more willing and able to alternate provider types as costs change, though oddly they were more likely to utilize self care or private informal care providers; (b) households are more responsive to changes in all costs for public providers than private ones; (c) given that costs impact household medical decisions and no significant difference in the

cost of Gambian medical providers exists, one would expect household wealth to be evenly distributed across provider types, as is observed; (d) because formal providers offer better clinical care quality than either self care or private informal care, costs are evidently more important to households' medical decisions than care quality; (e) households utilizing public medical care were most likely to utilize self care, because they fear rare yet catastrophic direct and indirect medical costs.

## **Kenya**

Descriptive cost models found that Kenyan households utilizing private formal providers (a) were more likely to incur some total medical, direct medical, and indirect medical costs and (b) faced higher total, out-of-pocket, and time costs on average than households who sought public care, private informal care or self care. Conversely, families seeking public care were more likely to incur direct non-medical costs and spent more on transportation costs than any other households. Indirect medical costs represented the largest share of total household costs.

Bivariate cost models supported some of these results; notably, private formal providers charged statistically higher direct medical costs than any other provider type. Households also faced statistically higher direct non-medical and indirect costs for public care than any other care type. Interestingly, total costs did not vary statistically among provider types.

These results largely support the existing empirical literature from Kenya. As expected, households who treated their child's diarrheal illness at home were poorer and should have spent less time traveling or waiting for medical care, paying for transportation or facing fewer out-of-pocket costs than any other provider type. As per the literature, Kenyan households often face higher transportation and time costs

accessing public medical care, though private formal care often has the highest user fees.

Multivariate cost analyses and cost elasticity results found that, as hypothesized, direct, direct non-medical and indirect medical costs influenced Kenyan households' choice of medical provider and varied by wealth group. On average, families were more cost inelastic than Gambian households and were more responsive to changes in direct non-medical costs than direct or indirect costs. Relative to other households, those who sought public care appeared extremely responsive to changes in out-of-pocket costs yet were less responsive to changes in transportation or time costs. As hypothesized, poorer households were more responsive to changes in out-of-pocket and transportation costs than wealthier families; however, contrary to hypotheses they were also more responsive to time costs than wealthier families. Finally, when the cost of any provider increased, all households were, as hypothesized, most likely to self treat rather than seek care elsewhere.

Findings from this dissertation indicate that Kenyan households who are wealthier and believe in vaccines are more likely to utilize formal medical care, though contrary to existing work education and case severity have no significant impact. Additional results suggest: (a) as expected, poorer households are most responsive to changes in all cost categories, and greater user fees, transportation and time costs encourage these families to treat diarrheal illnesses at home; (b) households utilizing public providers are far more responsive than other families to changes in out-of-pocket costs but very unresponsive to changes in transportation or time costs; this is odd considering time costs represent the largest share of total costs, and total costs are not

significantly different across providers; (c) given that costs impact household medical decisions and no significant difference in the cost of Kenyan medical providers exists, one would expect household wealth to be evenly distributed across provider types, as is observed; (d) because formal providers offer better clinical care quality than either self care or private informal care, costs are evidently more important to households' medical decisions than care quality.

## **Pakistan**

Descriptive cost models indicated that Pakistani households utilizing private informal providers (a) were more likely to incur some direct and direct non-medical costs and (b) faced higher out-of-pocket and transportation costs on average than households who sought private formal care, public care or self care. On the other hand, families seeking private formal and public care were more likely to incur indirect medical costs and spent more on time costs than any other households. Costs in each of these categories were the least for self treating households. Interestingly, the cumulative effect of these costs was that private formal providers had higher total costs for Pakistani households than public providers, private informal providers or self treating households. Time costs represented the greatest share of total household medical costs.

Bivariate statistics align with most of these descriptive statistics, as findings indicate that total and direct medical costs were significantly greatest among both private formal and informal providers than other provider types. While self care was the least costly care type among all household options, Pakistani households did not incur significantly different direct non-medical or indirect medical costs for private formal, informal or public care.

For the most part, these results support the existing empirical literature from Pakistan. As expected, households who treated their child's diarrheal illness at home should have spent less time traveling or waiting for medical care, paying for transportation or facing fewer out-of-pocket costs than any other provider type. While higher direct costs for private providers were also anticipated, the insignificant difference in transportation or time costs across provider types was an unexpected finding.

Multivariate cost analyses and cost elasticity results found that, as hypothesized, all cost categories (total, direct, direct non-medical, and indirect costs) influenced households' choice of medical provider and varied by wealth group. Unlike in Gambia, Kenya and India, there were few expected trends with respect to own and cross cost elasticities. Because there were no definitive trends in cost elasticity by income group, it was impossible to assess the hypotheses from Chapter 4. Pakistani households were, on average, more responsive to changes in direct non-medical costs than direct or indirect medical costs. Households were also most responsive to changes in the cost of private formal care while typically the least responsive to changes in the cost of public care. Poor households were, as hypothesized, most likely to utilize public or self care; contrary to hypotheses in Chapter 4, wealthier families were most likely to demand private formal, informal or self care rather than switch between formal providers.

Results from the dissertation offer several interesting conclusions: (a) given that costs impacted household medical decisions and households incurred the highest out-of-pocket and total costs when seeking private providers, one would expect that a greater share of poorer households would utilize public or self care, as was observed;

(b) because public care offers higher quality than either private or self care, poor households likely place more importance on cost than quality; (c) because high wealth households were most likely to utilize either private formal or informal care, while costs and quality were similar among these providers, such households evidently placed similar value on medical costs and quality.

## **India**

Descriptive cost models indicated that Indian households utilizing private formal providers (a) were more likely to incur some total medical, direct medical, and direct non-medical and (b) faced higher total, out-of-pocket, and transportation costs on average than households who sought public care, private informal care or self care. Conversely, families seeking private informal care were more likely to incur indirect medical costs and spent more on time costs than any other households. Ultimately, private providers witnessed higher costs in all categories than public providers or self treating households. Among total costs, indirect and direct medical costs represented the largest share of total household costs and were about equal. Indian households were the least likely of all countries to incur some costs when seeking medical care.

Bivariate results align with most of these descriptive statistics, as findings indicate that total and direct non-medical costs were significantly greater among both private formal and informal providers than any other provider type. Direct medical costs were highest for private formal and then private informal providers, while indirect costs were statistically similar among both these and public providers.

For the most part, these results support the existing empirical literature from India. As expected, households who treated their child's diarrheal illness at home should have spent less time traveling or waiting for medical care, paying for

transportation or facing fewer out-of-pocket costs than any other provider type. As expected, direct medical costs were highest among private providers; that transportation and time costs for public providers were not significantly greater than private ones was surprising.

Multivariate cost analyses and cost elasticity results found that, as hypothesized, all cost categories (total, direct, direct non-medical, and indirect costs) influenced households' choice of medical provider and varied by wealth group. Indian households were generally more responsive to changes in costs than Gambian, Kenyan and Pakistani families. Indian households were also, on average, most responsive to changes in direct medical costs. Across all cost categories, Indian families were the most responsive to changes in public provider costs and the least responsive to changes in private informal provider costs. Poorer households were, as hypothesized, more responsive to changes in public provider out-of-pocket and transportation costs than wealthier families; surprisingly, they were also more responsive to public sector time costs. Poor households were, as hypothesized, also most likely to utilize either public or self care; contrary to hypotheses from Chapter 4, wealthier families were most likely to demand either private formal or self care rather than alternating solely between formal providers.

Several interesting points can be made from these findings: (a) it is perplexing that Indian households seeking private informal providers were poorer than most other households, incurred some of the highest total, out-of-pocket and transportation costs, incurred similar time costs, received the worst quality of care, and yet were the least responsive to cost changes and the most satisfied among households; (b) perceived

lower out-of-pocket costs are a major reason why low wealth households sought public medical care, and they were correct that public providers charged less for care; (c) other factors not considered in this dissertation must explain why households received the highest quality of care, incurred the lowest costs, and yet were the least satisfied for public medical providers; (d) despite being wealthier and more educated, households utilizing private formal care incurred greater total, out-of-pocket and transportation costs, did not incur higher time costs, yet receive worse quality of care; (d) despite variation in quality of care, all households were most likely to utilize self care as costs rose in both public and private sectors.

Table 6-1. Gambia descriptive statistics of control variables and provider type

	Total (n=252)			Private Formal Provider (n=52)			Public Provider (n=91)			Private Informal Provider (n=60)			Self Care (n=49)			
	Percent of Sample	Mean	Stn Dev	Range	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev
Age		18.24	12.50	0,57	-	17.98	12.10	-	18.14	12.46	-	18.96	13.24	-	17.83	12.41
Gender																
Male	57.94				63.46			56.04			58.33			55.10		
Female	42.06				36.54			43.96			41.67			44.90		
Maternal Education																
No Formal Schooling	13.89				11.54			10.99			15.00			20.41		
Less than Primary	4.37				0.00			7.69			5.00			2.04		
Completed Primary	3.17				5.77			2.20			3.33			2.04		
Post-Secondary	0.40				0.00			1.10			0.00			0.00		
Completed Secondary	0.40				0.00			0.00			0.00			2.04		
Religious Education	77.78				82.69			78.02			76.67			73.47		
Case Severity																
Moderate or Severe	81.75				82.69			84.62			86.67			69.39		
Had Diarrhea but Minor	18.25				17.31			15.38			13.33			30.61		
Cultural Factors & Beliefs																
Vaccine Not Important	0.79				0.00			1.10			0.00			2.04		
Vaccine Important	99.21				100.00			98.90			100.00			97.96		
Income																
Poorest	20.24				11.54			19.78			25.00			24.49		
Poor	22.22				11.54			19.78			25.00			34.69		
Middle	15.87				17.31			14.29			13.33			20.41		
Upper to Middle	23.41				36.54			24.18			21.67			10.20		
Wealthiest	18.25				23.08			21.98			15.00			10.20		
Subjective Quality of Care																
Excellent	55.67				23.08			100.00			16.67			-		
Good	21.18				71.15			0.00			10.00			-		
Fair	16.75				1.92			0.00			55.00			-		
Bad	6.40				3.85			0.00			18.33			-		
Clinical Quality of Care																
IV or Fluids	25.79				26.92			17.58			44.90			61.22		
ORS or Zinc	47.22				53.85			60.44			10.20			12.24		
Antibiotics	17.86				19.23			8.79			10.20			10.20		
No Treatment	9.13				0.00			13.19			34.69			16.34		

Table 6-2. Gambia descriptive statistics of costs and provider type (U.S. dollars)

	Total	Private Formal Provider	Public Provider	Private Informal Provider	Self Care
<b>Direct Medical Costs</b>					
% Incurring Costs	25.40%	21.15%	30.77%	35.00%	8.16%
# of Households	252	52	91	60	49
Mean Costs	\$0.88	\$0.65	\$1.42	\$0.97	\$0.02
Min, Max Costs	\$0.00, \$42.25	\$0.00, \$9.75	\$0.00, \$42.25	\$0.00, \$17.77	\$0.00, \$43
Deviation	\$3.42	\$1.87	\$4.95	\$2.87	\$0.07
<b>Direct Non-Medical Costs</b>					
% Incurring Costs	14.68%	11.54%	25.27%	11.67%	2.04%
# of Households	252	52	91	60	49
Mean Costs	\$0.35	\$0.35	\$0.57	\$0.24	\$0.05
Min, Max Costs	\$0.00, \$7.8	\$0.00, \$7.8	\$0.00, \$5.2	\$0.00, \$3.47	\$0.00, \$2.6
Deviation	\$1.03	\$1.30	\$1.19	\$0.79	\$0.37
<b>Indirect Medical Costs</b>					
% Incurring Costs	81.75%	84.62%	96.70%	81.67%	50.02%
# of Households	252	52	91	60	49
Mean Costs	\$2.66	\$2.41	\$4.11	\$2.20	\$0.79
Min, Max Costs	\$0.00, \$84.32	\$0.00, \$47.33	\$0.00, \$84.32	\$0.00, \$19.66	\$0.00, \$19.32
Deviation	\$7.71	\$6.74	\$10.97	\$4.24	\$2.74
<b>Total Medical Costs</b>					
% Incurring Costs	83.33%	84.62%	97.80%	86.67%	50.02%
# of Households	252	52	91	60	49
Mean Costs	\$3.89	\$3.41	\$6.10	\$3.41	\$0.86
Min, Max Costs	\$0.00, \$126.57	\$0.00, \$47.33	\$0.00, \$126.57	\$0.00, \$40.89	\$0.00, \$30.00
Deviation	\$10.47	\$16.10	\$10.73	\$8.21	\$5.26

Table 6-3. Gambia bivariate model: total costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	-0.40	0.17	-0.39	0.18
Public	0.40	0.17	Base	Base	0.01	0.33
Private Informal	0.39	0.18	-0.01	0.33	Base	Base
Self Care	-1.26	0.00	-1.67	0.00	-1.65	0.00

Table 6-4. Gambia bivariate model: direct medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	-0.11	0.38	-0.04	0.77
Public	0.11	0.38	Base	Base	0.06	0.25
Private Informal	0.04	0.77	-0.06	0.25	Base	Base
Self Care	-1.84	0.05	-1.96	0.05	-1.89	0.04

Table 6-5. Gambia bivariate model: direct non-medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	-1.13	0.53	-0.91	0.64
Public	1.13	0.53	Base	Base	0.22	0.42
Private Informal	0.91	0.64	-0.22	0.42	Base	Base
Self Care	-1.62	0.09	-2.87	0.09	-2.54	0.05

Table 6-6. Gambia bivariate model: indirect medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	-0.69	0.23	-0.67	0.25
Public	0.69	0.23	Base	Base	0.02	0.31
Private Informal	0.67	0.25	-0.02	0.31	Base	Base
Self Care	-1.63	0.00	-2.33	0.02	-2.31	0.02

Table 6-7. Gambia multivariate nested logit models

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Provider Choice						
Total Medical Costs	-0.63	0.02				
Direct Medical Costs	-0.23	0.00				
Direct Non Medical Costs	-0.07	0.15				
Indirect Medical Costs	-0.33	0.00				
Total Medical Costs * Income	0.34	0.01				
Direct Medical Costs * Income	0.01	0.00				
Direct Non Medical Costs * Income	0.03	0.22				
Indirect Medical Costs * Income	0.01	0.01				
Formal Care (Private Formal & Public) relative to Informal Care (Private Informal & Self Care)						
Gender	0.87	0.62				
Maternal Education	1.01	0.98				
Age	1.00	0.95				
Income	1.51	0.01				
Case Severity	0.82	0.61				
Vaccine Belief	2.29	0.07				
Provider Type						
Fluids (Relative to ORS)						
Private Formal	Base	Base	-0.27	0.71	-1.13	0.02
Public	0.27	0.71	Base	Base	-0.74	0.07
Private Informal	1.13	0.02	0.74	0.07	Base	Base
Self Care	1.14	0.02	0.89	0.04	0.01	0.65
Antibiotics (Relative to ORS)						
Private Formal	Base	Base	0.43	0.70	-1.06	0.09
Public	-0.43	0.70	Base	Base	-1.22	0.00
Private Informal	1.06	0.09	1.22	0.00	Base	Base
Self Care	0.99	0.12	1.38	0.01	0.05	0.23
No Treatment (Relative to ORS)						
Private Formal	Base	Base	-16.02	0.82	0.03	0.79
Public	16.02	0.82	Base	Base	19.38	0.22
Private Informal	0.03	0.79	-19.38	0.22	Base	Base
Self Care	16.94	0.81	-17.46	0.47	1.09	0.37

Table 6-8. Gambia cost elasticities by cost, provider type and household wealth

	$\delta X / \delta P$ (Private Formal) -- High Income	$\delta X / \delta P$ (Private Formal) -- Middle Income	$\delta X / \delta P$ (Private Formal) -- Low Income	$\delta X / \delta P$ (Public) -- High Income	$\delta X / \delta P$ (Public) -- Middle Income	$\delta X / \delta P$ (Public) -- Low Income	$\delta X / \delta P$ (Private Informal) -- High Income	$\delta X / \delta P$ (Private Informal) -- Middle Income	$\delta X / \delta P$ (Private Informal) -- Low Income	$\delta X / \delta P$ (Self Care) -- High Income	$\delta X / \delta P$ (Self Care) -- Middle Income	$\delta X / \delta P$ (Self Care) -- Low Income
Total Medical Costs												
Private Formal	-0.82	-0.30	-0.60	0.08	0.00	0.00	0.36	0.15	0.36	0.30	0.15	0.45
Public	0.08	0.00	0.00	-1.05	-0.36	-0.72	0.45	0.15	0.27	0.45	0.21	0.45
Private Informal	0.45	0.15	0.30	0.45	0.15	0.27	-0.96	-0.33	-0.63	0.03	0.03	0.00
Self Care	0.30	0.15	0.30	0.45	0.21	0.42	0.15	0.03	0.00	-0.78	-0.39	-0.90
Direct Medical Costs												
Private Formal	-0.48	-0.21	-0.45	0.03	0.03	0.03	0.24	0.09	0.18	0.18	0.09	0.24
Public	0.03	0.03	0.03	-0.57	-0.18	-0.36	0.27	0.06	0.12	0.27	0.09	0.18
Private Informal	0.24	0.09	0.18	0.27	0.06	0.12	-0.66	-0.18	-0.33	0.15	0.03	0.06
Self Care	0.21	0.09	0.24	0.27	0.09	0.21	0.15	0.03	0.03	-0.60	-0.21	-0.48
Indirect Medical Costs												
Private Formal	-0.45	-0.15	-0.42	0.00	0.00	0.03	0.24	0.06	0.15	0.16	0.09	0.24
Public	0.00	0.00	0.03	-0.51	-0.15	-0.36	0.27	0.06	0.12	0.27	0.09	0.18
Private Informal	0.24	0.06	0.15	0.27	0.06	0.12	-0.63	-0.15	-0.30	0.14	0.03	0.03
Self Care	0.21	0.09	0.24	0.27	0.09	0.21	0.12	0.03	0.03	-0.57	-0.21	-0.45

Table 6-9. Kenya descriptive statistics of control variables and provider type

	Total (n=271)			Private Formal Provider (n=78)			Public Provider (n=75)			Private Informal Provider (n=55)			Self Care (n=63)			
	Percent of Sample	Mean	Stn Dev	Range	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev
Age		16.63	12.73	1,59	-	18.88	11.89	-	14.89	10.70	-	20.32	15.36	-	12.68	12.25
Gender																
Male	55.72				48.72			68.00			50.91			53.97		
Female	44.28				51.28			32.00		49.09				46.03		
Maternal Education																
No Formal Schooling	3.69				6.41			2.67		1.82				3.17		
Less than Primary	47.97				39.74			46.67		54.55				53.97		
Completed Primary	44.28				48.72			42.67		43.64				41.27		
Post-Secondary	0.00				0.00			0.00		0.00				0.00		
Completed Secondary	4.06				5.13			8.00		0.00				1.59		
Religious Education	0.00				0.00			0.00		0.00				0.00		
Case Severity																
Moderate or Severe	65.68				73.08			77.33		65.45				42.86		
Had Diarrhea but Minor	34.32				26.92			22.67		34.55				57.14		
Cultural Factors & Beliefs																
Vaccine Not Important	1.11				0.00			1.33		1.82				1.59		
Vaccine Important	98.89				100.00			98.67		98.18				98.41		
Income																
Poorest	27.78				28.21			21.33		34.55				29.03		
Poor	12.22				12.82			10.67		14.55				11.29		
Middle	25.93				19.23			29.33		25.45				30.65		
Upper to Middle	19.26				20.51			24.00		16.36				14.52		
Wealthiest	14.81				19.23			14.67		9.09				14.52		
Subjective Quality of Care																
Excellent	75.48				70.51			100.00		49.09				-		
Good	7.69				16.67			0.00		5.45				-		
Fair	5.77				5.13			0.00		14.55				-		
Bad	11.06				7.69			0.00		30.91				-		
Clinical Quality of Care																
IV or Fluids	25.46				21.79			4.00		61.90				-		
ORS or Zinc	51.29				62.82			74.76		12.70				-		
Antibiotics	16.97				14.10			14.67		9.52				-		
No Treatment	6.27				1.28			6.67		15.87				-		

Table 6-10. Kenya descriptive statistics of costs and provider type (U.S. dollars)

	Total	Private Formal Provider	Public Provider	Private Informal Provider	Self Care
<b>Direct Medical Costs</b>					
% Incurring Costs	48.71%	83.33%	54.67%	43.64%	3.17%
# of Households	271	78	75	55	63
Mean Costs	\$0.70	\$1.27	\$0.72	\$0.63	\$0.01
Min, Max Costs	\$0.00, \$11.50	\$0.00, \$11.50	\$0.00, \$8.95	\$0.00, \$5.23	\$0.00, \$0.30
Deviation	\$1.48	\$1.94	\$1.49	\$1.21	\$0.04
<b>Direct Non-Medical Costs</b>					
% Incurring Costs	17.71%	19.23%	36.00%	9.09%	1.59%
# of Households	271	78	75	55	63
Mean Costs	\$0.32	\$0.43	\$0.60	\$0.07	\$0.04
Min, Max Costs	\$0.00, \$11.90	\$0.00, \$11.90	\$0.00, \$10.45	\$0.00, \$1.49	\$0.00, \$2.99
Deviation	\$1.32	\$1.55	\$1.82	\$0.29	\$0.38
<b>Indirect Medical Costs</b>					
% Incurring Costs	76.01%	92.31%	98.67%	89.09%	17.46%
# of Households	271	78	75	55	63
Mean Costs	\$6.78	\$8.97	\$8.55	\$6.83	\$1.90
Min, Max Costs	\$0.00, \$78.64	\$0.00, \$78.64	\$0.00, \$35.35	\$0.00, \$23.49	\$0.00, \$65.78
Deviation	\$9.57	\$12.23	\$7.90	\$5.94	\$8.59
<b>Total Medical Costs</b>					
% Incurring Costs	88.97%	98.72%	96.00%	92.73%	17.46%
# of Households	271	78	75	55	63
Mean Costs	\$7.79	\$10.68	\$9.88	\$7.54	\$1.95
Min, Max Costs	\$0.00, \$81.28	\$0.00, \$81.28	\$0.25, \$35.80	\$0.00, \$28.41	\$0.00, \$68.76
Deviation	\$10.37	\$13.05	\$8.72	\$6.37	\$8.95

Table 6-11. Kenya bivariate model: total costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.00	0.90	0.00	0.90
Public	0.00	0.90	Base	Base	0.00	0.90
Private Informal	0.00	0.89	0.00	0.90	Base	Base
Self Care	-0.35	0.00	-0.27	0.00	-0.22	0.00

Table 6-12. Kenya bivariate model: direct medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.35	0.05	1.55	0.03
Public	-0.35	0.05	Base	Base	1.03	0.04
Private Informal	-1.55	0.03	-1.03	0.04	Base	Base
Self Care	-11.50	0.00	-10.89	0.00	-6.33	0.00

Table 6-13. Kenya bivariate model: direct non-medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	-0.33	0.05	1.20	0.03
Public	0.33	0.05	Base	Base	1.67	0.02
Private Informal	-1.20	0.03	-1.67	0.02	Base	Base
Self Care	-10.51	0.00	-12.43	0.00	-9.38	0.00

Table 6-14. Kenya bivariate model: indirect medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	-1.69	0.08	0.58	0.16
Public	1.69	0.08	Base	Base	4.33	0.05
Private Informal	-0.58	0.16	-4.33	0.05	Base	Base
Self Care	-8.55	0.00	-10.87	0.00	-6.38	0.00

Table 6-15. Kenya multivariate nested logit models

		$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Provider Choice							
Total Medical Costs		-0.12	0.11				
Direct Medical Costs		-0.18	0.04				
Direct Non Medical Costs		-0.47	0.09				
Indirect Medical Costs		-0.19	0.04				
Total Medical Costs * Income		0.07	0.13				
Direct Medical Costs * Income		1.19	0.04				
Direct Non Medical Costs * Income		1.93	0.06				
Indirect Medical Costs * Income		0.15	0.04				
Formal Care (Private Formal & Public) relative to Informal Care (Private Informal & Self Care)							
Gender		1.23	0.63				
Maternal Education		2.63	0.36				
Age		1.02	0.22				
Income		1.59	0.08				
Case Severity		0.53	0.15				
Vaccine Belief		7.53	0.00				
Provider Type							
Fluids (Relative to ORS)							
	Private Formal	Base	Base	12.96	0.06	-4.50	0.08
	Public	-12.96	0.06	Base	Base	-13.80	0.05
	Private Informal	4.50	0.08	13.80	0.05	Base	Base
	Self Care	-	-	-	-	-	-
Antibiotics (Relative to ORS)							
	Private Formal	Base	Base	0.81	0.81	8.97	0.09
	Public	-0.81	0.81	Base	Base	8.17	0.09
	Private Informal	-8.97	0.09	-8.17	0.09	Base	Base
	Self Care	-	-	-	-	-	-
No Treatment (Relative to ORS)							
	Private Formal	Base	Base	10.84	0.25	7.57	0.48
	Public	-11.52	0.25	Base	Base	-3.34	0.62
	Private Informal	-7.45	0.50	3.40	0.62	Base	Base
	Self Care	-	-	-	-	-	-

Table 6-16. Kenya cost elasticities by cost, provider type and household wealth

		$\frac{\partial X}{\partial P}$ (Private Formal) – High Income	$\frac{\partial X}{\partial P}$ (Private Formal) – Middle Income	$\frac{\partial X}{\partial P}$ (Private Formal) – Low Income	$\frac{\partial X}{\partial P}$ (Public) – High Income	$\frac{\partial X}{\partial P}$ (Public) – Middle Income	$\frac{\partial X}{\partial P}$ (Public) – Low Income	$\frac{\partial X}{\partial P}$ (Private Informal) – High Income	$\frac{\partial X}{\partial P}$ (Private Informal) – Middle Income	$\frac{\partial X}{\partial P}$ (Private Informal) – Low Income	$\frac{\partial X}{\partial P}$ (Self Care) – High Income	$\frac{\partial X}{\partial P}$ (Self Care) – Middle Income	$\frac{\partial X}{\partial P}$ (Self Care) – Low Income
Direct Medical Costs													
	Private Formal	-0.12	-0.09	-0.15	0.03	0.00	0.00	0.00	0.00	0.00	0.09	0.06	0.12
	Public	0.03	0.00	0.00	-0.30	-0.06	-0.12	0.03	0.00	0.03	0.06	0.06	0.09
	Private Informal	0.00	0.00	0.00	0.06	0.00	0.03	-0.12	-0.09	-0.15	0.12	0.12	0.21
	Self Care	0.09	0.09	0.15	0.21	0.06	0.09	0.09	0.06	0.12	-0.27	-0.24	-0.36
Direct Non Medical Costs													
	Private Formal	-0.24	-0.18	-0.27	0.03	0.03	0.03	0.03	0.00	0.00	0.18	0.18	0.24
	Public	0.03	0.00	0.03	-0.18	-0.15	-0.21	0.03	0.03	0.03	0.12	0.09	0.15
	Private Informal	0.03	0.00	0.00	0.03	0.03	0.03	-0.21	-0.18	-0.24	0.15	0.15	0.21
	Self Care	0.18	0.18	0.24	0.12	0.09	0.15	0.15	0.15	0.21	-0.45	-0.42	-0.60
Indirect Medical Costs													
	Private Formal	-0.13	-0.13	-0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.15
	Public	0.00	0.00	0.03	-0.12	-0.06	-0.12	0.03	0.00	0.03	0.06	0.06	0.09
	Private Informal	0.00	0.00	0.00	0.03	0.00	0.03	-0.12	-0.09	-0.15	0.09	0.09	0.12
	Self Care	0.13	0.13	0.13	0.09	0.06	0.09	0.09	0.09	0.12	-0.27	-0.27	-0.36

Table 6-17. Pakistan descriptive statistics of control variables and provider type

	Total (n=348)				Private Formal Provider (n=162)			Public Provider (n=78)			Private Informal Provider (n=40)			Self Care (n=68)		
	Percent of Sample	Mean	Stn Dev	Range	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev
Age	-	17.31	12.48	0,58	-	16.60	12.25	-	18.06	12.22	-	16.55	13.91	-	18.61	12.58
Gender																
Male	51.15				51.23			47.44			57.50			51.47		
Female	48.85				48.77			52.56			42.50			48.53		
Maternal Education																
No Formal Schooling	57.18				50.62			70.51			62.50			54.41		
Less than Primary	2.59				3.70			3.85			0.00			0.00		
Completed Primary	10.06				14.20			3.85			7.50			8.82		
Post-Secondary	0.57				0.00			1.28			0.00			1.47		
Completed Secondary	5.17				4.32			3.85			10.00			5.88		
Religious Education	24.43				27.16			16.67			20.00			29.41		
Case Severity																
Moderate or Severe	83.62				81.48			94.87			92.50			70.59		
Had Diarrhea but Minor	16.38				18.52			5.13			7.50			29.41		
Cultural Factors & Beliefs																
Vaccine Not Important	7.89				8.64			7.79			5.00			-		
Vaccine Important	92.11				91.36			92.21			95.00			-		
Income																
Poorest	18.39				16.67			20.51			17.50			20.59		
Poor	23.85				23.46			30.77			20.00			19.12		
Middle	16.95				16.67			16.67			20.00			16.18		
Upper to Middle	21.55				22.84			16.67			27.50			20.59		
Wealthiest	19.25				20.37			15.38			15.00			23.53		
Subjective Quality of Care																
Excellent	41.43				12.96			100.00			42.50			-		
Good	53.93				87.04			0.00			25.00			-		
Fair	4.64				0.00			0.00			32.50			-		
Bad	0.00				0.00			0.00			0.00			-		
Clinical Quality of Care																
IV or Fluids	16.09				19.14			10.26			16.18			33.82		
ORS or Zinc	50.86				56.79			60.26			29.41			33.82		
Antibiotics	15.23				14.20			14.10			11.76			13.24		
No Treatment	17.82				9.88			15.38			42.65			19.12		

Table 6-18. Pakistan descriptive statistics of costs and provider type (U.S. dollars)

	Total	Private Formal Provider	Public Provider	Private Informal Provider	Self Care
<b>Direct Medical Costs</b>					
% Incurring Costs	59.20%	74.07%	69.23%	75.00%	2.94%
# of Households	348	162	78	40	68
Mean Costs	\$2.11	\$2.89	\$1.77	\$3.10	\$0.06
Min, Max Costs	\$0.00, \$85.80	\$0.00, \$85.80	\$0.00, \$19.56	\$0.00, \$18.39	\$0.00, \$3.98
Deviation	\$5.99	\$7.33	\$3.36	\$4.82	\$0.48
<b>Direct Non-Medical Costs</b>					
% Incurring Costs	11.49%	16.05%	10.26%	12.50%	1.47%
# of Households	348	162	78	40	68
Mean Costs	\$0.24	\$0.22	\$0.38	\$0.51	\$0.01
Min, Max Costs	\$0.00, \$13.26	\$0.00, \$4.97	\$0.00, \$13.26	\$0.00, \$8.29	\$0.00, \$3.35
Deviation	\$1.18	\$0.72	\$1.86	\$1.80	\$0.04
<b>Indirect Medical Costs</b>					
% Incurring Costs	79.02%	93.21%	93.59%	90.00%	22.06%
# of Households	348	162	78	40	68
Mean Costs	\$5.82	\$7.47	\$6.32	\$5.63	\$1.41
Min, Max Costs	\$0.00, \$90	\$0.00, \$90	\$0.00, \$60	\$0.00, \$28.41	\$0.00, \$30
Deviation	\$10.76	\$13.12	\$9.73	\$6.39	\$5.21
<b>Total Medical Costs</b>					
% Incurring Costs	84.48%	99.38%	98.72%	97.50%	23.53%
# of Households	348	162	78	40	68
Mean Costs	\$8.18	\$10.58	\$8.48	\$9.25	\$1.47
Min, Max Costs	\$0.00, \$111.41	\$0.00, \$111.41	\$0.03, \$60.00	\$0.00, \$30.00	\$0.00, \$30.00
Deviation	\$13.05	\$16.10	\$10.73	\$8.21	\$5.26

Table 6-19. Pakistan bivariate model: total costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.32	0.02	0.02	0.08
Public	-0.32	0.02	Base	Base	-0.16	0.07
Private Informal	-0.02	0.08	0.16	0.07	Base	Base
Self Care	-1.57	0.00	-0.88	0.00	-1.36	0.00

Table 6-20. Pakistan bivariate model: direct medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.83	0.01	0.04	0.25
Public	-0.83	0.01	Base	Base	-0.79	0.01
Private Informal	-0.04	0.25	0.79	0.01	Base	Base
Self Care	-7.10	0.00	-6.26	0.00	-7.06	0.00

Table 6-21. Pakistan bivariate model: direct non-medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.17	0.73	-0.14	0.52
Public	-0.17	0.73	Base	Base	-0.31	0.40
Private Informal	0.14	0.52	0.31	0.40	Base	Base
Self Care	-8.95	0.17	-8.78	0.18	-9.10	0.17

Table 6-22. Pakistan bivariate model: indirect medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.40	0.09	0.02	0.14
Public	-0.40	0.09	Base	Base	-0.37	0.10
Private Informal	-0.02	0.14	0.37	0.10	Base	Base
Self Care	-1.25	0.00	-0.85	0.00	-1.20	0.00

Table 6-23. Pakistan multivariate nested logit models

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Provider Choice						
Total Medical Costs	-0.09	0.00				
Direct Medical Costs	-0.12	0.08				
Direct Non Medical Costs	-0.46	0.03				
Indirect Medical Costs	-0.15	0.02				
Total Medical Costs * Income	0.32	0.01				
Direct Medical Costs * Income	0.67	0.01				
Direct Non Medical Costs * Income	0.59	0.04				
Indirect Medical Costs * Income	0.06	0.05				
Formal Care (Private Formal & Public) relative to Informal Care (Private Informal & Self Care)						
Gender	1.03	0.90				
Maternal Education	1.27	0.32				
Age	1.00	0.97				
Income	1.59	0.00				
Case Severity	0.66	0.08				
Vaccine Belief	1.80	0.06				
Provider Type						
Fluids (Relative to ORS)						
Private Formal	Base	Base	3.81	0.03	1.47	0.06
Public	-3.81	0.03	Base	Base	-2.33	0.09
Private Informal	-1.47	0.06	2.33	0.09	Base	Base
Self Care	-0.26	0.70	3.54	0.01	1.20	0.14
Antibiotics (Relative to ORS)						
Private Formal	Base	Base	2.07	0.15	0.07	0.90
Public	-2.07	0.15	Base	Base	-2.00	0.06
Private Informal	-0.07	0.90	2.00	0.06	Base	Base
Self Care	-0.14	0.85	1.91	0.07	-0.07	0.91
No Treatment (Relative to ORS)						
Private Formal	Base	Base	0.57	0.66	0.32	0.72
Public	-0.57	0.66	Base	Base	-0.24	0.81
Private Informal	-0.32	0.72	0.24	0.81	Base	Base
Self Care	1.43	0.05	2.00	0.01	1.76	0.05

Table 6-24. Pakistan cost elasticities by cost, provider type and household wealth

Total Medical Costs	$\delta X / \delta P$ (Private Formal) -- High Income	$\delta X / \delta P$ (Private Formal) -- Middle Income	$\delta X / \delta P$ (Private Formal) -- Low Income	$\delta X / \delta P$ (Public) - High Income	$\delta X / \delta P$ (Public) - Middle Income	$\delta X / \delta P$ (Public) - Low Income	$\delta X / \delta P$ (Private Informal) -- High Income	$\delta X / \delta P$ (Private Informal) -- Middle Income	$\delta X / \delta P$ (Private Informal) -- Low Income	$\delta X / \delta P$ (Self Care) -- High Income	$\delta X / \delta P$ (Self Care) -- Middle Income	$\delta X / \delta P$ (Self Care) -- Low Income
Private Formal	-0.30	0.00	-0.15	0.00	0.00	0.00	0.06	0.03	0.06	0.06	0.03	0.09
Public	0.03	0.00	0.00	-0.06	-0.06	-0.09	0.03	0.03	0.03	0.03	0.03	0.06
Private Informal	0.12	0.00	0.06	0.03	0.03	0.03	-0.09	-0.06	-0.09	0.00	0.00	0.00
Self Care	0.15	0.00	0.09	0.03	0.03	0.06	0.01	0.00	0.00	-0.09	-0.06	-0.15
Direct Medical Costs												
Private Formal	-0.06	-0.06	-0.15	0.03	0.00	0.00	0.09	0.03	0.06	0.06	0.03	0.09
Public	0.00	0.00	0.00	-0.12	-0.06	-0.12	0.06	0.03	0.06	0.03	0.03	0.06
Private Informal	0.03	0.03	0.06	0.06	0.03	0.06	-0.15	-0.06	-0.12	0.00	0.00	0.00
Self Care	0.03	0.03	0.09	0.03	0.03	0.06	0.00	0.00	0.00	-0.09	-0.06	-0.15
Direct Non Medical Costs												
Private Formal	-0.63	-0.21	-0.57	0.06	0.03	0.03	0.33	0.12	0.24	0.21	0.09	0.30
Public	0.06	0.00	0.03	-0.39	-0.15	-0.45	0.18	0.06	0.18	0.15	0.06	0.24
Private Informal	0.36	0.12	0.24	0.18	0.06	0.18	-0.54	-0.18	-0.42	0.03	0.00	0.00
Self Care	0.21	0.09	0.30	0.15	0.06	0.24	0.03	0.00	0.00	-0.39	-0.15	-0.54
Indirect Medical Costs												
Private Formal	-0.21	-0.06	-0.18	0.03	0.00	0.00	0.12	0.03	0.09	0.06	0.03	0.09
Public	0.03	0.00	0.00	-0.15	-0.06	-0.15	0.06	0.03	0.06	0.06	0.03	0.09
Private Informal	0.12	0.03	0.09	0.06	0.03	0.06	-0.18	-0.06	-0.15	0.00	0.00	0.00
Self Care	0.06	0.03	0.09	0.06	0.03	0.09	0.00	0.00	0.00	-0.12	-0.06	-0.18

Table 6-25. India descriptive statistics of control variables and provider type

	Total (n=217)			Private Formal Provider (n=74)			Public Provider (n=38)			Private Informal Provider (n=45)			Self Care (n=60)			
	Percent of Sample	Mean	Stn Dev	Range	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev	Percent of Sample	Mean	Stn Dev
Age		17.11	13.44	2,57	-	15.29	12.09	-	23.31	15.73	-	9.77	4.85	-	20.95	14.95
Gender																
Male	45.62				56.76			47.37			33.33			40.00		
Female	54.38				43.24			52.63			66.67			60.00		
Maternal Education																
No Formal Schooling	29.49				18.92			42.11			22.22			40.00		
Less than Primary	11.06				0.00			10.53			1.11			25.00		
Completed Primary	45.16				59.46			15.79			66.67			30.00		
Post-Secondary	1.84				2.70			5.26			0.00			0.00		
Completed Secondary	11.52				16.22			26.32			0.00			5.00		
Religious Education	0.92				2.70			0.00			0.00			0.00		
Case Severity																
Moderate or Severe	68.20				75.68			78.95			77.78			45.00		
Had Diarrhea but Minor	31.80				24.32			21.05			22.22			55.00		
Cultural Factors & Beliefs																
Vaccine Not Important	0.00				0.00			0.00			0.00			-		
Vaccine Important	100.00				100.00			100.00			100.00			-		
Income																
Poorest	19.35				18.92			26.32			0.00			30.00		
Poor	17.51				8.11			21.05			33.33			15.00		
Middle	27.19				32.43			10.53			55.56			10.00		
Upper to Middle	24.88				35.14			26.32			0.00			30.00		
Wealthiest	11.06				5.41			15.79			11.11			15.00		
Subjective Quality of Care																
Excellent	38.85				16.22			10.53			100.00			-		
Good	39.49				83.78			0.00			0.00			-		
Fair	21.66				0.00			89.47			0.00			-		
Bad	0.00				0.00			0.00			0.00			-		
Clinical Quality of Care																
IV or Fluids	29.95				18.92			18.42			68.33			65.00		
ORS or Zinc	42.86				51.35			60.53			13.33			25.00		
Antibiotics	21.20				28.38			18.42			8.33			10.00		
No Treatment	5.99				1.35			2.63			10.00			0.00		

Table 6-26. India descriptive statistics of costs and provider type (U.S. dollars)

	Total	Private Formal Provider	Public Provider	Private Informal	Self Care
<b>Direct Medical Costs</b>					
% Incurring Costs	59.45%	97.30%	57.89%	77.78%	0.00%
# of Households	217	74	38	45	60
Mean Costs	\$2.93	\$6.09	\$0.99	\$3.30	\$0.00
Min, Max Costs	\$0.00, \$63.54	\$0.00, \$63.54	\$0.00, \$3.67	\$0.00, \$10.75	\$0.00, \$0.00
Deviation	\$6.81	\$10.50	\$1.21	\$3.42	\$0.00
<b>Direct Non-Medical Costs</b>					
% Incurring Costs	38.71%	48.65%	21.05%	88.89%	0.00%
# of Households	217	74	38	45	60
Mean Costs	\$0.39	\$0.69	\$0.23	\$0.58	\$0.00
Min, Max Costs	\$0.00, \$9.78	\$0.00, \$9.78	\$0.00, \$1.91	\$0.00, \$1.47	\$0.00, \$0.00
Deviation	\$1.08	\$1.71	\$0.56	\$0.45	\$0.00
<b>Indirect Medical Costs</b>					
% Incurring Costs	49.31%	62.16%	73.68%	66.67%	5.00%
# of Households	217	74	38	45	60
Mean Costs	\$2.52	\$3.32	\$3.47	\$3.67	\$0.08
Min, Max Costs	\$0.00, \$33.55	\$0.00, \$33.55	\$0.00, \$10.07	\$0.00, \$22.00	\$0.00, \$1.50
Deviation	\$5.33	\$6.60	\$3.35	\$6.81	\$0.33
<b>Total Medical Costs</b>					
% Incurring Costs	70.05%	97.30%	84.21%	88.89%	5.00%
# of Households	217	74	38	45	60
Mean Costs	\$5.86	\$10.11	\$4.69	\$7.56	\$0.08
Min, Max Costs	\$0.00, \$106.87	\$0.00, \$106.87	\$0.00, \$13.06	\$0.29, \$34.22	\$0.00, \$1.50
Deviation	\$12.19	\$17.99	\$3.94	\$9.97	\$0.33

Table 6-27. India bivariate model: total costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.22	0.00	-0.02	0.19
Public	-0.22	0.00	Base	Base	-0.23	0.00
Private Informal	0.02	0.19	0.23	0.00	Base	Base
Self Care	-1.44	0.00	-0.97	0.00	-1.53	0.00

Table 6-28. India bivariate model: direct medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.94	0.00	0.12	0.03
Public	-0.94	0.00	Base	Base	-0.77	0.02
Private Informal	-0.12	0.03	0.77	0.02	Base	Base
Self Care	-7.89	0.00	-1.67	0.00	-5.88	0.00

Table 6-29. India bivariate model: direct non-medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.57	0.00	-0.09	0.28
Public	-0.57	0.00	Base	Base	-0.80	0.00
Private Informal	0.09	0.28	0.80	0.00	Base	Base
Self Care	-1.38	0.00	-0.89	0.00	-1.44	0.00

Table 6-30. India bivariate model: indirect medical costs and provider type

	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Private Formal	Base	Base	0.05	0.11	0.02	0.34
Public	-0.06	0.11	Base	Base	-0.04	0.28
Private Informal	-0.02	0.34	0.04	0.28	Base	Base
Self Care	-1.28	0.00	-1.22	0.00	-1.31	0.00

Table 6-31. India multivariate nested logit models

		$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value	$\beta$ -Coefficient	P-Value
Provider Choice							
Total Medical Costs		-0.43	0.00				
Direct Medical Costs		-1.03	0.00				
Direct Non Medical Costs		-0.80	0.00				
Indirect Medical Costs		-0.55	0.02				
Total Medical Costs * Income		1.66	0.01				
Direct Medical Costs * Income		0.62	0.01				
Direct Non Medical Costs * Income		6.59	0.00				
Indirect Medical Costs * Income		0.26	0.03				
Care Type							
Gender							
	Private	Base	Base	0.52	0.52		
	Public	1.89	0.52	Base	Base		
	Self Care	3.00	0.43	1.56	0.65		
Maternal Education							
	Private	Base	Base	7.24	0.04		
	Public	0.14	0.04	Base	Base		
	Self Care	0.04	0.04	0.32	0.13		
Age							
	Private	Base	Base	0.91	0.00		
	Public	1.09	0.00	Base	Base		
	Self Care	1.12	0.03	1.02	0.58		
Income							
	Private	Base	Base	9.72	0.02		
	Public	0.11	0.02	Base	Base		
	Self Care	0.13	0.06	0.84	0.75		
Case Severity							
	Private	Base	Base	4.01	0.18		
	Public	0.25	0.18	Base	Base		
	Self Care	42.52	0.00	2.29	0.53		
Provider Type							
Fluids (Relative to ORS)							
	Private Formal	Base	Base	4.06	0.00	-7.73	0.02
	Public	-4.06	0.00	Base	Base	-11.80	0.01
	Private Informal	7.73	0.02	11.80	0.01	Base	Base
	Self Care	6.65	0.03	8.75	0.02	2.09	0.11
Antibiotics (Relative to ORS)							
	Private Formal	Base	Base	-0.56	0.72	-2.26	0.46
	Public	0.56	0.72	Base	Base	-1.71	0.34
	Private Informal	2.26	0.46	1.71	0.34	Base	Base
	Self Care	0.14	0.94	-0.41	0.39	1.39	0.91
No Treatment (Relative to ORS)							
	Private Formal	Base	Base	-15.51	0.07	-24.58	0.10
	Public	15.53	0.07	Base	Base	-9.05	0.33
	Private Informal	24.58	0.10	9.05	0.33	Base	Base
	Self Care	25.99	0.10	10.44	0.39	1.39	0.91

Table 6-32. India cost elasticities by cost, provider type and household wealth

Total Medical Costs	$\delta X / \delta P$ (Private Formal) -- High Income	$\delta X / \delta P$ (Private Formal) -- Middle Income	$\delta X / \delta P$ (Private Formal) -- Low Income	$\delta X / \delta P$ (Public) -- High Income	$\delta X / \delta P$ (Public) -- Middle Income	$\delta X / \delta P$ (Public) -- Low Income	$\delta X / \delta P$ (Private Informal) -- High Income	$\delta X / \delta P$ (Private Informal) -- Middle Income	$\delta X / \delta P$ (Private Informal) -- Low Income	$\delta X / \delta P$ (Self Care) -- High Income	$\delta X / \delta P$ (Self Care) -- Middle Income	$\delta X / \delta P$ (Self Care) -- Low Income
Private Formal	-0.48	-0.48	-0.66	0.15	0.06	0.36	0.00	0.00	0.00	0.60	0.24	0.27
Public	0.06	0.06	0.18	-0.51	-0.45	-1.14	0.06	0.36	0.54	0.12	0.12	0.54
Private Informal	0.00	0.00	0.06	0.15	0.21	0.36	-0.36	-0.48	-0.63	0.12	0.24	0.18
Self Care	0.42	0.42	0.42	0.21	0.18	0.42	0.30	0.12	0.09	-0.84	-0.60	-0.99
Direct Medical Costs												
Private Formal	-1.02	-0.90	-0.11	0.24	0.36	0.45	0.15	0.15	0.21	0.63	0.39	0.42
Public	0.24	0.36	0.45	-0.81	-0.90	-1.65	0.21	0.42	0.48	0.36	0.12	0.69
Private Informal	0.15	0.15	0.21	0.21	0.42	0.51	-0.78	-0.84	-1.02	0.42	0.27	0.33
Self Care	0.63	0.39	0.39	0.36	0.12	0.69	0.42	0.27	0.33	-1.41	-0.78	-1.44
Direct Non Medical Costs												
Private Formal	-0.63	-0.57	-0.72	0.15	0.24	0.30	0.10	0.10	0.17	0.39	0.24	0.27
Public	0.15	0.24	0.30	-0.48	-0.54	-1.02	0.12	0.27	0.30	0.21	0.06	0.42
Private Informal	0.09	0.09	0.15	0.12	0.24	0.30	-0.49	-0.55	-0.68	0.27	0.18	0.21
Self Care	0.39	0.24	0.27	0.21	0.06	0.42	0.27	0.18	0.21	-0.87	-0.48	-0.90
Indirect Medical Costs												
Private Formal	-0.42	-0.39	-0.48	0.12	0.15	0.18	0.06	0.06	0.09	0.27	0.31	0.18
Public	0.09	0.15	0.21	-0.36	-0.36	-0.69	0.09	0.15	0.21	0.15	0.03	0.30
Private Informal	0.06	0.06	0.09	0.09	0.18	0.21	-0.33	-0.33	-0.45	0.18	0.12	0.15
Self Care	0.27	0.18	0.18	0.15	0.03	0.30	0.18	0.12	0.15	-0.60	-0.46	-0.63

## CHAPTER 7 POLICY AND DISCUSSION

### **An Overview of Health System Reform**

All countries aim to achieve four performance goals: maximizing the population's health status, improving financial risk protection, ensuring public satisfaction with the health care system and maintaining equity in access to medical services. Doing this effectively and efficiently requires that governments construct and reform their health systems using five control knobs that include financing, payment, organizational, regulatory and behavioural mechanisms (Hsaio, 2008). Policymakers may turn a single knob or multiple ones during reform efforts, though this is largely contingent upon cultural, political and economic factors in addition to the complexity of existing problems throughout a given health system (Roberts et al. 2008).

Health system financing is broadly defined as the process by which revenue is collected, pooled and ultimately spent on the provision of health care services. It may be achieved through any combination of social, private or community-based insurance schemes, general revenue pooling as well as out of pocket payments incurred by patients before, during or after the utilization of health services (WHO, 2010; Roberts et al, 2008; Hsiao, 2007). The payment control knob offers a range of financial mechanisms geared towards altering provider incentives, ultimately impacting the cost, quality and efficiency of health care provision as well as patients' access to services. An array of payment categories exist, such as fee-for-service, capitation, salary, diagnostic related groups, global budgets or per diem rates, and vary by provider type – whether it be hospitals, clinics, independent or group physician practices, traditional healers or pharmacies, among others.

Organizational control knobs influence the development and functioning of public, private non-profit or private for-profit entities though these general categories can be further broken down to provide formal and informal care. Each organizational form and its components aim to achieve a unique set of goals and objectives, such as profit maximization or social welfare, in accordance with internal (workforce, capital, management, culture) and external (revenue source, regulation, competition) incentives.

Finally, government-based regulatory mechanisms attempt to reduce market failures that inherently exist in health care markets by redirecting insurer, provider or patient behaviour. For instance, the regulatory control knob may prohibit insurers from risk selecting healthy patients or require them to maintain set premiums or pre-defined benefit packages; regulation may also require that health care providers uphold minimum quality of care standards, mandate that individuals purchase health insurance or improve their incentives to seek free, cost-effective immunizations.

The following chapter begins by assessing and compiling this dissertation's findings from each country. More specifically, it examines how costs vary among provider types and then determines how and to what extent costs have influenced households' medical decisions. It then explores which, if any, policy control knobs may be best utilized by government to encourage efficient and effective behavior among families across Gambia, Kenya, Pakistan and India. The ultimate goal of these reforms aims to improve each country's health care system and overall performance measures. The chapter concludes with limitations of this dissertation and recommends future work that may expand on these limitations.

## Implications for Policy Makers

### Gambia

Results from Chapter 6 contradict many previous studies, household expectations and existing government policies in Gambia. This dissertation found that patients frequently incur user fees when utilizing public medical care despite policies explicitly banning them. These are either under-the-table fees or formal charges for medications such as antibiotics or ORS tablets. Furthermore, out-of-pocket costs, transportation costs, time costs, total costs and clinical quality of diarrheal care do not differ significantly between public and private formal providers. Quality is better and/or costs are higher only when compared against those households opting to treat their child's illness in the informal sector or at home. Yet as costs rise in the formal sector, Gambian families were most likely to utilize informal or self care.

Why, then, are households more likely to leave the formal sector and self treat when the quality of care is significantly worse? Further still, why are households more likely to leave the formal sector for informal providers that (a) cost the same yet (b) offer worse quality of care? The answer to the first question is seemingly straightforward – that costs are, to a certain extent, more important to Gambian households' medical decisions than quality of care. The answer to the second question, however, is that Gambian households are either unaware of how costs or quality differ among provider types or seek informal care due to other reasons, such as provider and drug availability, trust, or additional factors.

These findings suggest two, potential solutions for policymakers looking to encourage Gambian households to utilize high quality, low cost medical care for childhood diarrheal illnesses. First, while improving regulation of private sector

providers is unlikely given resource constraints, policymakers should consider ways to broadly reduce or eliminate user fees in the public sector. Given the risk of rare and catastrophic out-of-pocket costs for households utilizing public providers, financing mechanisms must be put in place to reduce households' likelihood of incurring them. A similar argument can be made for reducing rare yet extremely high wait or travel times in the public sector, either by improving organizational efficiencies, reducing workforce shortages, increasing medical supplies, or reducing the ease of transportation to facilities – all well documented problems in Gambia.

Beyond the aforementioned financing and organizational strategies, policymakers should simultaneously consider strategies to improve the transparency of medical costs and quality as data becomes available. Evidence from this dissertation suggests that, because costs and quality do not vary among public and private formal providers, households should be encouraged to alternate between them as costs change. This would hopefully reduce demand for private, informal medical care which is equally as costly yet offers worse clinical care of quality.

## **Kenya**

There are several key findings from Chapter 6 that offer insight into Kenya's health care system and potential policy solutions to improve its efficiency, equity and effectiveness. Despite efforts to remove public sector user fees, results from this dissertation suggest they do exist, albeit informally, because direct medical costs are positive. Households likely seek public care for child diarrheal illnesses because they believe out-of-pocket costs are free or, at the very least, lower than private formal or informal providers. While this is true, they also fail to realize and respond to the fact

that total public costs are not significantly different from private formal or informal care. This is due to the exceedingly high time and transportation cost of public care.

While it is certainly perplexing that wealthy households are more likely to self treat rather than utilize public and private formal providers as costs rise, these issues have a profound impact on poor households. Relative to their high wealth counterparts, low wealth Kenyan families are more responsive to changes in direct, direct non-medical and indirect medical costs. This makes empirical and theoretical sense, because medical costs – especially user fees – represent a much greater portion of their wealths. If poorer households seek public medical care, they are faced with both high time and transportation costs as well as unexpectedly positive user fees. While they would receive high quality medical treatment, the economic burden of such a decision would be as large as any private alternative. Conversely, they are more likely than other families to sacrifice high quality, public care to self treat their child's diarrheal illness if they perceive costs have risen in the public sector.

For Kenyan policymakers three potential solutions exist to ameliorate access and equity issues. First, government must improve how it implements or regulates existing financing policies to ensure the reduction or elimination of public user fees. Informal fees often occur because (a) public providers receive limited reimbursement from government and must charge fees to earn revenue and (b) regulatory capacity is too weak to effectively implement policies. As such, achieving this goal may be best served by increasing or improving the efficiency of provider payments. Second, households must be made aware of variation in public and private sector costs and care quality for child diarrheal care – notably that quality is identical for formal providers and costs also

similar across all external providers. Finally, policymakers must find ways of reducing transportation and time costs for public care, such as building additional facilities, improving roads, public transportation, or streamlining organization efficiencies.

Another major finding from this dissertation is that quality of care is significantly better among formal providers than informal ones, while total costs are similar. To maximize efficiency of child diarrheal treatment, households should be utilizing private and public formal care but not private informal care. Yet over 20% of Kenyan households sought informal care. Multivariate analyses suggest that these household decisions are either due to cultural differences or a lack of information on costs and care quality. Policymakers should consider several strategies: (a) improve the transparency of medical costs and quality as data becomes available or (b) develop campaigns to better inform households of the value of formal medical care for child health issues.

## **Pakistan**

Findings from this dissertation largely support Pakistan's empirical literature on costs, quality and other factors influencing household medical decisions. They also offer additional insight into issues that may help drive policy decisions at the federal, regional and local level. Most importantly, results indicate that 58% of Pakistani households in this study sought a private medical provider for diarrheal care despite it being highly inefficient. In other words, families utilizing private formal or informal care received worse clinical quality than those seeking public care, yet incurred significantly higher total medical costs. Among total medical costs, households utilizing private care incurred greater direct out-of-pocket costs yet similar transportation and time costs as those seeking public medical care. Most worrying is that, in prior studies, upwards of 80% of all Pakistani households have cited utilizing private formal or informal care.

It is difficult if not impossible to discern why most families chose to utilize private medical care despite high costs and low quality. It may be a matter of information asymmetry, where households simply lack awareness that there are better quality and less costly medical care alternatives. Conversely, the literature cites a number of organizational inefficiencies in the public sector that were not considered in this dissertation yet may be driving households to seek private medical care. Notably, Pakistani households have cited poor customer service and patient satisfaction as well as inadequate supplies of medical equipment, drugs, staff and clinicians. Given these ambiguities, policymakers should consider three potential solutions to encourage households to utilize public medical care: improve information asymmetries, improve public sector organizational shortfalls, as well as reducing the cost and improving the quality of private medical care.

Despite demand for public medical care being largely inelastic, evidence from this study also found that poorer families are most likely to self treat their child's diarrheal illness as public costs rise. While taking measures to improve public sector organizational inefficiencies or reduce information asymmetries is a critical first step for middle and upper wealth households, policymakers could further stimulate demand for public care and reduce the economic burden for low wealth populations by lowering or eliminating user fees, transportation costs or time costs.

## **India**

This dissertation offers several conclusions based on the results presented in Chapter 6. While all costs and quality, on average, had a statistically significant impact on Indian households' choice of medical provider, this effect appears limited among the nearly 55% all Indians who utilized private care. Relative to families seeking public

care, those utilizing informal care were poorer, incurred higher total, out-of-pocket and transportation costs, incurred similar time costs, and received worse clinical quality of care. Despite worse quality and higher costs, such households were the least responsive to changes in cost and the most satisfied among all Indian households. Similarly, despite being wealthier and more educated, households utilizing private formal care also incurred higher costs and worse quality than those seeking public care.

These findings offer no definitive policy to solve these issues, but instead offer a range of potential causes and solutions for Indian policymakers. (a) It may be that households lack the information to make efficient and effective medical decisions. As such policymakers should consider ways to improve the transparency of costs and quality across provider types. (b) Alternatively, households may be utilizing private formal and informal care for reasons beyond those examined in this dissertation. In line with the empirical literature, private providers may offer better customer service, availability and flexibility of treatments; household decisions may also be due to cultural differences or a greater trust in private providers. (c) Conversely, greater regulation or clinical standards for private medical providers could improve quality of care and reduce the out-of-pocket costs for Indian households.

Results from Chapter 6 also indicate that, despite the presence of public sector user fees, households who utilized public providers for their child's diarrheal illness, relative to all other Indian families, received the relatively better care at the lowest cost. Furthermore the poor were most responsive to changes in out-of-pocket costs, and this is largely what drove their decision to seek public medical care. Policymakers should be reassured that these and all remaining households utilizing public care are making

the best medical decisions for their children's health. It is simultaneously worrying that only 10% of Indian families who sought public medical care were extremely happy, suggesting that there are issues beyond cost and quality which must be improved.

Finally, despite relatively better clinical quality in the formal sector, households were most likely to utilize self care as costs rose among external providers. Indian policymakers must find ways to encourage households to seek child medical care in the formal sector and reduce the roughly 27% of families who self treated. As per the discussion above, strategies for achieving this goal vary among private and public providers.

### **Limitations and Future Research**

Notwithstanding the array of important statistical findings and policy recommendations offered by this dissertation, there exist a number of limitations and areas for future work that must be considered. Sample sizes for Gambia, Kenya, Pakistan and India were adequate to ensure statistical power, though they likely had a significant, albeit minor, impact on this study's validity and results. For instance, Kenya's multivariate findings indicated that direct medical, direct non-medical and indirect medical costs all significantly impacted households' choice of medical provider. As costs rose for any given provider, the likelihood of utilizing that provider declined. Yet total medical costs, which collectively added these costs, did not have a significant impact on household behavior. Limited sample size may have contributed towards this perplexing outcome.

As discussed in Chapter 5, while measurement error may have also hindered internal validity, the likelihood of this occurring was quite small. Measurement error, which was an issue for costs, had the potential to result in biased beta coefficients and

incorrect statistical outcomes. Yet because coefficients would always be biased towards zero, leading to a flatter and insignificant regression equation for  $\beta$ , it was argued that results from this dissertation were actually more significant than they appeared.

Methodologically this dissertation determined cost-choice elasticities by imputing average cost and quality indicators for medical providers not chosen by households – and issue that may also have influenced internal validity. Empirical evidence from prior studies suggests that this was the most effective and commonly applied method to achieve such results; nonetheless, this technique only simulated how such factors impacted household medical decisions rather than assessing them through observed behavior.

Most health care studies using secondary data also have issues with the generalizability of their findings. This dissertation applies a number of mechanisms to maximize generalizability for each country's health care system, including how and where data was collected, other sampling and methodological techniques, the use of widespread child diarrheal illnesses, and the inclusion of multiple countries in Africa and South Asia. Nonetheless, its results and policy conclusions are still limited. For instance, it is extremely difficult to generalize across countries like India which are geographically, culturally and economically diverse while also being the second most populated country on the planet. Despite the wide variation in severity of childhood diarrheal illnesses, its interconnectedness with household decision making and its high prevalence throughout all four nations, it is merely one health condition within the context of an entire health care system. Methodologically, the cross sectional nature of

this study and the lack of sample weighing further limited this dissertation's generalizability and representativeness, particularly given that the HUAS survey was conducted in a single catchment area.

Data and survey limitations from the HUAS also resulted in certain variables being operationalized ineffectively and poorly generalizable – thereby impacting internal and external validity. For instance, this dissertation measured household cultural beliefs as whether or not families thought vaccines were effective at preventing child illnesses. This was only one of many measures for culture and thus does not assess other factors, such as trust or biases that may be driving household medical behavior. Moreover, in some countries nearly 99% of households believed that vaccines were effective means to prevent child illnesses. The variation in responses was small, thus leading culture to appear insignificant at influencing households' choice of medical provider when the opposite may have been true.

The dissertation introduced several critical issues that have yet been explored, notably how out-of-pocket, transportation and time costs impact household choice of medical provider. It also examined their effect by wealth group and relative to other individual, household and provider level factors that influence medical decisions. Further still, it compared these decisions with the actual costs incurred by households and offers complex, unique and useful suggestions for policymakers looking to improve their health system performance goals. Yet future work must expand on this study and consider variables that were not included in this dissertation's models, whether because they were unavailable or the low sample sizes did not permit them. Most important of these include organizational factors such as workforce, medical supply, and drug

availability, as well as alternative measures for culture, quality, and information asymmetry. Household factors also include family size, which may impact both medical decisions and the cost of care – notably indirect medical costs. Beyond costs, findings presented in this dissertation suggest that these factors may play a crucial role in influencing households' choice of medical provider.

## LIST OF REFERENCES

- Acharya, L. B. and J. Cleland. 2000. "Maternal and child health services in rural Nepal: does access or quality matter more?" *Health Policy Plan* 15(2): 223-9.
- Acton, Jan Paul. 1973. "Demand for Health Care When Time Costs Vary More Than Money Costs." Santa Monica, CA: RAND Corporation.  
<http://www.rand.org/pubs/reports/R1189>.
- Acton, J. P. 1975. "Nonmonetary Factors in the Demand for Medical Services: Some Empirical Evidence." *Journal of Political Economy* 83(3): 595-614.
- Aga Khan University. 2003. *Health workers for change. A manual to improve quality of care—from Africa to Pakistan*. UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases. Karachi: Department of Community Health Sciences.
- Ager, A. and K. Pepper. 2005. "Patterns of health service utilization and perceptions of needs and services in rural Orissa." *Health Policy Plan* 20(3): 176-84.
- Agha, S. and M. Do. 2009. "The quality of family planning services and client satisfaction in the public and private sectors in Kenya." *Int J Qual Health Care* 21(2): 87-96.
- Agyepong, I. A. 1999. "Reforming health service delivery at district level in Ghana: the perspective of a district medical officer." *Health Policy Plan* 14(1): 59-69.
- Ahmed, N. U., M. M. Alam, F. Sultana, S. N. Sayeed, A. M. Pressman, and M. B. Powers. 2006. "Reaching the unreachable: barriers of the poorest to accessing NGO healthcare services in Bangladesh." *J Health Popul Nutr* 24(4): 456-66.
- Ahmed, S. M. and M. A. Hossain. 2007. "Knowledge and practice of unqualified and semi-qualified allopathic providers in rural Bangladesh: implications for the HRH problem." *Health Policy* 84(2-3): 332-43.
- Ahmed, S. M., M. A. Hossain, and M. R. Chowdhury. 2009. "Informal sector providers in Bangladesh: how equipped are they to provide rational health care?" *Health Policy Plan* 24(6): 467-78.
- Ai, C. And Norton, E. 2003. "Interaction terms in logit and probit models." *Economic Letters*, 80, 123-129.
- Akhter, S. and C. P. Larson. 2010. "Willingness to pay for zinc treatment of childhood diarrhoea in a rural population of Bangladesh." *Health Policy Plan* 25(3): 230-6.
- Akin, J. S., C. C. Griffin, D. K. Guilkey, and B. M. Popkin. 1986. "The Demand for Primary Health Care Services in the Bicol Region of the Philippines." *Economic Development and Cultural Change* 34(4): 755-82.

- Akin, J. S., D. K. Guilkey, and B. M. Popkin. 1981. "The demand for child health services in the Philippines." *Social Science and Medicine. Part C: Medical Economics* 15(4): 249-57.
- Akin, J. S. and P. Hutchinson. 1999. "Health-care facility choice and the phenomenon of bypassing." *Health Policy Plan* 14(2): 135-51.
- Amaghionyeodiwe, L. A. 2008. "Determinants of the choice of health care provider in Nigeria." *Health Care Manag Sci* 11(3): 215-27.
- Amin, A. A., V. Marsh, A. M. Noor, S. A. Ochola, and R. W. Snow. 2003. "The use of formal and informal curative services in the management of paediatric fevers in four districts in Kenya." *Trop Med Int Health* 8(12): 1143-52.
- Andersen, R. M. 2008. "National health surveys and the behavioural model of health services use." *Med Care* 46(7): 647-53.
- Asenso-Okyere, W. K. and J. A. Dzator. 1997. "Household cost of seeking malaria care. A retrospective study of two districts in Ghana." *Soc Sci Med* 45(5): 659-67.
- Asenso-Okyere, W. K., J. A. Dzator, and I. Osei-Akoto. 1996. "The Behaviour towards Malaria Care: A Multinomial Logit Approach." *Social Indicators Research* 39(2): 167-86.
- Asenso-Okyere, W. K., I. Osei-Akoto, A. Anum, and E. N. Appiah. 1997. "Willingness to pay for health insurance in a developing economy. A pilot study of the informal sector of Ghana using contingent valuation." *Health Policy* 42(3): 223-37.
- Auster, R., I. Leveson, and D. Sarachek. 1969. "The Production of Health, an Exploratory Study." *The Journal of Human Resources* 4(4): 411-36.
- Bajpai, N. and Dholakia, R. 2006. "Scaling Up Primary Health Services in Rural Rajasthan: Public Investment Requirements and Policy Reform." *Center on Globalization and Sustainable Development*. The Earth Institute at Columbia University, 32.
- Banerjee et al. 2004. "Health Care Delivery in Rural Rajasthan." *Poverty Action Lab*, Paper #4, Feb. 12.
- Baume, C., D. Helitzer, and S. P. Kachur. 2000. "Patterns of care for childhood malaria in Zambia." *Social Science and Medicine* 51(10): 1491-503.
- Becker, G. S. 1965. "A Theory of the Allocation of Time." *The Economic Journal* 75(299): 493-517.
- Bedi AS, Kimalu P, Kimenyi M, Manda D, Mwabu G, Nafula N. 2003. "User charges and utilization of health services in Kenya." Working Paper Series No. 381. Institute of Social Studies, The Hague, The Netherlands

- Bhat, R. 1999. "Characteristics of private medical practice in India: a provider perspective." *Health Policy Plan* 14(1): 26-37.
- Bhatia, J. and J. Cleland. 2004. "Health care of female outpatients in south-central India: comparing public and private sector provision." *Health Policy Plan* 19(6): 402-9.
- Bhatia, J. C. and J. Cleland. 2001. "Health-care seeking and expenditure by young Indian mothers in the public and private sectors." *Health Policy Plan* 16(1): 55-61.
- Bhatia, V., H. M. Swami, M. Bhatia, and S. P. Bhatia. 1999. "Attitude and practices regarding diarrhoea in rural community in Chandigarh." *Indian J Pediatr* 66(4): 499-503.
- Black, R. E., S. S. Morris, and J. Bryce. 2003. "Where and why are 10 million children dying every year?" *Lancet* 361(9376): 2226-34.
- Bloom, G., H. Standing, H. Lucas, A. Bhuiya, O. Oladepo, and D. H. Peters. 2011. "Making health markets work better for poor people: the case of informal providers." *Health Policy Plan* 26 Suppl 1: i45-52.
- Bojalil, R., H. Guiscafre, P. Espinosa, H. Martinez, M. Palafox, G. Romero, and G. Gutierrez. 1998. "The quality of private and public primary health care management of children with diarrhoea and acute respiratory infections in Tlaxcala, Mexico." *Health Policy Plan* 13(3): 323-31.
- Bolduc, D., G. Lacroix, and C. Muller. 1996. "The choice of medical providers in rural Bénin: A comparison of discrete choice models." *Journal of Health Economics* 15(4): 477-98.
- Boller, C., K. Wyss, D. Mtasiwa, and M. Tanner. 2003. "Quality and comparison of antenatal care in public and private providers in the United Republic of Tanzania." *Bull World Health Organ* 81(2): 116-22.
- Borah, B. J. 2006. "A mixed logit model of health care provider choice: analysis of NSS data for rural India." *Health Econ* 15(9): 915-32.
- Bosu, W. K., D. Ahelegbe, E. Edum-Fotwe, K. A. Bainsong, and P. K. Turkson. 1997. "Factors influencing attendance to immunization sessions for children in a rural district of Ghana." *Acta Trop* 68(3): 259-67.
- Brugha, R. and A. Zwi. 1998. "Improving the quality of private sector delivery of public health services: challenges and strategies." *Health Policy Plan* 13(2): 107-20.
- Bustreo, F., A. Harding, and H. Axelsson. 2003. "Can developing countries achieve adequate improvements in child health outcomes without engaging the private sector?" *Bull World Health Organ* 81(12): 886-95.

- Chakraborty, S., S. A. D'Souza, and R. S. Northrup. 2000. "Improving private practitioner care of sick children: testing new approaches in rural Bihar." *Health Policy Plan* 15(4): 400-7.
- Chawla, M. and R. P. Ellis. 2000. "The impact of financing and quality changes on health care demand in Niger." *Health Policy Plan* 15(1): 76-84.
- Chernichovsky, D. and O. A. Meesook. 1986. "Utilization of health services in Indonesia." *Soc Sci Med* 23(6): 611-20.
- Chopra, M., S. Munro, J. N. Lavis, G. Vist, and S. Bennett. 2008. "Effects of policy options for human resources for health: an analysis of systematic reviews." *Lancet* 371(9613): 668-74.
- Chuma, J., L. Gilson, and C. Molyneux. 2007. "Treatment-seeking behaviour, cost burdens and coping strategies among rural and urban households in Coastal Kenya: an equity analysis." *Trop Med Int Health* 12(5): 673-86.
- Clarke, S. E., J. Rowley, C. Bogh, G. E. Walraven, and S. W. Lindsay. 2003. "Home treatment of 'malaria' in children in rural Gambia is uncommon." *Trop Med Int Health* 8(10): 884-94.
- Coffey, R. M. 1983. "The Effect of Time Cost on the Demand for Medical-Care Services." *The Journal of Human Resources* 18(3): 407-24.
- Culver, A. J. and J. P. Newhouse. 2000. *Handbook of health economics*. Amsterdam ; New York: Elsevier.
- D'Souza, R. M. 2003. "Role of health-seeking behaviour in child mortality in the slums of Karachi, Pakistan." *J Biosoc Sci* 35(1): 131-44.
- de Bartolome, C. A. and S. A. Vosti. 1995. "Choosing between public and private health-care: a case study of malaria treatment in Brazil." *J Health Econ* 14(2): 191-205.
- De Costa, A. and E. Johannson. 2011. "By 'default or design'? The expansion of the private health care sector in Madhya Pradesh, India." *Health Policy* 103(2-3): 283-9.
- Dilip, T. R. 2010. "Utilization of inpatient care from private hospitals: trends emerging from Kerala, India." *Health Policy Plan* 25(5): 437-46.
- Dor, A., P. Gertler, and J. Van Der Gaag. 1987. "Non-cost rationing and the choice of medical care providers in rural Cote d'Ivoire." *J Health Econ* 6(4): 291-304.
- Dow, W. H. 1999. "Flexible Discrete Choice Demand Models Consistent with Utility Maximization: An Application to Health Care Demand." *American Journal of Agricultural Economics* 81(3): 680-85.

- Dzator, J. and J. Asafu-Adjaye. 2004. "A study of malaria care provider choice in Ghana." *Health Policy* 69(3): 389-401.
- Edejer, T. T., M. Aikins, R. Black, L. Wolfson, R. Hutubessy, and D. B. Evans. 2005. "Cost effectiveness analysis of strategies for child health in developing countries." *BMJ* 331(7526): 1177.
- Ensor, T. and S. Cooper. 2004. "Overcoming barriers to health service access: influencing the demand side." *Health Policy Plan* 19(2): 69-79.
- Fatmi, Z. and B. I. Avan. 2002. "Demographic, socio-economic and environmental determinants of utilisation of antenatal care in a rural setting of Sindh, Pakistan." *J Pak Med Assoc* 52(4): 138-42.
- Forsberg, B. C., D. Montagu, and J. Sundewall. 2011. "Moving towards in-depth knowledge on the private health sector in low- and middle-income countries." *Health Policy Plan* 26 Suppl 1: i1-3.
- Frew, E., J. L. Wolstenholme, W. Atkin, and D. K. Whynes. 1999. "Estimating time and travel costs incurred in clinic based screening: flexible sigmoidoscopy screening for colorectal cancer." *J Med Screen* 6(3): 119-23.
- Gertler, P., L. Locay, and W. Sanderson. 1987. "Are user fees regressive?: The welfare implications of health care financing proposals in Peru." *Journal of Econometrics* 36(1-2): 67-88.
- Gertler P, van der Gaag J. 1990. *The willingness to pay for medical care: evidence from two developing countries*. The Johns Hopkins University Press, Baltimore.
- Gething, P. W., A. M. Noor, D. Zurovac, P. M. Atkinson, S. I. Hay, M. S. Nixon, and R. W. Snow. 2004. "Empirical modelling of government health service use by children with fevers in Kenya." *Acta Trop* 91(3): 227-37.
- Ghaffar, A., B. M. Kazi, and M. Salman. 2000. "Health care systems in transition III. Pakistan, Part I. An overview of the health care system in Pakistan." *J Public Health Med* 22(1): 38-42.
- Goldman, F. and M. Grossman. 1978. "The Demand for Pediatric Care: An Hedonic Approach." *Journal of Political Economy* 86(2): 259-80.
- Government of Pakistan. 1993. *Utilization of rural basic health services in Pakistan*. Report of Evaluation Study. Islamabad: Ministry of Health and WHO.
- Government of Pakistan. 2000. *Utilization of public health facilities in Pakistan*. Islamabad: National Health Management Information System.

- Grossman, M. 1972. *The demand for health: a theoretical and empirical investigation*. New York,: National Bureau of Economic Research; distributed by Columbia University Press.
- Guagliardo, M. F., C. R. Ronzio, I. Cheung, E. Chacko, and J. G. Joseph. 2004. "Physician accessibility: an urban case study of pediatric providers." *Health Place* 10(3): 273-83.
- Gudipati, D. 2006. "Healthcare Delivery Systems in Rural India: Meeting the Changing Needs of Rural Populations." *The Heinz Journal*, Carnegie Mellon.
- Guerrant, R. L., M. Kosek, S. Moore, B. Lorntz, R. Brantley, and A. A. Lima. 2002. "Magnitude and impact of diarrheal diseases." *Arch Med Res* 33(4): 351-5.
- Ha, N. T., P. Berman, and U. Larsen. 2002. "Household utilization and expenditure on private and public health services in Vietnam." *Health Policy Plan* 17(1): 61-70.
- Habtom, G. K. and P. Ruys. 2007. "The choice of a health care provider in Eritrea." *Health Policy* 80(1): 202-17.
- Haines, A., D. Sanders, U. Lehmann, A. K. Rowe, J. E. Lawn, S. Jan, D. G. Walker, and Z. Bhutta. 2007. "Achieving child survival goals: potential contribution of community health workers." *Lancet* 369(9579): 2121-31.
- Hamel, M. J., A. Odhacha, J. M. Roberts, and M. S. Deming. 2001. "Malaria control in Bungoma District, Kenya: a survey of home treatment of children with fever, bednet use and attendance at antenatal clinics." *Bull World Health Organ* 79(11): 1014-23.
- Hanson, K. and P. Berman. 1998. "Private health care provision in developing countries: a preliminary analysis of levels and composition." *Health Policy Plan* 13(3): 195-211.
- Hsiao, W. 2008. "What is a Health System? Why Should We Care?" *Working Paper*.
- Hsiao, W. C., R. P. Shaw, A. Fraker, and World Bank. 2007. *Social health insurance for developing nations*. Washington, D.C.: World Bank.
- Hunte, P. A. and F. Sultana. 1992. "Health-seeking behaviour and the meaning of medications in Balochistan, Pakistan." *Social Science and Medicine* 34(12): 1385-97.
- Islam, A. and M. Z. Tahir. 2002. "Health sector reform in South Asia: new challenges and constraints." *Health Policy* 60(2): 151-69.
- Jacobs, B., P. Ir, M. Bigdeli, P. L. Annear, and W. Van Damme. 2011. "Addressing access barriers to health services: an analytical framework for selecting appropriate interventions in low-income Asian countries." *Health Policy Plan*.

- Jowett, M. and E. Danielyan. 2010. "Is there a role for user charges? Thoughts on health system reform in Armenia." *Bull World Health Organ* 88(6): 472-3.
- Kaosar, A. 2004. "The Tremendous Cost of Seeking Hospital Obstetric Care in Bangladesh." *Reproductive Health Matters* 12(24): 171-80.
- Khan A. 1996. "Policy making in Pakistan's population programme." *Health Policy Plan*; 11: 30-51.
- Kiwanuka, S. N., E. K. Ekirapa, S. Peterson, O. Okui, M. H. Rahman, D. Peters, and G. W. Pariyo. 2008. "Access to and utilisation of health services for the poor in Uganda: a systematic review of available evidence." *Trans R Soc Trop Med Hyg* 102(11): 1067-74.
- Konde-Lule, J., S. N. Gitta, A. Lindfors, S. Okuonzi, V. O. Onama, and B. C. Forsberg. 2010. "Private and public health care in rural areas of Uganda." *BMC Int Health Hum Rights* 10: 29.
- Kosek, M., C. Bern, and R. L. Guerrant. 2003. "The global burden of diarrhoeal disease, as estimated from studies published between 1992 and 2000." *Bull World Health Organ* 81(3): 197-204.
- Kutty, V. R. 2000. "Historical analysis of the development of health care facilities in Kerala State, India." *Health Policy Plan* 15(1): 103-9.
- Lancaster, K. J. 1966. "A New Approach to Consumer Theory." *Journal of Political Economy* 74(2): 132-57.
- Larson, C. P., U. R. Saha, R. Islam, and N. Roy. 2006. "Childhood diarrhoea management practices in Bangladesh: private sector dominance and continued inequities in care." *Int J Epidemiol* 35(6): 1430-9.
- Lasker, J. N. 1981. "Choosing among therapies: illness behaviour in the Ivory Coast." *Soc Sci Med Med Psychol Med Sociol* 15A(2): 157-68.
- Lavy, V. and J.-M. Germain. 1994. *Quality and cost in health care choice in developing countries*. Washington, D.C.: The World Bank.
- Lavy V, Quigley JM. 1991 *Willingness to pay for the quality and intensity of medical care: evidence from low income households in Ghana*. The World Bank, Washington D.C.; Hebrew University, Jerusalem; University of California, Berkley
- Lehmann, U., M. Dieleman, and T. Martineau. 2008. "Staffing remote rural areas in middle- and low-income countries: a literature review of attraction and retention." *BMC Health Serv Res* 8: 19.
- Levesque, J. F., S. Haddad, D. Narayana, and P. Fournier. 2006. "Outpatient care utilization in urban Kerala, India." *Health Policy Plan* 21(4): 289-301.

- Liu, Y., P. Berman, W. Yip, H. Liang, Q. Meng, J. Qu, and Z. Li. 2006. "Health care in China: the role of non-government providers." *Health Policy* 77(2): 212-20.
- Maestad, O. and A. Mwisongo. 2011. "Informal payments and the quality of health care: Mechanisms revealed by Tanzanian health workers." *Health Policy* 99(2): 107-15.
- Malama, C., Q. Chen, R. De Vogli, and G. L. Birbeck. 2002. "User fees impact access to healthcare for female children in rural Zambia." *J Trop Pediatr* 48(6): 371-2.
- Manzi, F., J. A. Schellenberg, T. Adam, H. Mshinda, C. G. Victora, and J. Bryce. 2005. "Out-of-pocket payments for under-five health care in rural southern Tanzania." *Health Policy Plan* 20 Suppl 1: i85-i93.
- Mbugua, J. K., G. H. Bloom, and M. M. Segall. 1995. "Impact of user charges on vulnerable groups: the case of Kibwezi in rural Kenya." *Soc Sci Med* 41(6): 829-35.
- McCoy, D., S. Bennett, S. Witter, B. Pond, B. Baker, J. Gow, S. Chand, T. Ensor, and B. McPake. 2008. "Salaries and incomes of health workers in sub-Saharan Africa." *Lancet* 371(9613): 675-81.
- McFadden D. 1973. "Conditional logit analysis of qualitative choice behaviour." In: Zarembka P (ed) *Frontiers in economics*. Academic Press, New York.
- McPake, B., D. Asimwe, F. Mwesigye, M. Ofumbi, L. Ortenblad, P. Streefland, and A. Turinde. 1999. "Informal economic activities of public health workers in Uganda: implications for quality and accessibility of care." *Soc Sci Med* 49(7): 849-65.
- Melnyk, K. A. 1988. "Barriers: a critical review of recent literature." *Nurs Res* 37(4): 196-201.
- Memon, Z. A., A. Pach, M. Rifkin, O. P. Han, B. Stanton, J. Clemens, and Z. Bhutta. 2008. "Health care preferences for children with typhoid fever in two slum communities in Karachi, Pakistan." *Southeast Asian J Trop Med Public Health* 39(6): 1110-25.
- Meng, Q., X. Liu, and J. Shi. 2000. "Comparing the services and quality of private and public clinics in rural China." *Health Policy Plan* 15(4): 349-56.
- Mills, A., R. Brugha, K. Hanson, and B. McPake. 2002. "What can be done about the private health sector in low-income countries?" *World Hosp Health Serv* 38(3): 24-30, 41-4.
- Ministry of Health. 2008. *Health System Profile: Pakistan*. Regional Health Systems Observatory, EMRO, 26-34

- Molyneux, C. S., V. Mung'Ala-Odera, T. Harpham, and R. W. Snow. 1999. "Maternal responses to childhood fevers: a comparison of rural and urban residents in coastal Kenya." *Trop Med Int Health* 4(12): 836-45.
- Morey, E. R., V. R. Sharma, and A. Mills. 2003. "Willingness to pay and determinants of choice for improved malaria treatment in rural Nepal." *Soc Sci Med* 57(1): 155-65.
- Muela, S. H., A. K. Mushi, and J. M. Ribera. 2000. "The paradox of the cost and affordability of traditional and government health services in Tanzania." *Health Policy Plan* 15(3): 296-302.
- Murray, C. J., T. Laakso, K. Shibuya, K. Hill, and A. D. Lopez. 2007. "Can we achieve Millennium Development Goal 4? New analysis of country trends and forecasts of under-5 mortality to 2015." *Lancet* 370(9592): 1040-54.
- Mwabu, G., M. Ainsworth, and A. Nyamete. 1993. "Quality of Medical Care and Choice of Medical Treatment in Kenya: An Empirical Analysis." *The Journal of Human Resources* 28(4): 838-62.
- Mwabu, G., J. Mwanzia, and W. Liambila. 1995. "User charges in government health facilities in Kenya: effect on attendance and revenue." *Health Policy Plan* 10(2): 164-70.
- Mwabu, G. M. 1986. "Health care decisions at the household level: results of a rural health survey in Kenya." *Soc Sci Med* 22(3): 315-9.
- Mwabu, G. M. 1989. "Nonmonetary Factors in the Household Choice of Medical Facilities." *Economic Development and Cultural Change* 37(2): 383-92.
- Mwabu G, Ainsworth M, Nyamete A. 1996. "The effect of costs, service quality and availability on the demand on the demand for medical care: Insights from Kenya." In Shaw RP, Ainsworth M (eds.) *Financing health services through user fees and insurance: Case studies from Sub-Saharan Africa*. World Bank Discussion Papers 294, Africa Technical Department Series. Washington, D.C., World Bank.
- Ndeso-Atanga S. 2003. "Health care quality and the choice of care providers: Cameroon II Africa's changing markets for health and veterinary services: The New Institutional Issues." UCIAS Edited Volume 5  
<http://repositories.cdlib.org/uciaspubs/editedvolumes/5/5>
- Ndyomugenyi, R., S. Neema, and P. Magnussen. 1998. "The use of formal and informal services for antenatal care and malaria treatment in rural Uganda." *Health Policy Plan* 13(1): 94-102.
- Newman, R. D., S. Gloyd, J. M. Nyangezi, F. Machobo, and J. Muiser. 1998. "Satisfaction with outpatient health care services in Manica Province, Mozambique." *Health Policy Plan* 13(2): 174-80.

- Noor, A. M., A. A. Amin, P. W. Gething, P. M. Atkinson, S. I. Hay, and R. W. Snow. 2006. "Modelling distances travelled to government health services in Kenya." *Trop Med Int Health* 11(2): 188-96.
- NoorAli, R., S. Luby, and M. H. Rahbar. 1999. "Does use of a government service depend on distance from the health facility?" *Health Policy Plan* 14(2): 191-7.
- Ogunbekun, I., A. Ogunbekun, and N. Orobato. 1999. "Private health care in Nigeria: walking the tightrope." *Health Policy Plan* 14(2): 174-81.
- Onwujekwe, O., K. Hanson, and B. Uzochukwu. 2011. "Do poor people use poor quality providers? Evidence from the treatment of presumptive malaria in Nigeria." *Trop Med Int Health* 16(9): 1087-98.
- Onwujekwe, O. E., B. S. Uzochukwu, E. N. Obikeze, I. Okoronkwo, O. G. Ochonma, C. A. Onoka, G. Madubuko, and C. Okoli. 2010. "Investigating determinants of out-of-pocket spending and strategies for coping with payments for healthcare in southeast Nigeria." *BMC Health Serv Res* 10: 67.
- Ozawa, S. and D. G. Walker. 2011. "Comparison of trust in public vs private health care providers in rural Cambodia." *Health Policy Plan* 26 Suppl 1: i20-9.
- Palmer, N., D. H. Mueller, L. Gilson, A. Mills, and A. Haines. 2004. "Health financing to promote access in low income settings-how much do we know?" *Lancet* 364(9442): 1365-70.
- Pannarunothai, S. and A. Mills. 1998. "Researching the public/private mix in health care in a Thai urban area: methodological approaches." *Health Policy Plan* 13(3): 234-48.
- Rao, S. 2005. "Delivery of Health Services in the Public Sector." In *Financing and Delivery of Health Care Services in India*. New Delhi: Ministry of Health and Family Welfare, 48.
- Parkhurst, J. O., S. A. Rahman, and F. Ssengooba. 2006. "Overcoming access barriers for facility-based delivery in low-income settings: insights from Bangladesh and Uganda." *J Health Popul Nutr* 24(4): 438-45.
- Patil et al. 2002. "Current Health Scenario in Rural India." *International Association of Agricultural Medicine and Rural Health*, 10, 129-135.
- Peters, D. H. 2002. *Better health systems for India's poor : findings, analysis, and options*. Washington, D.C.: World Bank.
- Phelps, C. E. and J. P. Newhouse. 1974. "Coinsurance, The Cost of Time, and the Demand for Medical Services." *The Review of Economics and Statistics* 56(3): 334-42.

- Philip, M. 1983. "Family health care spending in Latin America." *Journal of Health Economics* 2(3): 245-57.
- Pokhrel, S. and R. Sauerborn. 2004. "Household decision-making on child health care in developing countries: the case of Nepal." *Health Policy Plan* 19(4): 218-33.
- Prata, N., F. Greig, J. Walsh, and A. West. 2004. "Ability to pay for maternal health services: what will it take to meet WHO standards?" *Health Policy* 70(2): 163-74.
- Preker, A. S., R. M. Scheffler, and M. C. Bassett. 2007. *Private voluntary health insurance in development : friend or foe?* Washington, D.C.: World Bank.
- Qian, D., R. W. Pong, A. Yin, K. V. Nagarajan, and Q. Meng. 2009. "Determinants of health care demand in poor, rural China: the case of Gansu Province." *Health Policy Plan* 24(5): 324-34.
- Rani, M. and S. Bonu. 2003. "Rural Indian women's care-seeking behaviour and choice of provider for gynecological symptoms." *Stud Fam Plann* 34(3): 173-85.
- Ranson, M. K., M. Chopra, S. Atkins, M. R. Dal Poz, and S. Bennett. 2010. "Priorities for research into human resources for health in low- and middle-income countries." *Bull World Health Organ* 88(6): 435-43.
- Ridde, V. and F. Morestin. 2011. "A scoping review of the literature on the abolition of user fees in health care services in Africa." *Health Policy Plan* 26(1): 1-11.
- Roberts, M. J. 2004. *Getting health reform right : a guide to improving performance and equity*. Oxford ; New York: Oxford University Press.
- Russell, S. 2005. "Illuminating cases: understanding the economic burden of illness through case study household research." *Health Policy Plan* 20(5): 277-89.
- Rutebemberwa, E., G. Pariyo, S. Peterson, G. Tomson, and K. Kallander. 2009. "Utilization of public or private health care providers by febrile children after user fee removal in Uganda." *Malar J* 8: 45.
- Rutherford, M. E., K. Mulholland, and P. C. Hill. 2010. "How access to health care relates to under-five mortality in sub-Saharan Africa: systematic review." *Trop Med Int Health* 15(5): 508-19.
- Sadiq, H. and A. D. Muynck. 2001. "Health care seeking behaviour of pulmonary tuberculosis patients visiting TB Center Rawalpindi." *J Pak Med Assoc* 51(1): 10-6.
- Saksena, P., K. Xu, R. Elovainio, and J. Perrot. 2011. "Utilization and expenditure at public and private facilities in 39 low-income countries." *Trop Med Int Health*.

- Sauerborn, R., I. Ibrango, A. Nougara, M. Borchert, M. Hien, J. Benzler, E. Koob, and H. J. Diesfeld. 1995. "The economic costs of illness for rural households in Burkina Faso." *Trop Med Parasitol* 46(1): 54-60.
- Segall, M. 2000. "From cooperation to competition in national health systems--and back?: impact on professional ethics and quality of care." *Int J Health Plann Manage* 15(1): 61-79.
- Shah, N. M., W. R. Brieger, and D. H. Peters. 2011. "Can interventions improve health services from informal private providers in low and middle-income countries?: a comprehensive review of the literature." *Health Policy Plan* 26(4): 275-87.
- Shah, N. M., W. Wang, and D. M. Bishai. 2011. "Comparing private sector family planning services to government and NGO services in Ethiopia and Pakistan: how do social franchises compare across quality, equity and cost?" *Health Policy Plan* 26 Suppl 1: i63-71.
- Shaikh, B. T. and J. Hatcher. 2005. "Health seeking behaviour and health service utilization in Pakistan: challenging the policy makers." *J Public Health (Oxf)* 27(1): 49-54.
- Shenoy, K. T., T. S. Shenoy, and T. N. Krishnan. 1997. "Determinants of health care service utilization in Kerala." *Journal of Clinical Epidemiology* 50, Supplement 1(0): S45.
- Streefland, P. 2005. "Public health care under pressure in sub-Saharan Africa." *Health Policy* 71(3): 375-82.
- Stephenson R, Hennink M. 2004. "Barriers to family planning service use among the urban poor in Pakistan." *Asia Pac Popul J*; 19: 5-26.
- Taffa, N. and G. Chepngeno. 2005. "Determinants of health care seeking for childhood illnesses in Nairobi slums." *Trop Med Int Health* 10(3): 240-5.
- Terra de Souza, A. C., K. E. Peterson, F. M. Andrade, J. Gardner, and A. Ascherio. 2000. "Circumstances of post-neonatal deaths in Ceara, Northeast Brazil: mothers' health care-seeking behaviours during their infants' fatal illness." *Soc Sci Med* 51(11): 1675-93.
- Thaddeus, S. and D. Maine. 1994. "Too far to walk: maternal mortality in context." *Soc Sci Med* 38(8): 1091-110.
- Tuan, T., V. T. Dung, I. Neu, and M. J. Dibley. 2005. "Comparative quality of private and public health services in rural Vietnam." *Health Policy Plan* 20(5): 319-27.
- Victora, C. G., A. Matijasevich, M. Silveira, I. Santos, A. J. Barros, and F. C. Barros. 2010. "Socio-economic and ethnic group inequities in antenatal care quality in the public and private sector in Brazil." *Health Policy Plan* 25(4): 253-61.

- Waters, H., L. Hatt, and D. Peters. 2003. "Working with the private sector for child health." *Health Policy Plan* 18(2): 127-37.
- Waters, H. R., L. E. Hatt, and R. E. Black. 2008. "The role of private providers in treating child diarrhoea in Latin America." *Health Econ* 17(1): 21-9.
- Wiseman, V., A. Scott, L. Conteh, B. McElroy, and W. Stevens. 2008. "Determinants of provider choice for malaria treatment: experiences from The Gambia." *Soc Sci Med* 67(4): 487-96.
- Witter, S. 2009 (unpublished). *Summary of position on user fees, selected African and Asian countries (including all PSA countries)*. Briefing note for the Department for International Development.
- World Bank. 1997. *Towards a health sector strategy*. Washington DC: Health, Nutrition and Population Unit, South Asia Region.
- World Bank. Pakistan Poverty Assessment. 2002. *Poverty in Pakistan: vulnerabilities, social gaps, and rural dynamics*. Poverty Reduction and Economic Management Sector Unit South Asia Region.
- The World Bank. *Health and Poverty in the Gambia: A background report to the National Poverty Reduction Strategy Paper*. Africa Region Human Development Working Paper Series, November 2005.
- World Health Organization. 2009. *WHO Country Cooperation Strategy, 2008-2013: Gambia*. WHO Regional Office for Africa.
- World Health Organization. 2009. *Country Cooperation Strategy at a Glance: Gambia*. <http://www.who.int/countries/gmb/en/>
- World Health Organization. 2009. *Human Resources for Health Country Profile: The Gambia*. African Health Workforce Observatory, March.
- World Health Organization. 2009. *WHO Country Cooperation Strategy, 2008-2013: Kenya*. WHO Regional Office for Africa.
- World Health Organization. 2006. *Country Cooperation Strategy for WHO and Pakistan, 2005-2009*. World Health Organization Regional Office for the Eastern Mediterranean, Cairo.
- World Health Organization. 2011. *Country Cooperation Strategy at a Glance: Pakistan*. [www.whopak.org](http://www.whopak.org)
- World Health Organization. 2010. *The World Health Report. Health Systems Financing: The path to universal coverage*. WHO Press, Geneva, Switzerland
- World Health Organization. 2002. *Country Health Profile: India*.

- World Health Organization. 2010. *The World Health Report. Health Systems Financing: The path to universal coverage*. WHO Press, Geneva, Switzerland
- Xu, K., D. B. Evans, P. Kadama, J. Nabyonga, P. O. Ogwal, P. Nabukhonzo, and A. M. Aguilar. 2006. "Understanding the impact of eliminating user fees: utilization and catastrophic health expenditures in Uganda." *Soc Sci Med* 62(4): 866-76.
- Yazbeck, A. and D. H. Peters. 2003. *Health policy research in South Asia : building capacity for reform*. Washington, D.C.: World Bank.
- Yip, W. C., H. Wang, and Y. Liu. 1998. "Determinants of patient choice of medical provider: a case study in rural China." *Health Policy Plan* 13(3): 311-22.
- Zaidi, S. S., L. V. Seidlein, S. Q. Nizami, C. Acosta, and Z. A. Bhutta. 2006. "Health care utilization for diarrhoea and fever in 4 urban slums in Karachi." *J Coll Physicians Surg Pak* 16(4): 245-8.
- Zaman, K., S. Zeitlyn, J. Chakraborty, A. de Francisco, and M. Yunus. 1997. "Acute lower respiratory infections in rural Bangladeshi children: patterns of treatment and identification of barriers." *Southeast Asian J Trop Med Public Health* 28(1): 99-106.

## BIOGRAPHICAL SKETCH

Matt Kukla was born in Atlanta, GA to Ken Kukla and Kathleen Williams. After completing his Bachelor of Arts in Economics and Medicine at Depauw University in 2006, Matt spent several years working in the health care industry and traveling to over twenty five countries. Matt's experiences in both developed and developing countries led to his interest in improving health system performance as a means to reduce global poverty and enhance economic development. He returned home to pursue his PhD in Health Services Research at the University of Florida. A health economist by training, Matt specializes in two areas: (a) how institutional frameworks such as governance, judicial and political systems impact health care policy and health system performance; (b) how health financing and payment mechanisms influence the effectiveness, efficiency, equity and quality of health care systems. While his background focuses on the U.S. health care system, he conducts work in other developed and developing countries so as to find lessons and best practices for improving health system performance.