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ประเทศเนปาล



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วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาเศรษฐศาสตรดุษฎีบัณฑิต  
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DEMAND FOR MEDICAL CARE: AN ECONOMIC ANALYSIS  
OF KALA AZAR IN NEPAL

Mr. Shiva Raj Adhikari

A Dissertation Submitted in Partial Fulfillment of the Requirements  
for the Degree of Doctor of Philosophy Program in Economics

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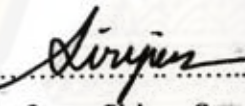
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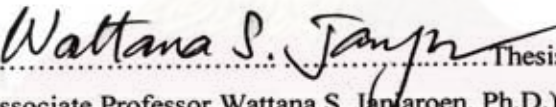
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จีวา ราช อัคริการี : การวิเคราะห์ทางเศรษฐศาสตร์ต่ออุปสงค์ของการบริการทางการแพทย์ของโรคคาลาอะซาร์ในประเทศเนปาล. (DEMAND FOR MEDICAL CARE: AN ECONOMIC ANALYSIS OF KALA AZAR IN NEPAL) อ.ที่ปริกษาวิทยานิพนธ์หลัก: รศ.ดร.ศิริเพ็ญ สุกกาญจนกันติ, อ.ที่ปริกษาวิทยานิพนธ์ร่วม: รศ.ดร.วัฒนา สุวรรณแสง จันเจริญ 198 หน้า.

การศึกษานี้ได้ทำการวิเคราะห์เชิงปริมาณถึงผลกระทบของโปรแกรมการจัดความยากจนโดยลดอัตราการผลิตโรคในกลุ่มผู้ป่วยยากไร้ โดยศึกษาในส่วนของ กระบวนการการตัดสินใจในการดูแลสุขภาพ รูปแบบการให้บริการสุขภาพจากการให้บริการของผู้ให้บริการ โดยขึ้นอยู่กับารับบริการ ในครั้งแรก และปัจจัยที่ส่งผลกระทบต่อการใช้บริการและเข้ารับการปรึกษาหลายครั้ง การวิเคราะห์ใช้การวิเคราะห์หลักฐานเชิงประจักษ์ ทั้งข้อมูลปฐมภูมิและทุติยภูมิจากประเทศเนปาล โดยวิเคราะห์ด้วยแบบจำลองทางสถิติที่ซับซ้อน โดยการศึกษาได้เน้นไปที่โรค Kala Azar (KA) หรืออีกชื่อหนึ่งคือ โรคของคณจน ซึ่งเป็นโรคเขตร้อนชนิดหนึ่ง ผลการวิเคราะห์อุปสงค์พบว่า ถึงแม้ว่าการบริการสุขภาพนั้นไม่เสียค่าใช้จ่ายใดๆ ที่โรงพยาบาลของรัฐก็ตาม ผู้ป่วยยากไร้ก็มีความอ่อนไหวในระดับสูงต่อราคา การให้บริการสุขภาพโดยไม่เสียค่าใช้จ่าย อาจจะไม่เพียงพอที่จะกระตุ้นให้เกิดการเข้ารับบริการสุขภาพจากผู้ป่วยหรือครอบครัวยากไร้ได้ นอกจากนี้ยังได้ทำการศึกษาแนวทางของการ ใช้นโยบายทางการคลังด้านอุปสงค์ และการพัฒนาความเข้าใจถึงโรคและการให้บริการที่โรงพยาบาลรัฐ จากแบบจำลองพบว่า นโยบายการคลังด้านอุปสงค์ช่วยกระตุ้นการให้บริการในโรงพยาบาลรัฐเพิ่มจากร้อยละ 16 เป็นร้อยละ 63 ซึ่งเป็นผลสืบเนื่องจากผลกระทบจากราคา อย่างไรก็ตามพบว่าผลกระทบจากรายได้มีไม่มากนัก ส่วนนโยบายการพัฒนาความรู้ความเข้าใจเกี่ยวกับโรค ช่วยลดการดูแลรักษาด้วยตนเองหรือที่บ้าน การซื้อยาจากร้านขายยา และการใช้บริการจากคลินิกเอกชน และช่วยกระตุ้นการให้บริการในโรงพยาบาลรัฐเพิ่มขึ้น การใช้แนวทางแบบองค์รวมแทนการใช้แนวทางแบบดั้งเดิมซึ่งมักเน้นที่โรคนั้นจะช่วยจัดความเชื่อมโยงระหว่างความยากจนและ KA ได้ การขยายการให้บริการรักษาโรค KA ทั้งในผู้ให้บริการภาครัฐและภาคเอกชน และการเข้าถึงความรู้ด้านโรค KA ที่ดีขึ้นจะช่วยควบคุม KA ในประเทศเนปาลได้

สาขาวิชาเศรษฐศาสตร์  
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ลายมือชื่อนิติ.....  
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KEYWORDS : DEMAND/ PRICE/ HEALTH CARE/ KALA AZAR/ NEPAL

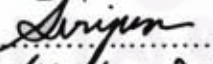
SHIVA RAJ ADHIKARI: DEMAND FOR MEDICAL CARE: AN ECONOMIC ANALYSIS OF KALA AZAR IN NEPAL. THESIS ADVISOR: ASSOC.PROF. SIRIPEN SUPAKANKUNTI, Ph.D. THESIS CO-ADVISOR: ASSOC. PROF. WATTANA S JANJAROEN, Ph.D., 198 pp

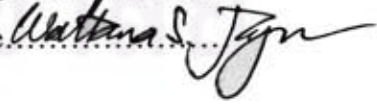
This study contributes to the literatures by measuring in quantitative terms the potential effects of poverty-alleviation programs on the incidence of disease; exploring road map of decision making process for health seeking; examining utilization patterns of health services based on first consultation and factor influencing multiple consultations to the providers. For empirical analysis, the sophisticated statistical tools are applied to recently collected data from secondary and primary sources in Nepal. The study focuses on Kala Azar (KA) - a neglected tropical disease, also known as disease of poor. The results of demand analysis suggest that absolute poor are highly price sensitive, although health services are provided free of cost at the public hospitals. Provision of free health care may not be sufficient to encourage utilization of health services by the poor patients or households. Based on empirical model, this study has also explored the implication of introducing demand side financing and better access to information on the utilization of public hospitals. The utilization of public hospital can be increased from 16 percent up to 63 percent due to price effects; however, the effect of income on utilization rate is relatively small. Better access to information reduces likely of using self-care or home care; drug stores and private clinics and increases the utilization of public hospitals. A holistic approach rather than traditional disease-centered approach can break the links between poverty and KA; and expansion of KA care in public and private providers and better access to information can help to control of KA in Nepal.

Field of Study: Economics

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Student's Signature.....

Advisor's Signature.....

Co-Advisor's Signature.....

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## CONTENTS

	Page
ABSTRACT (THAI).....	iv
ABSTRACT (ENGLISH).....	v
ACKNOWLEDGEMENTS.....	vi
CONTENTS.....	vii
LIST OF TABLES.....	x
LIST OF FIGURES.....	xi
LIST OF ABBREVIATIONS.....	xii
CHAPTER I INTRODUCTION.....	1
1.1 Background.....	1
1.2 Current profile of Kala Azar.....	2
1.3 Health care system in Nepal.....	5
1.4 Research context and significance.....	7
1.5 Research objectives.....	9
1.6 Research questions.....	10
1.7 Organization of the study.....	11
CHAPTER II REVIEW OF THE LITERATURE.....	12
CHAPTER III RESEARCH METHODOLOGY.....	24
3.1 Conceptual framework.....	24
3.2 Research design.....	26
3.3 Study setting.....	27
3.4 Sample size and data collection.....	28



	Page
3.4.1 Qualitative methods.....	28
3.4.2 Quantitative methods.....	30
3.4.3 Inclusion and exclusion criteria.....	32
3.5 Data quality and data management.....	33
3.6 Definition of variables and measurements.....	34
3.7 Dissemination plan.....	43
CHAPTER IV SPECIFICATION AND ECONOMETRIC MODELING....	44
4.1 Determinants of disease.....	44
4.1.1 Community characteristics .....	44
4.1.2 Individual and household characteristics.....	45
4.2 Demand for health care.....	46
4.3 Demand for multiple visits.....	50
CHAPTER V RESULTS OF QUALITATIVE STUDY.....	52
5.1 Decision making process to seek health care.....	52
5.2 Empirical findings .....	55
5.2.1 Summary results in words.....	55
5.2.2 Summary results in numbers.....	58
5.3 Analysis of decision making process.....	60
5.4 Discussion.....	62
5.5 Conclusions.....	64
CHAPTER VI RESULTS OF DETERMINANTS OF DISEASE.....	65
6.1 Introduction.....	65



	Page
6.2 Determinants of community characteristics.....	66
6.3 Determinants of individual and household characteristics.....	69
6.3.1 Interactions between poverty and household characteristics	71
6.4 Discussion.....	72
6.5 Conclusions.....	75
CHAPTER VII RESULTS OF DEMAND FOR HEALTH CARE.....	76
7.1 Introduction.....	76
7.2 Demand for first consultation of health services.....	77
7.2.1 Results of maximum likelihood estimation.....	80
7.2.2 Policy simulation.....	83
7.3 Demand for multiple consultation of health services.....	86
7.3.1 Results of maximum likelihood estimation.....	87
7.4 Discussion.....	89
7.5 Conclusions.....	93
CHAPTER VIII CONCLUSIONS LIMITATION AND FUTURE RESEARCH	94
8.1 Conclusions.....	94
8.2 Limitations.....	97
8.3 Future research.....	98
REFERENCES.....	99
APPENDIX.....	111
BIOGRAPHY.....	185

## LIST OF TABLES

	Page
Table 3.1 Time valuation methods .....	38
Table 3.2 List of relevant variables for the analysis of Kala Azar .....	42
Table 6.1 Descriptive results .....	67
Table 6.2 Estimated influences of community variables on KA incidence.....	67
Table 6.3 Descriptive statistics for the surveyed individuals .....	69
Table 6.4 Estimated effects of household and individual characteristics.....	70
Table 6.5 Results of household characteristics interaction with poverty.....	71
Table 7.1 Descriptive statistics for the variables used in demand analysis.....	79
Table 7.2 Factors affecting choice of provider-type by KA consumers.....	81
Table 7.3 Own price elasticity of demand and income elasticity.....	83
Table 7.4 Effect of cash transfer on probability of utilizing public hospital...	84
Table 7.5 Effects of knowledge about KA on the choice of providers.....	85
Table 7.6 Summary results of the explanatory variables.....	86
Table 7.7 Results of maximum likelihood estimation and marginal change...	88
Table 7.8 Elasticity of forward looking price .....	88

## LIST OF FIGURES

	Page
Figure 1.1 Incidence of KA in Nepal 1980 to 2006 .....	4
Figure 1.2 Monthly distributions of KA cases in Nepal (2006) .....	5
Figure 3.1 Conceptual frameworks: determinants of illness and demand .....	25
Figure 3.2 Selection of districts for field survey .....	27
Figure 3.3 Flow chart of field survey .....	34
Figure 5.1 Choice of first contact health care providers .....	59
Figure 5.2 Sources of financing .....	60
Figure 5.3 Decision making process of KA consumers .....	61


  
 ศูนย์วิทยุทรัพยากร  
 จุฬาลงกรณ์มหาวิทยาลัย

## LIST OF ABBREVIATIONS

CBS	Central Bureau of Statistics
CPR	Contraceptive Prevalence Rate
DALYs	Disable Adjusted Life years
DAT	Direct Agglutination Test
DSF	Demand Side Financing
EDPs	External Development Partners
FGD	Focus Group Discussion
HH	Household
HP	Health Post
IIA	Independence of Irrelevant Alternatives
iid	independent identically distributed
IOM	Institute of Medicine
KA	Kala-Azar
LISREL	Linear Structural Relationships
LSMS	Living Standard Measurement Survey
MIMIC	Multiple Indicators Multiple Causes
MNL	Multinomial logit
MOHP	Ministry of Health and Population
NL	Nested logit
OLS	Ordinary Least Square
PCBD	Primary Care at below District level
PHCC	Primary Health Care Centre
PKDL	Post Kala Azar Dormal Leishmaniasis
RUM	Random Utility Model
SAG	Sodium Antimony Gluconate
SHP	Sub-health Post
VL	Visceral Leishmaniasis
WHO/TDR	World Health Organization/ Special Programmes for Research and Training in Tropical Disease



# CHAPTER I

## INTRODUCTION

### **1.1 Background**

In developing countries of the world, the volume and range of economic analyses of behaviour of people have been expanding rapidly over the past few decades, because of the increasing emphasis placed on evidence-based policy and availability of household level data. Primary roles of health care policies are to enhance health status of the population, to improve efficiency in resource use, mobilizing new resources and to ensure equity in health care delivery and financing. Many policy changes often try to affect the outcomes through the changes in economic variables, as the economic factors are considered more effective and powerful tools for changing behaviour of the people. Economic analyses, therefore, are most relevant and commonly used in the close examination of treatment seeking behaviour of the people and response of the implemented policies. The treatment seeking behaviour of people is analyzed based on economic theory of consumer choice that provides a systematic analysis of how economic variables, among others, can affect the behaviour of the people. Estimates of how utilization of health care services changes when prices and income change are important inputs for introducing and designing new policies and evaluation of existing health policies.

Demand analysis of medical care is increasingly recognized due to its importance of health care policy not only in general health care but also in disease specific care. A number of demand analyses in the literature focus on specific diseases. For example Dzator and Asfu-Adjaye, (2004) analyzed demand for malaria health care services and Freiman and Zuvekas (2000) analyzed mental health services. Disease specific analysis of demand has a number of advantages. First, diseases vary so widely in severity and responsiveness to medical interventions, considering all the diseases together makes it extremely difficult to understand the marginal effects of specific demand-affecting variables. Second, tropical diseases have own specific features that require specific policies to control or elimination of the disease. The

demand analysis can provide a piece of useful information for designing specific target policies for that purpose. Third, tropical disease, such as Kala Azar (KA), is disease of the poor (Remme et al, 2006; Thankur, 2006; Ahluwalia, et al. 2003). The treatment seeking behaviour of the poor people may differ from others such as they are more sensitive to price than the better off (Gertler and Hammer, 1997). This study deals with demand for medical care of KA that comprises behaviour of consumers related to utilization and not utilization of health care services of KA.

## 1.2 Current profile of Kala Azar

Visceral leishmaniasis (VL)<sup>1</sup> also known as KA is a neglected tropical disease<sup>2</sup>. It is the most serious form, usually fatal if untreated (Thakur, 2006). KA is caused by the bite of infected sandfly, manifests itself by irregular fever, loss of weight with wasting, splenic enlargement, liver enlargement, change in colour of skin (Chatterjee, 1980; Cheesbrough, 1998). KA results in a high mortality, with estimates ranging from 80% to 100% (Ahluwalia, et al. 2003).

KA is diagnosed using Direct Agglutination Test (DAT) (Cheesbrough, 1998). Field-level serological diagnosis (dipstick rk39)<sup>3</sup> tool has been recently developed and implemented in the country. Sodium Antimony Gluconate (SAG) is first line drug for treatment. The second line drug amphotericin B is prohibitively costly and requires intravenous administration and hospitalization. Recently, new oral drug Miltefosine<sup>4</sup>

---

<sup>1</sup> Leishmaniasis is a group of diseases caused by protozoan parasite of genus *Leishmania* (*L. donovani* complex, *L. major* complex, *L. tropica* complex). VL is the most severe form of leishmaniasis. It is caused by *L. donovani* and *L. infantum* (*L. chagasi*) (Thakur, 2006; Cheesbrough, 1998). VL and KA are frequently used for same disease in this study.

<sup>2</sup> Tropical diseases are also called infectious diseases that appear primarily in the tropics. Ecological and low socioeconomic conditions facilitate transmission of the disease. Tropical disease, therefore are called disease of the poor (Remme et al, 2006). Tropical diseases are parasitic diseases such as Malaria, African trypanosomiasis, Chagas disease, Schistosomiasis, Leishmaniasis, Lymphatic filariasis, Onchocerciasis, and Intestinal nematode infections; Leprosy; Dengue fever; Japanese encephalitis; Trachoma; and Infectious diarrheal diseases (Mahmoud, et al, 2006).

<sup>3</sup> A rapid immunochromatic strip test using rK39 antigen has now become available commercially. The test is simple, rapid (10 minutes), inexpensive, requires no other reagents or instruments and can be performed in the field by the paramedics. The test requires only 1 to 2 drops of blood/serum and results can be read visually.

<sup>4</sup> The recommended dose is 2.5 mg/kg/day in divided doses taken after meals for 28 days. Side effects include mild gastrointestinal symptoms like vomiting and diarrhoea, asymptomatic transient elevation of hepatic enzymes, and rarely nephrotoxicity. It is available in India by the trade name of Impavido (Zentaris). It is a teratogenic drug and thus can not be used in pregnant females, and females of child bearing age group must practice contraception for the duration of therapy and for 2 months

has been introduced that is easy to administer at the community-level. Recently, the common consensus among the KA endemic countries in South Asia has been built to apply oral drugs (miltefosine) and rK-39 diagnostic tools for treatment and diagnosis of KA.

In the preventive side, residential insecticide spraying and long-lasting insecticide impregnated bed nets are popular for vector control. Ecological vector management that is plastering the walls and floors of houses and cattle sheds with a mud/lime mixture does also help to reduce the vector.

The global estimate for the incidence of Kala-azar cases per year is 0.5 million, and out of them India, Bangladesh, Nepal, Sudan and Brazil captured more than 90 per cent of the total cases (Bhattacharya et al 2006). A number of studies estimated the burden of disease with different figures, for example, the disease accounts for the loss of about 400,000 (17 percent of global) DALYS in these countries per year (WHO/SEARO, 2005); Bangladesh, India and Nepal account for an estimated 300,000 cases annually and 60% of the global burden in terms of DALYs of KA (Bern et al, 2005). The DALYs for India only lost due to KA in 1990 were calculated 6.8 million for men and 0.5 million for women and based on official recorded data (Bhattachaya, et al, 2006). The burden might be grossly underestimated because estimations are based on reported data.

In fact, KA is a common public health problem of Bangladesh, India and Nepal and regional collaborative efforts should be undertaken to control the disease (MOHP, 2009; Bern and Chowdhury, 2006; Kishore et al,2006). The Governments of these countries have recently made their commitments to eliminate KA from the Indian sub-continent (Kishore et al, 2006). Elimination of infectious disease generally implies the reduction to zero of the incidence of infection caused by a specified agent in a defined geographical area, as a result of continued and deliberate efforts (Molyneux et al, 2004). The elimination of KA has, however, been defined as in

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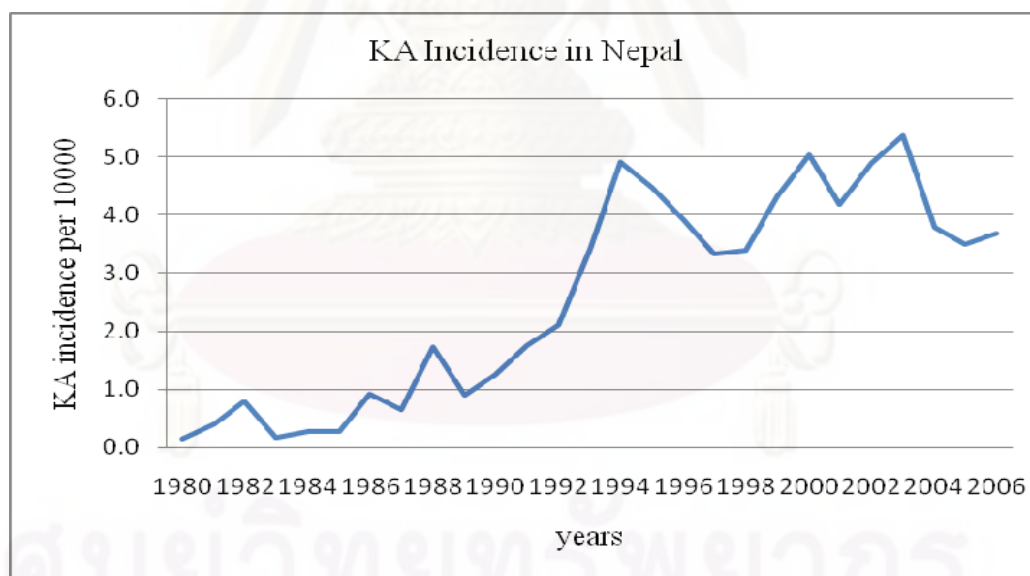
after therapy. However “Miltefosine”, the first oral drug, is safe with minimal side-effects and should be promoted as the drug of choice for the management of KA cases.

reducing the annual incidence to less than one case per 10 000 population by 2015 at the district or sub-district levels in the endemic countries (Kishore et al, 2006).

The elimination or control of infectious diseases within and among endemic nations is a global public good (Smith et al, 2004) because it has spill over effects, all countries in this region can get the benefits. Public goods may be local, regional and global, based on the scope of their impacts or cross boarder externalities and degree of publicness. KA is treated as regional public goods.

In Nepal, KA is primarily confined to the twelve districts of Terai belt bordering the State of Bihar, India and about 8.0 million people are at risk in the country. In Nepal, reported incidence rates have varied from about four to five cases per ten thousand populations since 2000.

Figure: 1.1 Incidence of KA in Nepal 1980 to 2006

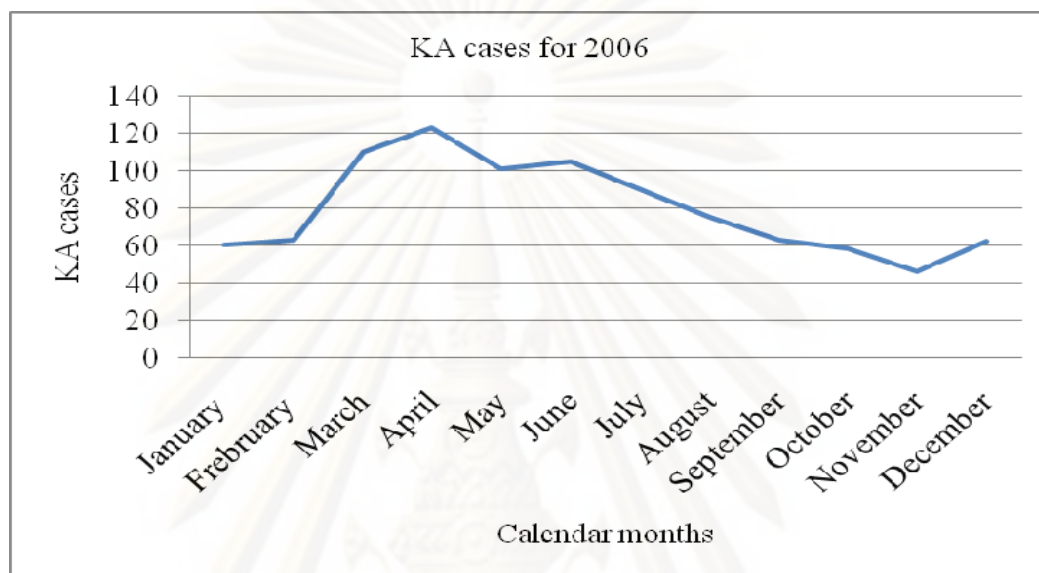


Sources: (MOHP, 2007)

The seasonality of KA is shown in Figure 2. Note that the number of KA cases in Nepal in 2006 started increasing after February and remained at more than 100 cases per month during March-June. November had the lowest cases in Nepal. Total number of KA cases in Nepal during 2006 was 1531(MOHP, 2007).



Figure: 1.2 Monthly distributions of KA cases in Nepal (2006)



Sources: (MOHP, 2007)

Indoor residual insecticide spraying in two cycles in a year has been continuously implemented in the risk area of KA. For the case management, early detection and timely appropriate treatment have been implemented in Kala-azar endemic districts. Diagnostic and treatment services that include rK-39 diagnostic tools and drugs SAG, Miletfosine and Amphotericin B are provided free of cost at public hospitals.

### 1.3 Health care system in Nepal

Nepal's health care system is hierarchically structured could be compared to five –layer pyramid: self care at family level, primary care at below district level, primary care at district level, secondary care and tertiary care, from bottom level to top level respectively. Self care is the practice of activities that individuals initiate and perform on their own behalf in maintaining health and make decisions about their health. Primary care at below district level (PCBD) includes sub-health post (SHP), health post (HP) and primary health care centers (PHCC). They provide clinical and preventive services. Primary care at district level includes district hospitals and

district public health offices. District hospital provides inpatient, emergency and outpatient services whereas the district public health offices are primarily responsible for preventive services. Secondary care is provided by zonal and sub regional hospital with various degree of specialization in curative care. Finally, tertiary care is at the top level of health service pyramid that includes central hospitals, university hospital and large private hospitals. They provide higher degree of specialist services. Public health care providers dominate health care market; however, growth rate of private health care providers, in recent year, is in increasing trend. Health care services provided by public providers are heavily subsidized in all levels and PCBD provides curative and preventive services at free of cost with good coverage in the rural areas. There is referral system in policy from PCBD to the district or zonal hospitals (Thapa, 2007); however, rarely have been materialized in practice due to various reasons for examples, there is no incentive system to the PCBD providers to stimulate the referral system; there might be overburden of work to the PCBD providers that discourages the referral system or people do not follow the referral system in their decision making to choose the health providers.

People are receiving various degrees of services from private health care providers including private clinic run by the doctors and private hospital and nursing homes among others. Traditional healers, drug stores among others are also playing the role as health care providers in Nepal. Like in other developing countries, people have choices of health care providers with various degree of quality of care in rural and urban areas; however, qualified health care providers from both public and private sectors are concentrated on urban area. Diagnosis and treatment services for KA are heavily subsidized by the Government of Nepal and are only available in the public (district and zonal) hospitals. Very few diagnostic services but not treatment services for KA are found in the private providers. After introduction of diagnostic tool, rK39, diagnostic services in private sector are difficult to find in the market. There are at least two reasons that make less incentive to the private providers to provide KA care: first, KA is disease of the poor and the poor do not have better capacity to pay for treatment and, second, public hospitals provide these services at free of cost to the people.

#### **1.4 Research context and significance**

KA that is mostly a disease of rural and poor communities remains a major public health problem in Nepal. Like other infectious diseases, incidence of the disease is closely related to community-level as well as household or individual level characteristics. A number of studies have indentified community level factors like socio-economic situation of a geographic area, cultural, environmental and governance factors as important determinants of KA in poor developing societies (Wijeyaratne et al, 194; Alvar et al, 2006; Pattanayak 2001; Sharma et al, 2004). Poverty is considered a root cause as well as an important consequence of KA and this vicious cycle of poverty and disease makes KA one of the most intractable disease in poor communities (Alvar et al, 2006; Adhikari, et al, 2009); but little is known about the causal pathway from household level characteristics and community factors to disease incidence. A strong connection between disease and these factors has long been robustly established (Wijeyaratne et al, 194; Alvar et al, 2006; Pattanayak 2001; Sharma et al, 2004). However, understanding the direction and magnitude of the correlation is more difficult because these evidences were derived from qualitative studies or speculations. These studies have dedicated substantial effort in establishing the link between poverty and infectious diseases (Wijeyaratne et al, 194; Alvar et al, 2006). However, how to break the link between poverty and disease is scarce in the literature.

Poor people are facing several constraints for treatments such as limited access of health care services and information, lack of knowledge and education, and are living particularly in remote and rural area. The treatment seeking behaviour of the people is more complex that can be influenced by several factors such as information, knowledge, obtaining cost of the services, socio economic status, and other psychological factors such as perceptions on disease, attitude about health care providers.

The behaviour of the people after showing the signs and symptoms of KA has major implications for transmission and consequently, for control of the disease. Delays in seeking and obtaining diagnosis and treatment facilitate continued

transmission of the disease and greater probability of experiencing adverse sequelae of the disease and post kala-azar dermal leishmaniasis (PKDL)<sup>5</sup>. PKDL provides reservoir infection. KA has only human reservoir in South Asian countries<sup>6</sup>.

The health care services in developing countries are underutilized and the poor people than the better off are less likely to utilize the services even though the public health services are targeted to them (O' Donnell, 2007; Borah, 2006) because of demand and supply sides barriers (Ensor and Cropper, 2004). The economic factors such as prices and income are important in affecting the utilization of health care services. Total cost<sup>7</sup> of obtaining services includes the price of service, transportation cost, opportunity cost of travel and waiting time, and all these factors together determine the demand for health care. On the other hand, borrowing from formal/informal financial market to cope the out of pocket payment is quite common in developing countries (Adhikari et al, 2009; Van Damme et al., 2004) where alternative health care financings are not available. Bolduc et al. (1996) has demonstrated the effect of opportunity cost of informal savings in the choice of health care provider in rural area of Africa and found that increasing opportunity cost affects utilization negatively. The study seeks to investigate whether borrowing of loans, inter alia, has any impacts on choice of health care providers.

The literature indicates that consumer choice plays a very important role in the selection of health care providers when health services are accessed for the first time after the onset of an episode of illness. The decision making process, however, is complex that requires several steps (Ward et al, 1997; Pokharel, 2004). The consumers may visit more than one health care provider to find the better health care services. The limited choices for health care service leads to greater chances for

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<sup>5</sup> PKDL is cutaneous form of leishmaniasis can occur two year after treatment and recovery from KA (Cheesbrough, 1998). There are no standard guidelines for treatment of PKDL cases (Bhattacharya, 2006).

<sup>6</sup> Other types of leishmanises have both animal and human reservoir (Thakur, 2006). For example, in Brazil, the rural reservoirs for *L. Chagasi* are domestic dogs and wild foxes, and vector in *Lutzomia longipalpis* (Berman, 2006).

<sup>7</sup> Prices of health care services or user fee, in developing countries are almost zero or zero (Xu et al, 2006). However, there are travel cost, waiting time, travel time that play role as price health services.



consecutive visits. The treatment and diagnosis services for KA in Nepal are limited in the public hospitals. There are possibilities of multiple visits to different health providers and they come eventually to consult public health hospitals. Therefore, it is important to analyze decision-making process in several steps (Ward et al, 1997). The economic analysis of several steps of decision-making process is rare in the literature due to the lack of sufficient information. Indeed, the existing literature on demand for health care primarily deals with first consultation of health care providers by utilizing the data of Living Standard Measurement Survey in which information on multiple visits in various health care providers is not available. The study of subsequent decision-making behaviour in economic analysis might be of theoretical interest in model specification.

The prevailing policy of treatment of KA has two side consequences: limited choices and availability of free services for the consumers to the people. Choices (preferences) and constraints (or limits) are two channels for policy interventions. Policy reduces the constraints by abolishing the user fee of health care in public hospitals; however, choice of providers is limited because people have to visit public hospitals to get free services.

### **1.5 Research objectives**

The overall objective of the study is to provide new insights into the social determinants of KA incidence and the decision-making behaviour of the people to seek and to utilize health care of KA care by use of the cross sectional data collected through an integration of qualitative and quantitative methods. The specific objectives are:

- To examine the determining factors of incidence of KA in the community and household levels
- To explore the determinants and road map of decision-making process to seek health care of KA
- To analyze the demand for medical care of KA using first consultation of health care services

- To investigate the factor determining of multiple visits to the health care providers.

### **1.6 Research questions**

Considerable amount of researches in developing countries on determinants of diseases, decision making process to seek health care and utilization pattern of health care services are found in the literature. Determinants of disease patterns are essential to be able to tackle the roots of disease burden and to break the link between poverty and disease. The disease has its roots in the socio-economic, cultural, environmental and governance factors; however, findings from these studies are based on qualitative studies (Wijeyaratne, et al 1994; Pattanayak, 2001; Sharma et al., 2004; Alvar et al, 2006). None of the studies indicates in quantitative terms the potential effects of poverty-alleviation programs on the incidence of KA.

Knowing how consumers decide on the choice of health care providers and how they prefer to use various resources like time, money and efforts, might help policy makers to improve delivery of healthcare services. Similarly, a considerable amount of researches in developing countries has been conducted in the area of utilization of health services (Gertler and van der Gaag; 1990; Mwabu, et al 1993; Bolduc et al, 1996; Dzator and Asafu-Adjaye, 2004; Borah, 2006), few of them; however, there are limited disease- specific researches. Surprisingly, demand analysis based on sequential visits has rarely found in the literature. The demand analysis based on first consultation of health care providers has a number of limitations, for example, it underestimates the cost of health care services and it does not fully capture the health care utilization patterns.

The policy makers can get pieces of information that required for designing disease control policy from various sources; however, these different sources have adopted different frameworks and methods produce different results. The methods and results are sufficiently varied so as to design effective disease control policy is uncertain. The study resolves some sources of this uncertainty through producing

pieces of information within a framework. Therefore, the research questions for this study are as follows.

- a) What are the community characteristics to determine the incidence of KA in Nepal?
- b) What are the household characteristics to determine the incidence of KA in Nepal?
- c) How consumers decide to utilize health care services of KA and what are the factors to determine the decision making process to seek health services?
- d) Do people utilize free health care services of KA at the public hospital; what are price and income elasticities for demand for health care of KA; and what are the possible policy instruments to increase the utilization of public hospital for KA care?
- e) What are the determining factors of multiple visits to find the better health care services for KA?

### **1.7 Organization of the study**

The structure of the study is as follows: the introduction section has described current profile of KA, the motivation for study, objectives and research questions. The second chapter has briefly reviewed the literatures related to health care demand analysis from the methodological perspective. The third chapter discusses the conceptual framework, sources of information, data collection methods, definition of variables and measurements. Specification and econometric modeling are presented in the fourth chapter. The fifth chapter explores the decision making process to seek health care of KA based on qualitative study. The sixth chapter produces the empirical results of determinants of incidence of disease. Demand for medical care of KA is discussed in the seventh chapter. The final chapter concludes the research findings of the study with exploring limitations and possible future researches in this field.

## CHAPTER II

### REVIEW OF THE LITERATURE

In economic analysis, consumer behavior is expressed as a utility maximization problem subject to a given budget constraint. The demand functions are derived by solving the optimization problem. Demand describes the quantity of goods or services per unit of time that an individual purchases and consumes given the set of the prices and income of the consumer. The demand models based on continuous choice or discrete choice are popular in the economic literatures. Continuous choice model is based on neoclassical theory of consumer behavior while the relatively new choice model, discrete choice model is derived from the random utility theory. In the neoclassical theory, the utility is the function of quantities of commodity consumed, but in the discrete choice model, the utility is expressed as a function of attributes of the commodities. In health economics, both models are equally important although discrete choice models are often used because of the nature and availability of health data. Discrete choice depicts where and what kinds of health services to consume while the continuous choice portrays how much of health services to consume.

In the econometric modeling of demand function, the dependent variable usually reflects utilization of health care services. Observed utilization level reflects the point of intersection of demand and supply functions (market equilibrium) and the utilization of health care services reflects satisfied demand or observed demand. Sometimes, it is hard to clearly distinguish between these two functions from the observed data. In this situation, the explicit and implicit assumptions facilitate to estimate the demand function. For example, we use the term, in economics, “other things being equal” that limits the shifting factors, or supply factors, then it is possible to estimate demand functions. Similarly, the assumption of rational behaviour of the consumer reduces or ignores the possibility of supplier-induced demand in medical service utilization.



Utilization of health care services has become a topic of widespread interest among the health economists. The determinants of demand for health care are important for a number of reasons. For example, quantification of these factors is necessary to assess medical care needs of the community and potential impact of utilization on health. Demand analysis can also indicate to the policy makers the role of consumer awareness and knowledge can play in improving the utilization of highly cost-effective health interventions or health services.

The economic models that are most relevant and commonly used in health care demand are the human capital theory and the orthodox utility theory. The first approach used for the analysis of health care demand is the inter-temporal model of utility function where utility depends upon the flow of healthy days from the stock of health and consumption of other commodities. The second approach is similar to orthodox utility theory that considers health as a choice commodity (Jack, 1999).

Grossman (2000; 1972) has developed inter-temporal utility model, which is based on the household production framework. The model, for the first time introduced the concept that consumers do not demand medical care per se, but it is a derived demand generated through the demand for health. Individual demands health for two purposes: consumption and investment purposes. Individual can maximize his utility by generating good health and better health enhances utility or happiness. Health is desired as an investment good since good health enhances earning capacity. Health, thus, is both a consumption and investment good.

According to this model, the stock of health capital depreciates over time and the consumer can produce gross investments by using medical care and their own time as inputs. It is assumed that the efficiency of the production process depends on individuals' stocks of other forms of human capital, especially education. The rate of depreciation of the health stock rises with age. This implies that the stock of health falls with age. The optimal gross investment in health is positive until the last period of life. The marginal product of the stock of health diminishes as the stock increases.

Grossman's demand model has revolutionized the economic analysis of health (Leibowitz, 2004). This model has opened up the possibility of further research in the areas of health economics, for example, allocating time between income and leisure, allocating remaining leisure time on health and non health activities, allocating earned income to health and non health resources, producing health capital for use in future years. The model, however, is not free from criticisms. The questions raised by the researchers are on unrealistic assumptions of the theory. The assumptions that are often criticized are the assumption of perfect information, deterministic nature of the model, and the endogeneity of length of life, among others. Some researchers have raised serious issues on methodologies that are used in estimation of Grossman demand model. For example, Ehrlich and Chuma (1990) have claimed that if health investment functions assume constant returns to scale technology, which is used by Grossman, creates "bang-bang" problem with respect to optimal investment and health maintenance choices. Similarly, Wagstaff, (1993) has argued that the empirical formulation that used by Grossman is inappropriate because it fails to take into account the inherently dynamic character of the health investment process.

Grossman has used a very different theoretical paradigm to describe the determinants of health outcomes (Grossman, 2000). The empirical analysis of demand for health is also complicated because of the fact that theoretical models often involve inherently latent (unobservable) variables, which are often proxied by indicator variables. Many researchers have used the multiple indicators multiple causes (MIMIC) model, which can be estimated as linear structural relationships (LISREL). The researchers face problems of measurement of health related issues, particularly health status of the people among others. The Grossman model of demand for health, thus, has continued to be refined, modified from both the theoretical and empirical prospective. Grossman (2000) has provided a comprehensive review of this model in the theoretical and empirical ground and suggested further research areas of interest. Grossman model is more consistency with longitudinal data. In developing countries, data needed for the estimation of this model are not usually available and as a result, Grossman's models are usually applied in the developed country context.

The second approach, the static concept of demand analysis, however, is derived from Grossman's model and focuses on the estimation of the effects of price and income on utilization of medical services and health care expenditure. This approach supports the conditional utility function that depends on health outcome and consumption of goods and services other than health care, subject to health production function and budget constraint. Many different model specifications have been used in the literature for the estimation of demand for health care. The model specifications are based on: a) price is interacted with income and b) time prices are entered into the utility function rather than the budget constraint (Levin et al, 1998) that leads to two groups of results on demand for health care.

Former group of studies have shown that price elasticities are relatively inelastic as in the case of the studies conducted in Malaysia (Heller, 1982) and the Philippines (Akin et al., 1986; Schwartz et al, 1988). The later group of research studies suggest that changes in price affect quantity of health care demanded as shown by the studies conducted in Pakistan (Alderman and Gertler, 1989), Cote d'Ivoire (Dor and van der Gaag, 1987; Gertler and van der Gaag, 1991), and Kenya (Mwabu, 1986). The later concept of demand for health care that explore the effects of access prices of health care is popular in developing countries because the policies of developing countries concentrate on how to improve the access to health care services to the population.

Discrete choice models are typically used to obtain estimates of price elasticities of demand for health care. The left-hand side dependent variable is often measured as the incidence of use of various kinds of health facilities (for example, self care, private facility, public facility, traditional healer), though some studies utilizes continuous variable as intensity of consumption of health service to measure demand for health care.

The discrete choice theory is derived from the random utility model (RUM) that expresses the rational utility theory of the consumer and a lack of information regarding the characteristics of individual or alternatives on the part of the researchers

(Train, 2003). The researcher only observes that part of the utility that makes up from the alternatives. The alternatives are mutually exclusive, finite and exhaustive in the discrete choice model.

The indirect utility function is decomposed into two functions: one depends on observable factors and the other captures the effect of unobserved characteristics. This can be represented by the following equation<sup>8</sup>:

$$U_i = V_i + \varepsilon_i$$
 Where,  $i$  = alternatives,  $V_i$  is a systemic component of utility and  $\varepsilon_i$  is a stochastic component of utility.

A decision maker faces a choice among  $i$  alternatives.  $U_i$  is the true but unobservable (latent) utility for alternative  $i$ ,  $V_i$  is the observable systematic component of utility, and  $\varepsilon_i$  is the factor unobservable to the researcher. There are some aspects of utility that the researcher does not or cannot observe, therefore, representative utility is not equal to true utility,  $U_i \neq V_i$ .  $\varepsilon_i$  captures the factors that affect utility but are not included in  $V_i$ . Assuming that the individual can choose between two alternatives,  $i$  and  $j$ , then the probability that alternative  $i$  is chosen is given by

$$\pi_i = \text{prob}(U_i > U_j) = \text{prob}(V_i + \varepsilon_i > V_j + \varepsilon_j) = \text{prob}(V_i - V_j > \varepsilon_j - \varepsilon_i),$$

For all,  $i \neq j$

From this, it can be seen that the higher difference in the probability for choosing an alternative, the larger the difference in observed utility. Hence, observed choice is determined by the difference in utility not the level of utility per se. Due to this reason, in the process of estimation of demand for health care, one alternative should be normalized. Most of the studies have used self-care as a base category whose prices are almost zero in most cases.

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<sup>8</sup> Similar equation can be used in the neoclassical model however there is different in meaning of  $\varepsilon_i$ . In neoclassical theory,  $\varepsilon_i$  represents measurement error, misspecification, left out variables etc but not the utility (Varian, 1992).



Health sector data have special features like discrete nature of the data, problems of censoring, integer counts or time duration and several factors complicate attempts to obtain unbiased estimates of the impact of variables that influence demand for health care. The health care data provide wider applications of econometrics models that are binary logit/probit, multinomial logit/probit, nested logit, ordered logit, mixed logit, Tobit, negative binomial, finite mixture, among others. These models have some advantages in presenting and analyzing the choice behaviour; however, they have some limitations as well. Subsequently, the researchers are continuously interested to find and to apply appropriate models to describe the choice behaviour of the decision makers.

Scott, et al(1996) conducted a research to explore the associations between outcome variables and the consumer's characteristics using three set of binary choice: decision to follow up; to prescribe; and to perform or to order a diagnostic test utilizing national health survey data 1989/90 of Australia. Yip, et.al (1998) estimated the utilization of health care using multinomial logit model to estimate the factors that influenced consumers choice of medical provider in the three tiered health care system in rural china. Gertler and van der Gaag (1990) and Mwabu et al (1993), a few of them, have investigated impact of user fee in choice of health care services using nested logit and multinomial logit models.

Cameron and Trivedi (1988) have developed a count data model to analyze the choices of insurance plans and health care providers using household survey data of Australia. Dow (1995) has compared the specification of the models: parsimonious non-linear, linear and flexible using Cote d'Ivoire health care data and found that results are sensitive to choices of model specification and flexible model was considered more appropriate to get robust estimation of health care demand. Similarly, Bolduc et al. (1996) has estimated demand for health care using three different models: multinomial logit, independent multinomial probit and multinomial probit using data from rural villages of Africa. They have found similar result as suggested by Dow (1995) about the impact of model specification on results and questioned previous results of using multinomial logit specifications. Kenkel (1990)

has applied ordered logit model in categorical measures of health related information of US national health interview survey to estimate the effect of socioeconomic variables to health information and demand for health care. Recently, Borah (2006) has applied a very sophisticated and more powerful model, mixed logit model, on health care data collected in India.

Specification of the behavioural model and estimation of the parameters of the model that are interrelated tasks in discrete choice model are challenging for the researchers. The discrete choice models that are based on probability of events are relatively less informative to the researchers. Researchers are facing the problems how to take full advantages of information available from estimated results and to present the reader friendly manner. For this purpose, the researchers need to know at least the capabilities and limitations of the choice models.

Logit (binary as well as multinomial) and nested logit are derived under the assumptions that the error terms are independent and identically distributed (iid) and extreme value distributed. The probit model (binary as well as multinomial), on the other hand, is derived under the assumption that the unobservable part of utility is normally distributed (Train, 2003). The multinomial logit (MNL) model has a special property as it assumes independence of irrelevant alternatives (IIA)<sup>9</sup>. The cross elasticities are same for all alternatives due to IIA assumptions. MNL, therefore, is not useful to estimate cross elasticity among the alternatives.

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<sup>9</sup> The IIA assumption is identical to the assumption of *independent and identically distributed* (iid) random components of each alternative. There are three properties of IIA viz: a) probabilities range from zero to one b) sum to one over alternatives and c) S- shaped function of representative utility. Unobserved factors uncorrelated over alternatives and same variance for all alternatives, known as IIA. This implies that the ratio of the probabilities of choosing one alternative over another is unaffected by the presence or absence of any additional alternatives in the choice set. The ratio of the choice probabilities for two alternatives j and k does not depend on any alternatives other than j and k. Since the ratio is independent from alternatives other than j and k, it is said to be independent from irrelevant alternatives.

The nested logit (NL) model is a generalization of the MNL model that allows for a particular pattern of correlation in unobserved utility (i.e. differences in cross-elasticities of substitution across alternatives). An NL model is appropriate when the set of alternatives faced by a decision maker can be partitioned into subsets, called nests. Theoretically, the multinomial probit model does not impose IIA and is attractive; however, it has some practical limitations. The practical complexity not only makes it difficult to obtain the partial effects on the response probabilities, but also makes maximum likelihood infeasible for more than about five alternatives (Wooldridge, 2002).

Ordered logit model uses categorical variable where respondents are asked to report a particular category and where there is a natural ordering such as excellent health, good health, fair or poor health . It seems reasonable to assume that excellent health is better than good, which is better than fair, which is better than poor, for everyone in the population. An econometric model that can be used to deal with ordered categorical variables is the ordered probit model.

Mixed logit is based on the assumption that the unobserved portion of utility consists of a part that follows any distribution specified by the researcher plus a part that is iid extreme value. With probit and mixed logit, the integral does not have a closed form and is evaluated numerically through simulation. All studies have demonstrated that prices of health services do affect the demand for health care; however, the size of the impacts may differ with model specifications and the nature of data.

Discrete choice modeling is used to explain the likelihood of using different kinds of services and whether or not to consume certain types of care. This approach can not describe the intensity of consumption of the services. Continuous choice model can analyze the intensity of consumption and can predict the quantities of health care services consumed. Health care expenditure is a measure of intensity of consumption of the services. The analysis of determinants of health expenditure can be used to derive the optimal amount of health expenditure for a society (Matteo,

2003) and can identify the factors affecting the health care expenditure. The health care expenditure model can be applied to both micro and macro-level data; however, this review focuses on the studies based on micro-level data. The studies on determinants of health expenditure are limited in developing countries due to the fact that required data are not available and modeling of the health care demand is not straight forward (Rous and Hotchkiss, 2003). Two major problems arise when attempts to analyze demand by using health care expenditure data: health expenditure data are highly skewed violating the assumption of normal distribution of the dependent variable and have presence of a large number of zero expenditures making it impossible to apply the ordinary least squared (OLS) methods (Chaze, 2005).

The literatures on health care expenditure have demonstrated that most of the studies used parametric techniques to estimate the elasticities of income and prices (Matteo, 2003). The parametric technique assumes a functional form, normal distribution and linear relationships, however, true shape of the functional form is unknown and it is highly sensitive to the choice of the functional form. The OLS method is highly sensitive to outlier values of expenditures. Sometimes the researchers have applied weighted least squares or generalized linear model, to get rid of these problems but this does not able to solve all problems that arises from nature of health expenditure data. The log linear specifications are used to minimize these problems in estimations of demand functions, as well. Researchers use log for dependent variable (log linear) to avoid the normality problems however, this technique cannot rule out but reduces the problems (Wooldridge, 1992). The log linear form, applying natural log of both dependent and independent, facilitates the estimation of elasticities. However, from theoretical prospective, both linear and log linear specifications are inconsistent with budget constraint (Hunt-McCool, et al 1994; Deaton and Muellbauer, 1980).<sup>10</sup>

Under such circumstances, relatively advanced methods, such as non-parametric and maximum likelihood techniques are used to solve these problems.

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<sup>10</sup> In this case, sum of all price and income elasticities are equal to one. We can't get the information from the estimated elasticities on luxurious goods or necessity goods or inferior goods.



Non-parametric technique is quite flexible that reduce the distribution assumptions. The techniques assume that there are non-linear relationships between health care expenditures and other economic variables, such as income. This technique is also called distribution free method that is useful to deal with both inadequacies of functional form and data with respect to outliers. These methods are consistence with budget constraint and consumer behaviour as well. Deaton and Muellbauer, (1980) have developed an ideal demand system that is derived from dual of utility maximization. They derived the expenditure function, which is inverted of the indirect utility function. The dependent variable of this demand function is log of share of particular expenditure on goods or medical services to total expenditure<sup>11</sup>. Hunt-McCool, et al (1994) has estimated demand for inpatient services and out patient services using this concept.

There are also estimators known as semi-parametric, which make some distributional assumptions, but fewer than the parametric estimators. Quantile regression, semi-parametric based method, assumes a parametric specification for the  $q$ th quantile of the conditional distribution (Jones, 2000). Heteroskedaticity problem can be dealt with by estimating quantile regressions<sup>12</sup> (Deaton, 1997). The quantile regression estimator is popular now because it provides more efficient estimation than the least square models do (Yu and Satander, 2003). Quantile regression explores the information about the distribution of the dependent variable rather than the conditional mean<sup>13</sup>. Manning et al. (1995) has applied quantile regression to estimate the demand for alcohol.

Non-linearity can arise many ways. For examples, nature of the data, truncated and censored, causes nonlinear. Maximum likelihood estimators has been continued to use as an alternative method for non-linear estimator (Cameron and Trivedi, 2005).

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<sup>11</sup> This particular case gives the sum of the shares of different commodities equal to one.

<sup>12</sup> If the quantile regression lines are not parallel, this informs heteroskedaticity.

<sup>13</sup> As we know that there are two alternative methods in econometrics to analyze the data in dependent variable ( $y$ ) and given  $x$  (independent variables): conditional expectation or mean,  $E(y/x)$  or conditional median,  $M(y/x)$ . Conditional mean is conventionally popular than conditional median (Wooldridge, 1992).

The generalized flexible Box-Cox transformation model, which is based on maximum likelihood estimates, uses nonlinear transformations of the dependent and the explanatory variables of an OLS regression model. The Box-Cox device is also appropriate for a model with no a priori functional form has been utilized widely in econometric modeling. The researchers have claimed that the Box-Cox transformation method is appropriate for hedonic relationships as well. Hedonic expenditure relationship approaches are also applied in health care expenditure modeling, such as (Goldman, and Grossman, 1978; Levy and Quigley, 1993). The Box-Cox technique (1964) has been used in strictly positive continuous value order to achieve normality. The method does not use the nonlinear transformation of dummy variables. It has some features that can solve the problems of robust estimation as well as hedonic pricing. This device, however, has some limitations, for example, this yields transformation bias (Kanamori and Takeuchi, 2006).

There are several approaches of modeling limited dependent variable like the two-part model, the Tobit model, the sample selection model, hurdle models and finite mixtures models. Two-part model comprises binary logit/probit model and OLS model. Binary logit/probit models have been applied for understanding whether individuals make any health care expenditures and OLS has been used only on the sub-sample with non-zero expenditures (log of expenditure). However, there is possibility of sample selection bias if there are many zeros (Chaze, 2005). The Tobin model assumes that the individuals choose the levels of health expenditure to maximize their welfare. Zero expenditure represents a corner solution where preferences for health care are so low that the individual is better-off spending nothing on health care. This model in some cases may not be feasible (Chaze, 2005). Sample selection model or generalized Tobin or hurdle models are primarily based on normality assumptions and maximum likelihood estimation. The assumptions may not be always realistic and may lead to biased results (Chaze, 2005).

On the other hand, for the empirical analysis of demand for health care, self-reported illness and first consultation with health care providers are used as the primary variables, although questions have been raised about the reliability and

validity of these variables. Self-reported illness may produce biased results as the perception of illness may be different for poor and non-poor individuals and perception about a disease affects the choice of health care services and providers (Akin, et al, 1998). Akin et al (1998) have nicely described the possible bias in the estimation of health care demand and suggested solving this problem by controlling for bias in sample selection. They used symptoms of the diseases in order to determine ill respondents.

Another potential problem in the estimation of demand is that the consumers may consult more than one provider for treatment for the same episode (Gertler et al, 2000); therefore, analysis based on the first visit to health care provider does not capture the complex decision-making behaviour of the people. The demand analysis with multilevel approach could be extremely useful in this situation (Jack, 1999). The reviews reach to the conclusions that the debates on theories as well as empirical estimations of demand for health care are continuing, consequently, the various arguments encourage the researchers to experiment and develop new, more-appropriate approaches for the estimation of health care demand.

## CHAPTER III

### RESEARCH METHODOLOGY

#### **3.1 Conceptual framework**

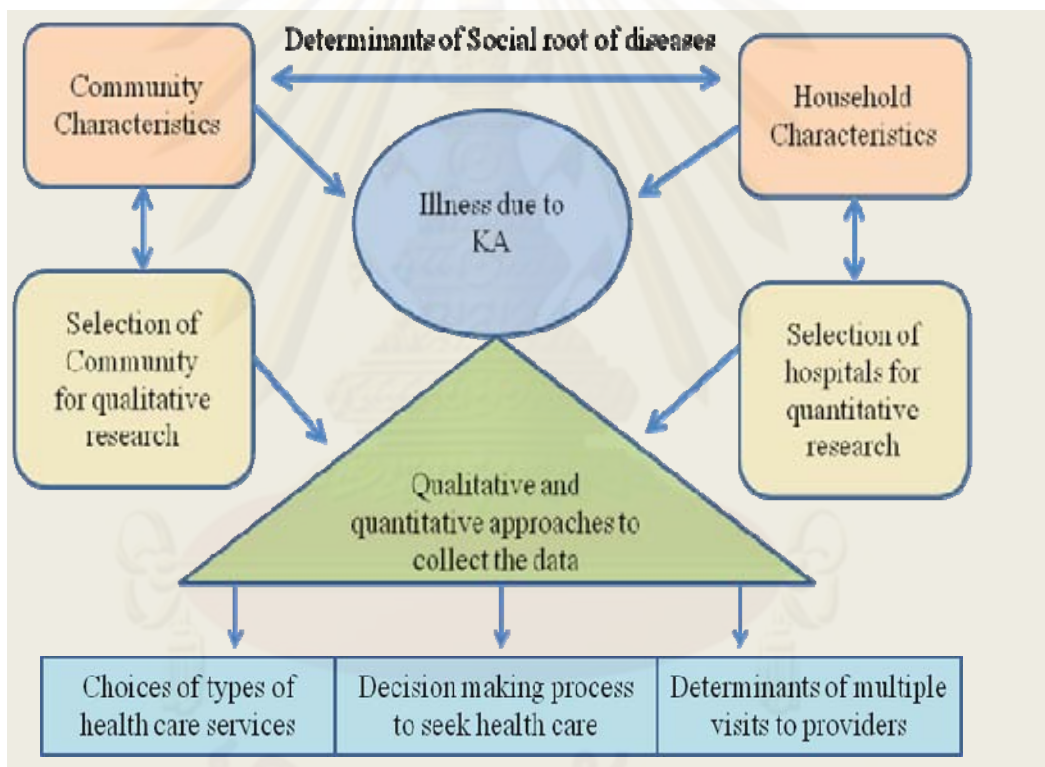
Health status of the people is primarily influenced by the behavioural decisions of the individuals or family, housing condition, occupation, health environmental factors, besides genetically inherited health endowments. Thus, illness may not be a random event and it may be systematically related to the individual, household and community-level factors. The study is related to specific tropical disease, KA that is determined by the complex interaction between environmental and socioeconomic factors, for example, geographical isolation, remoteness, environmental and climatic condition, poverty, access to health services, infrastructure development, population density, education, social networks and institutions and individual and household characteristics.

In the event of an illness, a majority of individuals seek some type of treatment. The consultation of health care services, such as public, private, self-treatment and no treatment depends upon the type of illness, access to service provider, time and money prices of health services, economic status of the individual/household, among others. It might be insightful to examine the decision-making behaviour of the health care consumer in the process of choice of health care providers. The decision-making behaviour to seek treatment, however, is a dynamic process that may have several steps. There might be at least three possible cases: what type of services people choose to seek health care; whether they do sequential consultation for health care or not; and what are the factors to determine the decision making process to seek health care. The primary issue is how to capture all issues related to determinants of illness and treatment seeking behavior of the people in the research study. Quantitative approach that is popular in economics may not be sufficient to capture the interactions, attitudes, beliefs, events and behavior of people.



The integration of qualitative and quantitative methods might have the capacity to capture the nature and dynamic aspect of the society and improves the quality of research through triangulation process (Scrimshaw 1990; Gill 1997; Jick, 1979). Triangulation is an iteration process of finding results; and does help to better understand the structure of economic relations that is fundamental to understanding the nature of the society. The conceptual framework of proposed study is illustrated in the following figures.

Figure 3.1 Conceptual Framework: determinants of illness and demand for KA Care



The conceptual framework gives the full range of information from determinants of illness/disease to decision making behavior to seek health care and utilization of health care services. Both community level and individual and household level characteristics are used to identify social root of burden of disease. Economic variables, individual, household, and socio-demographic characteristics determine different levels of demand for health care. Discrete choice models are used

to identify the factors affecting decision-making behaviour of the people. A qualitative study explores the decision making process to seek health care.

### **3.2 Research design**

The study used descriptive, explanatory and causal comparative econometric design. Cross sectional data were collected from primary as well as secondary sources. The study primarily has focused on two fold issues: determinants of burden of disease and health seeking behavior, which are two sides of a coin. Convenience and random sampling methods are used to collect the data from the field survey in the KA endemic districts of Nepal. Methodological triangulation was employed in the data collection, analysis and interpretation in order to improve quality of research. Varieties of analytical tools, simple descriptive qualitative tool to sophisticated econometric tools, are applied for data analysis. The communities, household and individual are unit of analysis in this study.

Secondary sources of data collection were basically the documents and reports published by the Central Bureau of statistics (CBS), Ministry of Health and Population (MOHP), External Development Partners (EDPs) and other published and unpublished literatures. Information on community level characteristics was obtained for 204 KA endemic areas (*ilaka*) for 12 districts. The community level variables include the number of KA cases in the area, population at risk, incidence, intensity and severity of poverty, population density, per capita government expenditure, health facilities in the area, coverage of clean drinking water supply, sanitation facilities, infrastructural characteristics, etc.

We used both qualitative and quantitative methods to collect the data from primary sources. The purpose of mixing of qualitative and quantitative study design is to produce valid and reliable social data and can be used to inform the key impact evaluation questions, survey the questionnaire or the stratification of the quantitative sample, and analyze the social and economic context. The qualitative methods were

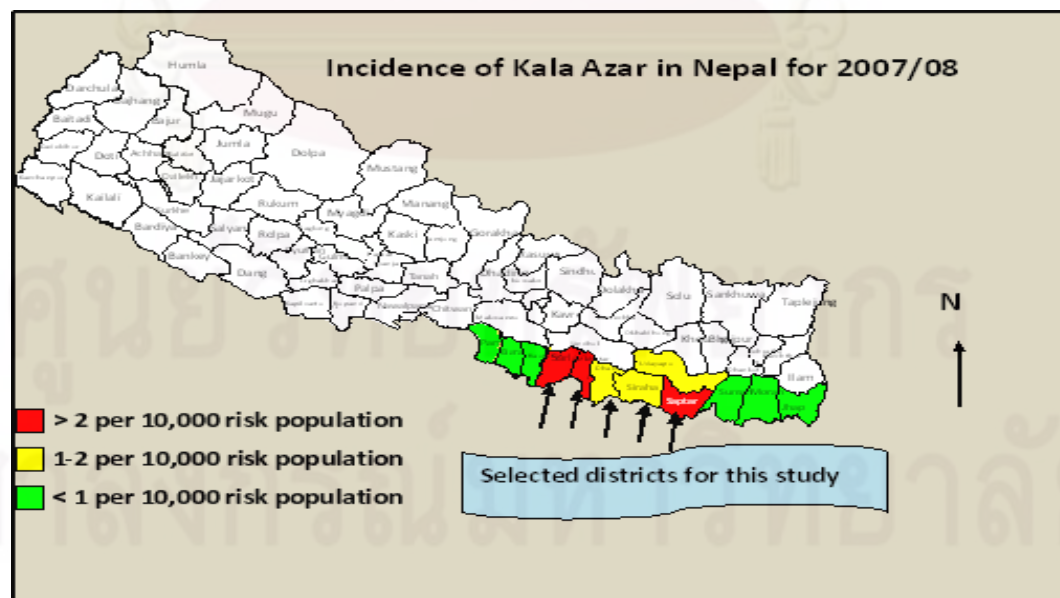
used to better understanding the decision making behavior and to complement the quantitative analysis conducted afterwards.

### 3.3 Study setting

KA has confined to 12 districts of Nepal namely: Jhapa, Morang, Sunsari, Saptari, Siraha, Udayapur, Dhanusha, Mahottari, Sarlahi, Rautahat, Bara, and Parsa. All districts lie in the Terai (plain area) region of Nepal<sup>14</sup> and border with India. The districts are situated in the tropical climatic zone at a low altitude, a few hundred feet above sea level. Open border and trade liberalization in Nepal and India have increased the flows of goods and services, and movement across the border or migration of labour forces. These activities increase the exposure of KA.

Five districts were purposively chosen for the study (see in the Map). These districts, Siraha, Saptari, Dhanusha, Mahottari and Sarlahi show the highest KA incidence among all 12 KA endemic districts of Nepal according to the latest statistics on KA. In these five districts, there are six public hospitals providing diagnosis and treatment services to KA consumers. Both quantitative and qualitative methods were limited in these districts to collect the data.

Figure 3.2 Selection of districts for field survey



<sup>14</sup> The ecological belt of Nepal includes Mountain, Hills and Terai.

### **3.4 Sample size and data collection**

#### **3.4.1 Qualitative methods**

Information was gathered through focus group discussion (FGD) and in-depth interviews. The discussion, designed to reveal beliefs, opinions and motives, took place in an informal setting. In-depth interviews using semi structured template was designed to better understand the attitudes, beliefs and knowledge of the population in KA endemic areas of Nepal. Open-ended questions were asked to illicit information related to general knowledge about KA, health seeking behaviour, choice of services, factors affecting the decision to utilize or not to utilize KA services, attitudes, beliefs, risk, health care cost, among others. Primary target group for discussions and information gathering of the study was the individuals with KA or caregivers of KA consumers. We will use the term “KA group” to refer to this group of individuals in the community.

Multistage convenience sampling approach was used to select the communities and the participants. Eight communities with high KA incidence rates were chosen for the purpose of this study. Social mapping, an activity to locate KA experienced households in relation to other households, was used at each of the research sites to identify the highest KA incidence neighbourhoods. Then 8 to 12 participants, male and female but not always in equal numbers, were selected for conducting the FGDs and then 2 or 3 participants were purposely selected from each group for in-depth interviews. The choice of individuals for in-depth interviews was guided by the ability of the persons to provide additional information on the disease, decision-making process of consumer’s families and/or community leaders or representatives. Research methods included the use of participatory analysis tools and FGD with the KA group. A total of 101 people were consulted for the qualitative study. No incentives were offered for participation in the study.

A research team consisted of three individuals, two men and a woman, an economist, a sociologist and a medical person from a health institution. All were trained in their own disciplines and had prior field level research experiences.



Training sessions were conducted with specific goals, structures, time-frames, and procedures of the study. Among the three researchers, one was trained to be the moderator and other two were trained as transcribers. Standard guidelines, as proposed by Stewart and Shatmdasani (1990) and Ritchie and Lewis (2003), were followed during the data collection process. The team spent two days in each community. The research team explained the purpose of the study to the formal leaders of the communities and then to the KA group members. The team members ensured an open and friendly environment to encourage the participants to express their opinions without any hesitation. FGDs were conducted in a nondirective manner; however, discussions were used as a source of new and fresh ideas to develop new hypotheses. The FGDs, thus, probed in-depth specific aspects on how people allocate their resources, how they decide about healthcare seeking and types of services to use, etc. Before conducting the FGDs and the in-depth interviews, some background information on the selected communities was obtained from primary and secondary sources. In some group meetings, the participants were requested to do an exercise to obtain few quantitative parameters like proportion of people poor in the community, proportion of KA consumers using different types of medical care services, etc., through a process of consultation and consensus.

Methodological triangulation was employed to improve the accuracy of the information obtained. This is done through the use of various approaches, such as team composition, secondary information, discussion with participants with different perspectives, etc. FGD and in-depth interview with same participants were conducted in order to increase convergent validity. Debriefing was conducted immediately after the FGD while the team was still in the field so that the team can evaluate the quality of the session conducted. This also allowed the team to improve their skills and to cross-check the responses. We used causal-impact analysis, or flow diagrams, to show the links between different underlying factors of health seeking decision and the flow of events.

Coding of focus group interviews, ethnographic field notes, information collected from in-depth interviews and other relevant documents were used for analysis of emerging themes and presentation of data in the form of narratives. Data analysis was an iterative process, whereby themes were continuously generated, revised and re-examined.

### **3.4.2 Quantitative methods**

Data on self reported incidence of illness and health status are subject to significant errors in reporting or systematic bias (Lindeboom et al 2004; Hernandez-Quevedo et al 2005; Groot et al, 2000; Oswald et al 2008). Health care costs are also often reported with relatively high recall bias (Attanayake et al 2000; Adhikari et al, 2009). To minimize these problems, we have decided to collect data from all KA consumers showing up in the district hospitals. In Nepal, more than 80% of KA consumers seek care from district hospitals at some point of the disease stage. Therefore, collecting information from hospital based consumers would have relatively low selection bias, if any. The advantage of this type of survey is that there is no uncertainty or recall bias about the disease; only the consumers who tested positive for KA in the hospital were interviewed.

For this study, data were collected from clinically confirmed KA consumers seeking care from these six hospitals. A comparable set of non-KA consumers seeking care from these hospitals were also selected for interview to explore how individual and household characteristics differ between KA and non-KA consumers.

A systematic approach was used to select the respondents for the survey. Consumers who sought care for any reason from outpatient facilities of the hospitals during the period October 2008 to December 2008 was defined as the sampling frame. The consumers in the outpatient clinics can be subdivided into two groups: consumers with KA and consumers seeking care for medical conditions other than KA. When a KA case is clinically confirmed in the hospital, the consumer is immediately admitted. Thus, KA consumers were primarily the hospitalized consumers. When a KA case was clinically confirmed, the field researchers contacted the consumer immediately to

start collecting data on the disease, its progression, and the history of healthcare service use. Attempts were made to collect information on all KA consumers seeking care from these six hospitals during the data collection period but some of the consumers refused to participate in the study or could not provide the basic KA related information. During the three months of data collection, the study successfully collected information from 367 KA subjects out of 379 KA cases seeking care. Note that the survey collected information from more than 25 percent of total KA cases in the country for the year 2007-8 (1371 cases were reported for 2007/2008 by Ministry of Health and Population (MOHP, 2009).

The study also collected data from non-KA consumers seeking medical care at the facilities. All non-KA consumers who exited the outpatient facilities in between 10 to 11:00 AM each morning were interviewed. Total number of non-KA consumers interviewed over the study period was 353.

The ethical clearance for this study was obtained from WHO/TDR, Geneva and Nepal Health Research Council, Kathmandu, Nepal. The researcher began interview with a general introduction and greeting process to build rapport and promote a relaxed and informal atmosphere. Then researcher read thoroughly consent form and consent certificate and requested to the participants to provide consent for survey, if they agreed, survey procedure had proceed, if they did not agree to provide consent for survey, we dropped the procedure.

The quantitative data were collected using a structured questionnaire which included questions on various factors affecting demand for care and choice of providers. The questionnaire asked consumers about the origin and progression of illness, visits to providers, cost of care, transportation cost, opportunity cost, knowledge about KA and KA treatment, income of the household, whether borrowed money to pay for healthcare costs, various socio-demographic characteristics of the consumer and the household. To ensure quality of data collected, rigorous mechanism

were in place at all stages of the survey and data collection. Questionnaires<sup>15</sup> were designed in a way so that all the questions are in a logical order, easy to understand and phrased in local language.

### 3.4.3 Inclusion and exclusion criteria

Following inclusion and exclusion criteria have been adopted to select the research participant in different strategies of data collection in the field.

- The consumers who had KA declared by the hospital were KA service consumers. All KA service consumers admitted to the hospitals during field study period were included as research participants.
- The remaining consumers who consulted to hospitals for receiving treatment were non-KA consumers. All non-KA consumers who visited to the hospitals during the field study time were included as research participants.
- The individuals who lived in selected KA risk communities with similar characteristics were included as research participants for FGD.
- In the selected KA risk community, the individuals who had experiences of KA were included as research participants for in-depth analysis.
- The participants who gave the sign in the consent form were included as study participants.
- Among the non-KA consumers, who visited to the hospitals due to the cause of accident and pregnant were excluded from the research participants because first is not a disease and later is a natural phenomenon.
- In the selected KA risk community, all individuals with similar characteristics other than selected research participants (8 to 12 persons) through convenience sampling procedures for FGD and in-depth interview were excluded as research participants in this study.
- The individual who did not give the sign in the consent form and the required information were excluded as research participants.

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<sup>15</sup> Questionnaires are given in the appendix.

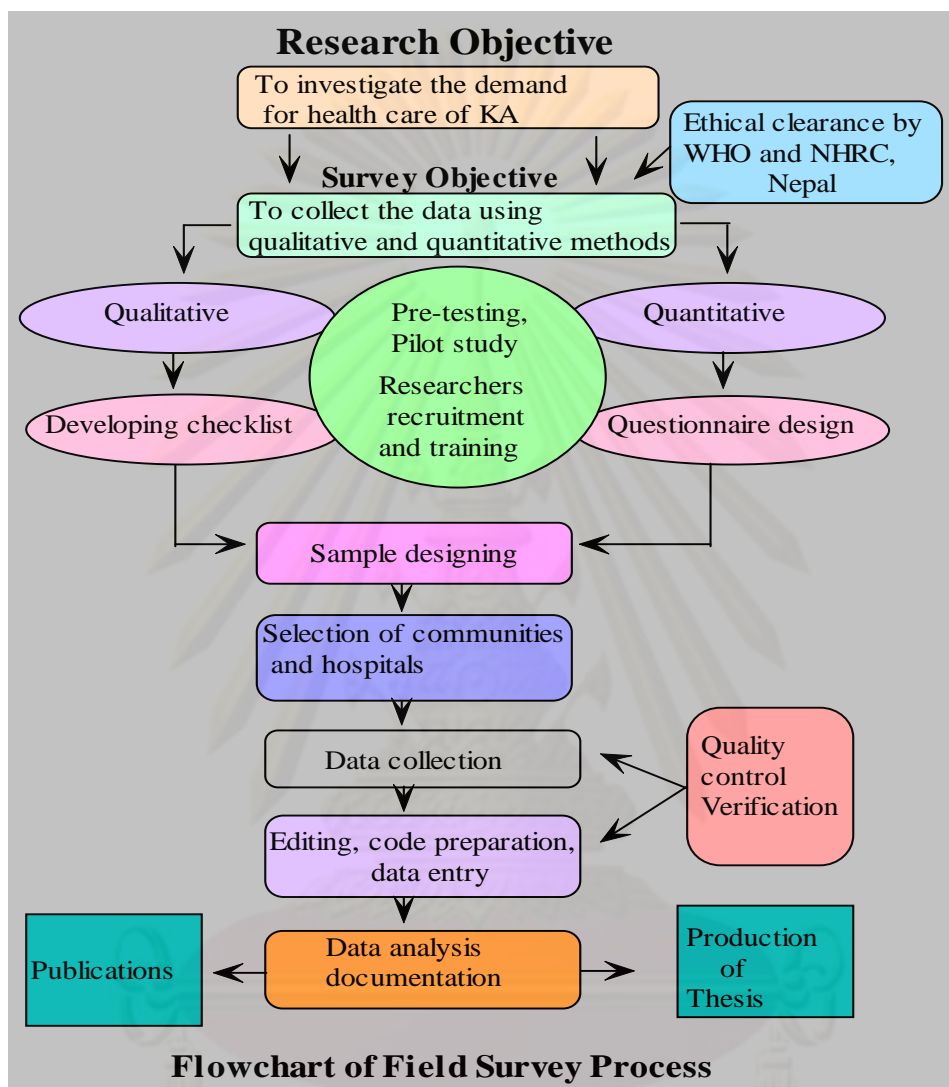


### 3.5 Data quality and data management

Top priority has been given to maintaining the quality of work in each stage of research study. Questionnaires were in a logical order, easy to understand and local language and finalized after pre-testing in the field (general procedure is given in the following flow chart). Self reported health and recall period can also affect the quality of data. Mentioned earlier, we have collected data from the hospital to avoid the possible biases.

Recall period is most important for gathering information because length of the recall period affects the quality of data. We collected data in the hospital and developed a roster to minimize recall bias as far as possible. The activities related to attribution of quality of research have been conducted such as no missing data, internal consistency, among others. Data processing was conducted during data collection period to ensure the data free from inconsistency and incompleteness. Survey data were double checked and coded on daily basis before and after being entered on the computer. Data were entered into the Census and Survey Processing System (CSPro.3 program) with controlling mechanism developed to prevent entering errors. The frequencies of each variable and cross tab with related variables were used to manage the data and prevent entering errors as well as to validate the data entry. A copy of data was stored on a CD that was kept in a locked drawer of the investigator's office. Statistical Package for the Social Sciences (SPSS Inc., Chicago) SPSS Version 11.5 was primarily used for data management and Statistics / data analysis (Stata Corp., Texas) STATA version 10.1 was used for data analysis.

Figure 3.3 Flow chart of field survey



### 3.6 Definition of variables and measurements

**Health care providers:** Health care providers are categorized into five groups as dependent variables for the choice of providers: self-care, public clinic, public hospitals, private clinic/hospitals and drug stores. Self care is the practice of activities that individuals initiate and perform on their own behalf in maintaining health and make decisions about their health. Self-care includes home care used home-made traditional medicine, consulting with traditional healer. Public clinic providers are sub-health posts; health posts; primary health care centers. Private clinic/ hospital

providers include clinic services providers and private hospitals and nursing homes. Drug store or suppliers and quacks are included as drug store service provider. Public hospital providers are district and zonal hospitals.

**Multiple visits to the providers or provider shopping:** provider shopping or multiple visits means the use of a second provider without referral from the first for a single episode of illness (Savigny et al, 2004; Aikins, 2005). This is a pathway of visit to service providers to find better care. The demand analysis based on first consultation of health care providers underestimates the cost of health care and does not capture path of decision making process. The number of visits to the various providers gives count of visits that is defined as provider shopping. We found more than five category of provider shopping (number of visits); however, we used five visits only.

**Health care costs:** The health care expenditures include the sum of the total medical cost paid to all consulted health care providers in course of treatment, travel costs, monetary value of travel, waiting time, inpatients' days and all inpatient and out patient costs. All cost components were collected through administrating the questionnaire to the participants. The methodology of valuation of time cost is discussed in later sections. The total cost can be categorized into inpatient and out patients cost. Inpatient costs are included the cost of treatment and diagnosis and other associated cost while the consumer hospitalized in standard care services. The total cost that is net from the inpatient cost is called out patient cost.

**Household Income:** Income is a variable that has a critical importance in the household decision making behaviour. Household income sources can be broadly categorized into two groups: factor income and non-factor income (Mckay, 2000). Factor income includes payment received by the household or household members who supply the factors of production, such as labour, land and capital. Non-factor income is defined as net transfers received from source outside the household that do not need to be repaid, such as government subsidy. A number of studies on demand for health care used income as proxied by expenditure and consumption, such as

Dzator and Asafu-Adjaye (2004), Gertler, and van der Gaag (1990), a few of them. Debates on using income or consumption data have been continuing in developing countries because both types of data have some advantages and disadvantages.

Household consumption can be measured more accurately than household income (Deaton, 1997) because consumption is more stable than the income and exact income data is difficult to obtain in rural HH production activities. Consumption or expenditure data collected from the interview survey remains subject to considerable strategic and recall bias (Russell, 2004). On the other hand, income data have own importance as well. Income is the means of financing for consumption. Income can be treated as an input and consumption is output. Consumption gives utility to the consumer, which is useful for welfare measurement. Again, if the households are facing major reduction in incomes, they sell household's assets, such as livestock. This leads to reduction of future income streams. Sources of income of HH may be useful in studying the relationships between sources of income poverty, however household consumption data do not provide such information. The household income is more useful to study poverty dynamics (McKay, 2000) because poverty index based on income data generally lower than based on household consumption data, for example, Nepal (Maltsoğlu and Taniguchi, 2004). Income data may, hence, be more meaningful for estimation of variation of income within or between the socioeconomic groups. This study seeks to know the possible effect of household loans for treatment seeking behaviour, due to this reason; income is particular importance for this study. Household income has at least two roles: to represent the output of household activities and to server the role as an input for health production, education production, child health production, among others. We, therefore, prefer to collect the income data through using accounting framework similar to LSMS rather than the consumption data.

The information on total incomes of the HHs has been collected through incorporation of source-wise data with a one-year income cycle starting or past 12 months. Both regular and irregular incomes, as well as cash and non-cash income, are included in total income. Food items and other goods produced for self-consumption are valued at prevailing market price. First, we investigated the major income



variation factors in rural area from the focus group discussion in community. We gave emphasis to these factors during the survey period. Again, we developed additional probes or alternate question sequences for income sources for which there is notable misreporting (non-reporting, underreporting, and over-reporting) such as wages, self-employment income. We followed the procedures similar to Attanayake, et al. (2000) during the interview time, that the researchers, informally, move on to more detailed discussions about agriculture, harvesting, livestock, outside work during the off time of agriculture work, individual occupation of HH member and other possible sources of income that help to receive more accurate information on HH income.

Income variable can be used as dummy variables as used by Yip and Liu (1998); Hanson, et al (2004), and as a step function such as poor non-poor category similar to Morey, et al (2003) in discrete choice model, although we purpose quadratic form of income in the model as suggested by Gertler and van der Gaag(1990). It is assumed that health is a normal good; hence, income has positive effects on the demand for health care.

**Prices of health care services:** Prices of health care include transportation cost, travel time, waiting time to see the health providers, unofficial charge such as tips and bribes. The transportation costs, associated medical cost, unofficial charges are in monetary unit; and travel time and waiting time in non-monetary term are and considered as time price. Time price is widely accepted to value in health economics, such as in cost effectiveness analysis, cost benefit analysis and choice of health care providers. There are two valuation techniques for lost of time of the household member (Kooreman and Wunderink, 1996, Goldschmidt-Clermont, 1982). The debates found in literature on valuation methods for time particularly time used for household production, volunteer time and leisure time (Drummomd, et al, 2005; Kooreman and Wunderink, 1996). Similar to other studies, such as Asenso-Okyere, and Dzator (1997) Attanayake, at al (2000); Chima, et al (2003), we used both methods: the proxy good method, also called the market cost method or replacement cost method and the opportunity cost method to give monetary value of time used. Former is output method and later concerns with input method. We apply the methods

for valuation of time used by consumers and caretakers who are economically active people.

Table 3.1: Time valuation methods

Consumers (economically active)	Methods	Tools
Fixed income group, service holder, labour	Opportunity cost method	$Value(T) = t_i w_i$ t= used time, w= market wage rate i=individual
Unemployed person/ job seekers (In agriculture economy, disguised unemployment seems quite high but unemployment is rarely found through out the year.)	Imputation of the actual wage of similar individuals such as those of same gender, education and age	Similar formula as used above. (we assumed that unemployment and job seeking are for short period in the agriculture economy)
Housewife	Replacement cost method used (contribution of housewife in the household production is valued through asking how much you have to pay for same work done by a housewife when you have hired a person from another house.)	$Value(T) = t_i O_i$ t= used time, O= replacement cost (this cost has been collected through questionnaire) i=individual
Students and children $\leq$ 10 years and 60+ age group	Due to difficulties in methodology, valuation method was not used.	Population census 2001 assumed that 11 to 60 age group economically active population

If market wage rate is not available, we used minimum wage rate set by the government. Required information was collected through questionnaire. Developing countries based studies such as Gertler and van der Gaag (1990), Buldoc et al (1996), Dzator and Asafu-Adjaye (2004) and Borah (2006), and economic theory suggested that prices have negative impact on demand.

**Household Characteristics:** The definition of household (HH) is found different across the survey (Deaton, 1997). In this study, household is consumption as well production unit where people are with living together, eating together, and with

pooling of funds. A person or a family is considered a HH member (s), who is working outside or sitting outside for doing any economic activities, is frequently keeping in touch with other members, sending money for HH expenses. HH has maintained own rules regulations, cultures, among others that are called HH characteristics. Not all characteristics of the HHs may be possible to capture in the quantitative terms, therefore some of them used in this study for example, HH size, caste/ethnicities, education, information about disease and borrowing loan. Followings are the explanation of these variables.

**Household Size:** The total number of HH member is called household size. HH size affects the production and consumption of HH. Similarly household size may have effects on demand for health care. High numbers of HH members may have possibilities of receiving information from different sources. The information can help to make appropriate decision for diagnosis and treatment of KA and to reduce the total direct cost bearded by the HH. If greater numbers of HH are more likely to choose self-care, the effect may be positive. The channels of the effect are not clear, thus we cannot predict the effects. HH size can be grouped into child and adult. Number of children may have different impacts. Dzator and Asafu-Adjaye (2004) have found that child has positive impact on choice of health care.

**Education:** Education influences the decision making process of health care choice. Better-educated people can produce health more efficiently (Grossman, 2000) by making use of appropriate decision to employ the health inputs. Productivity of health, thus, is related to choice of the health care services. Therefore, education influences the choice of health care services. Not only the education of service consumer, but also the education of spouse, other family member, and education of parents in the case of children can affect the choice of health care provider because education has spill over effects. Education can be used as different form, for example, binary (literate/ illiterate), category (no education, primary education, secondary education etc) and continuous (years of completed schooling, highest education in the household) variables.

**Information:** Alike to education, health information is an important factor that allows him or her to make better decisions about medical care (Kenkel, 1990). On the other hand, poorly informed consumers are more likely to underestimate the marginal product of medical care. Individual can received health information from various sources such as radio, TV or poster and various form such symptoms of disease, vectors of disease, and preventive measures among others. Information, therefore, has measured by utilizing a set of variables that include symptoms of disease, access of information, transmission and preventive knowledge, among others on KA. The right answer of each question has got one point, similarly wrong answer has got minus one point and sum of the points gives the score or index of information. The complete correct answer has earned full marks (maximum 38) and incomplete correct answer has got the negative marks (maximum -38) that has made the range of access of information.

**Borrowing Loans:** The body of literature reveals that health insurance services influence the choice of health care providers. However, if there are no health insurance services, the individual fully depends on out of pocket payment for medical care. There are various sources of finance to out of pocket payment such as past savings, selling assets, borrowing loans etc. (Adhikari et al, 2009, Van Dame et al, 2004). The financial mechanism may also influence the decision to visit the health care services. The concept of borrowing loan includes the purchasing of drugs in credit from the market. The drug suppliers might not charge the interest rate separately but they can include in the total price of drugs. Variable of borrowing loan is in binary or continuous. This variable contributes to delay treatment because it takes time to borrow loan, therefore it has negative impact on choice for health care. Loan can contribute to increase health care expenditure because loan may inflate the income of the household.

**Ethnicity/Caste:** In Nepal, there are more than 100 ethnic/caste groups with distinct language and culture. This implies that there are different possibilities of categorization of people according to ethnic/caste groups; however, we used binary variable dalit / ethnic groups or disadvantaged group and others.



**Individual Characteristics:** Individual characteristics, such as age, sex, marital status, health status and health need are related to consumers. Theoretically, there exists a u-shaped relationship between health care use and age (Akin et al, 1985). Age reflects experiences as well as the values and norms of the society. Age may be one of the factors to determine the choice of the providers. Previous studies such as Berman, and Fenaughty, (2005) suggest that age can be used in various forms such as categorical variables, and years of age. Other individual characteristics such as gender and marital status may have effects on demand for health because society or cultures practices show gender discrimination in developing countries. There, however, is no theoretical background about the direction effects of these variables. These variables generally represent as a taste in the utility function.

Perceived need of health services is psychological that is caused by physical symptoms as well. We measure perceived need by using severity of health measured by the consumers themselves. We have used dummy variables for health status. Number of healthy days in a year is also used to measure the health status. Perceptions of the respondent on risk of disease and attitude or beliefs on modern health care services are also used as binary variables. All these variables reduce the upward and downward bias of the estimation of price elasticities of health care demand (Jack, 1999).

**Community characteristics:** Most of the community related information was for 2003/04, although the community level KA incidence data were available for 2004 to 2006. To ensure consistency with other community level variables and minimize the possible missing cases, this study has used average KA cases for the year 2004 to 2006. The community level poverty measures were also available at the small-area level and this study has used the published poverty incidences. Factors reflecting the preventive aspects of KA were measured by coverage of drinking water. Road density, measured as kilometers (km) of road per 100 square km area, was used as a variable for infrastructural development. For infectious diseases like KA, population density should affect transmission probability positively. We have also included total governmental development expenditure in the district per person to indicate the

possible effects of governmental inputs in overall development and quality of public services. Data related to caste and accesses to health services in the local levels are not found. We, therefore, have adopted two proxy variables: disadvantaged population and contraceptive prevalence rate for these variables respectively. For each of the districts, proportion of population disadvantaged was defined as the percent of minority caste/ ethnic population living in the area where literacy rate among them is no more than 30%. Contraceptive prevalence rate is defined as number of fertile couples using contraceptives per 100 married women of reproductive age. Table 3.2 lists all the variables used in the analysis.

**Table 3.2: List of relevant variables for the analysis of Kala Azar**

<b>Characteristics</b>	<b>Category</b>	<b>Description</b>	<b>Sources</b>
<b>KA incidence</b>	Continuous	Estimated average KA incidence for 2004, 2005, and 2006	MOHP, 2007
<b>Poverty</b>	Continuous	Estimated incidence, intensity and severity of poverty at the small community level	CBS et al, 2006
<b>Drinking water</b>	Continuous	Percentage of households with access to piped or tap and tube-well water for drinking purposes	CBS, et al 2003
<b>Road</b>	Continuous	Road-density in km per 100 square kilometer square of area of the district	CBS, et al 2003
<b>Population</b>	Continuous	Population per square kilometer of area of the districts	CBS, et al 2003
<b>Government expenditure</b>	Continuous	Governmental development expenditure per capita	CBS, et al 2003
<b>Education</b>	Continuous	Overall literacy rate in percent	CBS, et al 2003
<b>Disadvantaged population</b>	Continuous	Percentage of disadvantage (minority caste and ethnic groups) population with literacy rate below or equal to 30	CBS, et al 2003
<b>Contraceptive prevalence rate</b>	Continuous	Number of fertile couples using contraceptives per 100 married women of reproductive age	CBS, et al 2003

### 3.7 Dissemination plan

This research study seeks to have a significant impact on the future of KA control or elimination in KA endemic regions of South Asia. In order to achieve this objective, the programme includes a stakeholders, policy makers, political parties, and beyond publication in the international peer-reviewed journals, dissemination efforts have targeted those individual and institutional that have the most impact on local and national KA policy. The dissemination plans include: (a) presentation of research findings at national and international conferences; (b) publication of research findings in national and international peer reviewed journals; (c) meetings with local and national stakeholders to discuss research findings; (d) annual report to WHO/TDR and e) thesis submission to home and host institutions.

## CHAPTER IV

### SPECIFICATION AND ECONOMETRIC MODELING

#### 4.1 Determinants of disease

Multivariate cross-sectional analysis has been exploited to explore the determinants of disease. We estimated community level of incidence of KA that is a continuous variable. Therefore, we exploited ordinary least square (OLS) to analyse the determinants of community incidence of KA. At the individual level, the dependent variable is dichotomous, i.e., presence or absence of KA. The logistic regression has been applied to explain the probability of KA of a person. Heteroscedasticity effects that are mostly problem with cross-sectional data are corrected by using the robust standard error estimates. We estimated elasticity coefficients for all independent variables. The elasticity measures the proportionate change in dependent variable associated with a given proportionate change in independent variable, *ceteris paribus*. The elasticity is a scale-free measurement.

##### 4.1.1 Community characteristics

In this study, we have used regression model to identify the factors explaining the variability of KA incidence rates across small areas. In general form, the regression model can be written as:

$$KA_i = F(\text{Poverty}; \text{dwater}; \text{road}; \text{pop}; \text{govtexp}; \text{edu}; \text{dispo}; \text{cpr}) \dots \dots (1)$$

Where,  $KA_i$  = KA incidence rate in the *i*th community  
*poverty* = poverty incidence, or intensity or severity at community level  
*dwater* = percentage of safe drinking water  
*road* = road density  
*pop* = population density  
*govtexp* = government development expenditure (in Nepali rupees)  
*edu* = literacy rate  
*dispop* = percent of population disadvantaged  
*cpr* = Contraceptive prevalence rate (proxy for use services)

We have estimated elasticity for poverty and other variables of interest by utilizing following formula. Elasticity = marginal change  $\times$  (mean of independent variable/mean of dependent variable), where marginal change = change in dependent variable/change in independent variable.



#### 4.1.2 Individual and household characteristics

In this analysis, we have used logistic regression to explain the probability of KA of a person. Let the variable  $D_j$  represents whether the  $j$ th person has KA or not. If the person has KA,  $D_j$  is equal to 1, otherwise  $D_j$  is zero. Many of the explanatory variables are also dummy variables.

We have used maximum likelihood estimator to quantify the relationships between KA incident case and other explanatory variables. There are two groups of explanatory variables. First group includes characteristics of household and individual include poverty, caste, household size, age, sex, education and occupation. The second group of variables consists of interactions between poverty and other factors. The empirical model used for the analysis can be written as:

$$\lambda(D_j) = g(POV_j, Caste_j, Size_j, A_j, S_j, Lit_j, [Occu_j]) \dots\dots\dots(1)$$

Where,  $\lambda D_j$  = logistic transformation of the variable KA, which takes the value of 1.0 if the person has KA and takes the value of zero when the person does not have KA.

$Pov_j$  = poverty (=1), if the person belongs to a poor household based on national poverty line (dummy variable)

$Caste_j$  = Caste: Dalit and disadvantaged (=1) and other (dummy variable)

$Size_j$  = household size (continuous variable)

$A_j$  = age of subject (continuous variable)

$S_j$  = sex of subject; Male (=1) or female (dummy variable)

$Lit_j$  = educational status of subject; Literate and illiterate (=1) (dummy variable)

$[Occu_j]$  = a set of occupation related variables. The occupations entered in the analyses were agriculture, service and small trade, student, labour, and homemaker or doing nothing.

Note that in equation (1), we have not included any of the interaction terms. For KA, it is possible that the poverty incidence modifies the effects of other household variables. To allow this possibility, another regression model of the following specification was also estimated:

$$\lambda(D_j) = g(POV_j, Caste_j, Size_j, A_j, S_j, Lit_j, [Occu_j], [POV_j \times X_j]) \dots\dots\dots (2)$$

Where,  $[POV_j \times X_j]$  is a set of interaction variables to see if the introduction of interactions affect the coefficients of other variables in the model.

We estimated poverty elasticity and elasticity for other variables by exploiting the following formula. Elasticity = marginal change  $\times$  (mean of independent variable/mean of dependent variable), where, marginal change = change in dependent variable/change in independent variable. If independent variable is dummy variable, there will be average change.

## 4.2 Demand for health care

### The Utility Structure and the Empirical Model

The behavioural model in this study has been developed by adapting the models purposed in a number studies analyzing healthcare demand ( Gertler and van der Gaag, 1990, Mwabu et al 1993, Sanh et al 2003, and Borah, 2006). The utility function is derived as a function of health and consumption. In event of an illness, a KA consumer decides the type of medical care she will consume. For deriving the theoretical underpinnings of the analysis, we can start from a general utility function  $u$ , which depends on health status (H) and consumption of goods (C) for the individual  $i$ . Therefore, in absence of any illness (say KA), the utility function can be written as

$$u_i = u (H_i, C_i) \dots\dots\dots (1)$$

With KA, utility function shifts downward and therefore,

$$u_i = \alpha_k^j u (H_{ij}, C_{ij}) \dots\dots\dots (2)$$

Where,  $\{\alpha_{kj}\}$  = value of  $\alpha_k$  when  $j$ th type of care is used,  $0 < \alpha_k^j \leq 1$  and the value of it depends upon the severity of illness. After successful treatment of KA, value of  $\alpha_k$  will become equal to 1.0 so that the utility function shifts back to the original level. Note that the choice of providers affect utility in two different ways: first, by shifting the utility function as the severity of the disease declines and second, by affecting health status and consumption. It is assumed that the utility function satisfies strict convexity condition.

$$U_c > 0, U_{cc} < 0, U_H > 0, U_{HH} < 0$$

Therefore, health status of a consumer with KA depends on the type of treatment services (M) received as well as individual and provider related characteristics (X).

$$H_i = H (M_1, M_2 \dots M_j, X_i) \dots \dots \dots (3)$$

The health production function exhibits  $H_m > 0, H_{mm} < 0$ .

The consumer receives income from total working time multiplied by wage rate and other sources like unearned income and transfer payments. Thus total income of the consumer can be expressed as:

$$Y_i = \delta A_i + \omega T_i \dots \dots \dots (4)$$

Where,  $\delta$  is flow of income from other sources such as assets or home production ( $A$ ) of an individual consumer,  $\omega$  is the wage rate,  $T$  is total working time for an individual consumer. The consumer allocates her total budget for health care and consumption of goods and services. Therefore, monetary value of consumption of non health care goods and services can be written as:

$$C_{ij} = Y_i - P_{ij} \dots \dots \dots (5)$$

Where,  $C_{ij}$  is the monetary value of resources that consumer spends on a composite commodity which includes all goods and services excluding health care received from provider type j.  $P_{ij}$  is the value of resources that individual consumer devotes to receive the medical care from health provider j.

The equations (3) and (5) suggest that consumption of non health care goods and services, the attributes of the health care provider choices and the characteristics of the decision maker enter the utility function shown in equation (2). Since we are modelling discrete choice of types of healthcare providers, the utility function should be expressed as random utility for empirical estimation. By definition, random utility has two components: deterministic component  $V$  and a random component  $\mathcal{E}$ . The random utility function can be written as:

$$U_{ij} = V_{ij} + \mathcal{E}_{ij} \dots \dots \dots (6)$$

The individual consumer selects the health care provider  $j$  that maximizes her utility. In empirical estimation, assumptions on the distribution of the disturbances lead to various estimable discrete choice models like probit and logit. The random utility model can further be simplified by assuming additive separability of utility arguments. Therefore, the utility function (3) and (5) can be written as,

$$U_{ij} = \alpha_k^j \{ f(Y_i - P_{ij}) + H(M_{ij}, X_i) \} + \varepsilon_{ij} \dots \dots \dots (7)$$

In this formulation, utility is a function of net income  $(Y_i - P_{ij})$  after paying for health care provider  $j$  and health production function  $H(M_{ij}, X_i)$  that depends upon attributes of health care provider choices and decision makers. Presence of  $\alpha$  in the equation should not pose a problem as  $\alpha$  is affected by provider attributes, which are already included to explain the health status  $H$ .

For empirical specification, following Sahn et al 2003, we can assume that the health production function  $H(M_{ij}, X_i)$  is linear in  $M$  and  $X$ . The set of  $X$  includes individual and household characteristics. The variable  $M_{ij}$  are related to quality of medical care as perceived by consumers. Although the standard care for KA is available only in public hospitals in Nepal, we cannot assume that the characteristics of other types of health care providers will not affect the health status of KA consumers Mwabu et al (1993) and Sanh et al (2003). Use of non-standard care types may help KA consumers in reducing pain and suffering, or help in the diagnosis of the disease. Thus, the provider characteristics may reflect some aspects of quality but, in general, quality of services is treated as unobserved, similar to a number of previous studies Gertler and van der Gaag, (1990); Borah, (2006). For specifying the empirical equation, we again follow a number of previous studies to define the function  $f(\cdot)$  in equation (7) as an additive function of log of net consumption and square of log of net consumption (function of prices and income in quadratic form respectively). The quadratic functional form allows the possibility that higher-income consumers may choose high price-high quality options compared to relatively low-income consumers. Therefore, in quadratic form, we can write,

$$f(Y_i - P_{ij}) = \beta_1 \{ \ln(Y_i - P_{ij}) \} + \beta_2 [\ln(Y_i - P_{ij})]^2 .$$



For discrete choice problems, consumers compare the expected utility of any option  $j$  with the utility derived from “reference” option so that the difference in utility values between the two options ( $V_j - V_o$ ) helps the consumer to select the best option. For price and income variables, difference between two options can be expressed as (see Sahn et al 2003):

$$V_j - V_o = \alpha_1 \times \left\{ -\frac{P_{ij}}{Y_i} \right\} - \alpha_2 [2 \ln(Y_i) \left( \frac{P_{ij}}{Y_i} \right)] + [H(M_{ij}, X_i) - H(M_{io} - X_i)]$$

Note that this type of discrete choice demand function may be estimated by using Multinomial Logit (MNL) or Nested logit Model (NLM). The MNL model is relatively robust (Leibowitz, 2004; Mwabu, et al, 1993) and in this analysis we have used the MNL model for our empirical estimation. The MNL makes the assumption known as IIA. This means adding or deleting outcomes (or alternative) does not affect the odds among the remaining outcomes. A Hausman test can explore the possible problem of IIA. Assuming that the MNL is estimated with based category  $b$ , J-1 tests can be computed by excluding each of the remaining categories to form the restricted model. By changing the base category, a test can also be computed that excludes  $b$  (Long and Freese, 2003). STATA software has command for Hausman test.

We have estimated elasticity for price, income and other selected variables by employing following formula. Elasticity = marginal change  $\times$  (mean (or median) of independent variable/mean (median) of dependent variable), where, marginal change = change in dependent variable/change in independent variable. If independent variable is dummy variable, the marginal change is called average change. Sometimes, mean values of dependent or independent variables are highly fluctuated with sample size or outlier values. Median values of dependent and independent variable can produce robust coefficients of elasticity. STATA software command can produce the elasticity for all variables of interest.

### 4.3 Demand for multiple visits

#### Model specification

Conditional on treatment seeking, the utility is derived from the improved health status ( $H$ ) for the individual after receiving medical treatment from various health care providers and consumption of goods and services other than health care ( $C$ ). Therefore, the utility function will be  $u_i = \alpha_k u (H_i, C_i)$  ..... (1)

Where,  $0 < \alpha_k \leq 1$ . If value of  $\alpha_k$  is closed zero the severity of illness will be high and it is closed to one, the health is getting improvement. When  $\alpha_k = 1$ , utility will be maximum. We suppose that the health status of a consumer with KA depends on the quality of treatment services ( $M$ ) received as well as individual consumer and provider related characteristics ( $X$ ).

$$H_i = H (M_1, M_2, \dots, M_j, X_i) \dots \dots \dots (2)$$

The consumer has already allocated the budget for health care and consumption of goods and services other than health care to maintain given level of health status. The consumer receives income from total working time multiplied by given wage rate and other sources, assists, transfer payment etc. Thus total income of the consumer can be expressed as:  $Y_i = \delta A_i + \omega T_i$  ..... (3)

Where,  $\delta$  is flow of income from other sources such as assists or home production ( $A$ ) of an individual consumer;  $\omega$  is wage rate;  $T$  is total working time for an individual consumer. The consumer allocates his total budget for health care services and consumption of goods and services; however, there is uncertainty of outcome of treatment. KA care is only available in public hospital, visits to other than public hospital leads to treatment failure. Again, if they choose other than public hospital, again there may be treatment failure. People make sequential visits to the providers; however, the individual can not maximize his utility because his health has not been improved; in contrast, he has allocated from his fixed budget for different providers. In addition to this, there is time lag for consultation services. Conventional utility theory does not capture this complex situation. Therefore, we use pragmatic approach of demand analysis to capture some parts of complex situation. The study

focuses on determinants of multiple visits to the providers. All KA patients should visit to the public hospital to get standard care; therefore, price of public hospital is treated as forward looking price for KA care that can determine the multiple visits to the providers. Thus the estimating equation based on pragmatic fashion is

$$Q_k = \gamma_0 + \gamma_1 F_p + \gamma_2 Y + \gamma_3 X + \varepsilon_i \dots\dots\dots (4)$$

Where  $Q_k$  = number of visits to find the standard KA care provider;  $F_p$  = forward looking provider prices (actual price of public hospital)  $Y$  = household income;  $X$  = vector of house and individual characteristics

Count variables indicate how many time visits has happened to find the standard care of KA. The linear regression model has been often applied to count outcomes; this can result in inefficient, inconsistent and biased estimates although expected results can be found. There are a number of models designed to count outcomes. The basic model is Poisson regression model that extends the Poisson distribution by allowing each observation to have a different value of mean. Equi-dispersion of the data is the pre-condition for Poisson regression model. Sometimes, in count data the variance exceeds mean, this is called overdispersion. Overdispersion is a problem in count data model that is almost similar to heteroskedasticity problem in the linear regression model. This problem can solved through computation of robust standard errors. One alternative to solve this problem is application of a full maximum likelihood analysis of the NegBin I model (Verbeek, 2004; Cameron and Trivedi, 2005). We will exploit Poisson regression model with robust standard error to estimate the determinants of multiple visits to find the standard care of KA. We have used STATA command to test whether the presence of overdispersion or not.

We estimated elasticity similar to other demand equation by exploiting the following formula. Elasticity = marginal change  $\times$  (mean (or median) of independent variable/mean (median) of dependent variable), where, marginal change = change in dependent variable/change in independent variable. If independent variable is dummy variable, the marginal change is called average change. Sometimes, mean values of dependent or independent variables are highly fluctuated with sample size or outlier values. Median values of dependent and independent variable can produce robust coefficients of elasticity.

## CHAPTER V

### RESULTS OF QUALITATIVE STUDY

#### **5.1 Decision making process to seek health care**

Debates on using the qualitative methods to analyze economics of health care have continued since long time (Shadish 1995; Krantz 1995; Coast 1999). Many economists prefer quantitative methods. They believe that qualitative methods are of limited use in economics or policy research. Qualitative researchers are usually less concerned with generalization of results (Chung, 2000; Dixon-Woods et al 2001). Some of the findings are based on exception cases or outlier values in the qualitative studies that cannot be generalized. In contrast, quantitative data from statistically representative samples are better suited to assessing causality by using econometric methods or reaching generalizable conclusions (Baker, 2000; Chung, 2000).

Qualitative research that is more popular in sociological studies (Bhatti and Fikree 2002); has been increasingly recognized in recent years as having a distinctive and important contribution to make to health care research (Dixon-Woods et al 2001). Qualitative research in economics of health care is relatively new (Coast 1999; Keiser, 1999; Allegri et al 2006; Eddama and Coast 2009), which is primarily concerned with scarce resources that can make or determine the choices and influence the decision to choose the best alternatives. The sociological studies are limited to analyze the factors that influence to the decision of health seeking; however, economic analysis is a step ahead in analyzing health-seeking behaviour, because it concerns with sources of influence and choices of health care that do help to describe and to predict the behaviour of consumers, but we cannot ignore the contribution of sociological factors.

No doubt, qualitative methods that describe situations, events, interactions, attitudes, beliefs and people's behaviour (Patton 1990) are also less structured and have minimum assumptions; can be used in economic analysis (McPake et al 1999; Ensor 2004; Allegri et al 2006; Eddama and Coast 2009); however, qualitative



method cannot be substituted for quantitative method. In deed, adding a qualitative dimension to a research plan can strengthen the research outcomes. When qualitative and quantitative surveys are conducted together, they can provide checks on each other's findings, countering errors in quantitative data (Krantz 1995; Coast 1999; Chung, 2000; Giacomini and Cook, 2000; Dixon-Woods et al 2001). The mixing of quantitative and qualitative methods has better capacity to capture the nature and dynamic aspect of the society and can improve quality of research (Chung, 2000; Russell, 2004; Chuma et al, 2006; Khan and Manderson, 1992; Scrimshaw 1990; Gill 1997). An appropriate mixing of these methods in conducting a research is a type of triangulation (Jick, 1979). Triangulation is an iteration process of finding results; and does help to better understand the structure of economic relations that is fundamental to understanding the nature of the society. There is a special casual connection between economic structure and other elements of social structure (Hart, 1998) and mix of qualitative and quantitative study design can yield valid and reliable social data and can be used to inform the key impact evaluation questions, survey the questionnaire or the stratification of the quantitative sample, and analyze the social and economic context (Allegri, et al, 2006).

Indeed, adding qualitative method into quantitative method can complement the research; however, ingredient of mixing two methods is still debatable (Driscoll et al, 2007). Qualitative and quantitative techniques can be mixed according to the technical requirements of a research (Adamson et al, 2004). Technical requirements of the particular research can be decided by the researcher. In economic analysis of health care seeking behaviour, it should be guided by theory of rational decision making because the consumers of health care services are rational decision makers, when faced with a set of possible alternatives for health care, they assign preferences to each of the various alternatives and then choose the most preferred health service provider from the set of affordable alternatives. Consumer behaviour can then be expressed as an optimization problem in which the consumer selects the health care services such that their utility is maximized subject to their budget constraint.

Analysis of consumer decision making in health sector is a complex process of comparing feasible alternatives and evaluating the satisfactions associated with the relevant options. Using qualitative research method in understanding consumer behavior in health is quite intricate (McPake et al, 1999). One significant concern is that the choice of providers as well as the number of provider contacts depends on a host of variables which are related to health decision making in a non-linear fashion. Qualitative responses may not be able to capture these nonlinearities unless probed in explicitly. In this study, we have made an attempt to understand how and why consumers make specific decisions, what motivates them to adopt a specific health intervention and what features they find attractive with each of the options. To answer this type of questions, we identify a number of primary factors that influence consumers' decision making and develop a road map to show how consumers make decisions related to the utilization of health care services.

Knowing how consumers decide to seek health care services and how they would prefer to spend their time, money and efforts might help health service providers to better target the consumers. The analysis of why and how people utilize health services help policy makers to improve delivery of health services, decide on the types of services the system should offer, and to identify approaches to make the health services more accessible to the poor consumers. This study is based on a qualitative study conducted in KA endemic areas of Nepal. The focus of the study is to analyze decision making behavior of population at risk of KA and to understand how economic factors interact with other social factors in the decision makings related to healthcare seeking for KA. The study adopted both qualitative and quantitative methods to gather information on KA consumers and their healthcare seeking behavior but this section reports the qualitative data collected through in-depth interviews and focus group discussions to analyze the decision making process.

## 5.2 Empirical findings

### 5.2.1 Summary of results in words:

During the discussion, the participants explained about the evaluation of risk of KA and the perception about the illness:

*“Kala Azar is a very dangerous disease; .... last year many people were killed by this. When I became sick with high fever, I was afraid and went to the hospital directly.....”* (Male, community 1)

*“The community is a KA prone area where dozens of people get infected every year”.* (Female, community 4)

*“KA treatment is not new for me. The last one was the second attack for me .... I went directly to the public hospital last time”.* (Female, community 7)

People are aware of the risk of KA, probably because it is a fatal disease. It appears that people in the community know the symptoms of the disease quite well. Perception about the disease and subjective evaluation of urgency for seeking care are the principal driving forces triggering the first visit to health professionals. After the first contact, however, it is the individual's and the professional's notions of need drive the demand for additional care such as paramedical tests, use of drug, follow up, consultation with another provider, among others. The change in the individual's perception of health care need and efficacy of the earlier visits affect subsequent visits or visits to different providers.

*“I visited the private clinic in Lahan.... he gave me some medicines and suggested me to come back after 7 days, .....my health was going down, I went back there again before a week..... I did blood test..... my problem did not improve...it became even worse.....then I decided to go to the district hospital.”* (Male, community 6)

*“ .. first time I went to the drug store to buy drugs, but it did not help.....my brother in law suggested me to go to private clinic in India, ..... Bhukhar (high fever) was still continuing ....I went to Dhami (traditional healer).....again, I went to*

*primary health centre, the doctor suggested me to go Jilla Aspatal (district hospital), after the treatment in Jilla Aspatal, I recovered.”*

(Female, community 5)

In Nepal, effective KA care is available only in the public hospital; therefore, choice of provider is the most important determinant of cure. Public (district and zonal) hospitals in the KA endemic area provide KA care at free of cost. It was unclear why people chose other health care providers first, although the KA services are completely free at the public hospitals. Upon probing, this issue became somehow clear:

*“Rich people can pay for transportation cost, food cost and others.... They can stay in a hotel for few days if it is necessary to stay in the area while getting treatment from the district hospitals.... ”* (Female, community 2)

The hospitals are located in the urban areas of the districts and the KA consumers require to spend significant amount of time, effort and other resources for obtaining care from the hospital.

*“I went to the drugstore near the village, I was given some medicines but the medicines did not work for me....we didn't have money to buy more medicines.....When my condition became serious, my wife borrowed 3000 rupees with 5 percent interest rate per month”* (Male, community 8)

*“I cannot go to the hospital alone. My husband needs to go for work..... I stayed home.”* (Female, community 3)

*“If we want to go to the hospital, we need to go in the morning and can expect to come back in the evening. I would not be able to work and would not get my Rs 160. So, after work, I went to the pharmacy - this was easy for me and costs only about Rs 75.”* (Male, community 5)

*“It is often easier (convenience) to go to a private place close by than going to the Jilla Aspatal (district public hospital)...there is usually a long queue in Jilla Aspatal.”* (Male, community 1)

*“Some services are free, but if we are hungry, we need to eat something and that is not free; bus fare is not free; accommodation is not free.....urban area is urban area ...every things there is more expensive”. (Female, community 2)*



*“I along with my wife went to Jilla Aspatal on foot to save bus bhada (transportation cost). It took us three and a half hours to go there” (Male, community 6)*

*“My brother took me in a bicycle to go to hospital; it took 3 hours to reach there” (Male, community 7)*

Therefore, although the KA services are provided free of charge, consumers and the accompanying family members have to pay for transportation cost, accommodation and food expenses. Therefore, expected cost of treatment would be high for them.

*“..... I got ill. I could not work more than a month. I had to borrow money to buy rice. If I used that money to go to the hospital, my kids would have been hungry.....”*

(Male, community 4)

*“My wife went to the thula sahu (local landlord) to ask for some money. He told her that she can borrow money at the monthly interest rate of 7 percent. With this high interest rate, it will be difficult for us to repay the principal and the interest. We decided not to borrow the money and decided not to go to the hospital” (male, community 8)*

*“She had been in bed for more than three weeks. I was worried about her health and decided to borrow 2000 rupees ..... for her treatment at the hospital.” (Male, community 6)*

*“Now we are facing a greater state of poverty than before because I could not work in the field due to physical weakness.” (Male, community 3)*

*“Those KA consumers who are from very poor families cannot afford the treatment and quietly accept the illness as their destiny and die from it due to lack of treatment” ( Female, community 4)*

*“In course of my treatment, I had to sell my one Kattha land and became landless again,” (Male, community 5)*

Almost two fifth of individuals with KA preferred self care or home care. One of the major reasons for choosing self care is the lack of financial resources for seeking modern health care. Distance of the facilities, travel time and waiting time are also important in affecting the utilization of health care. Individual and household characteristics are also important in the decision making of choice of healthcare providers.

*"I was still worried about my wife. She had already undergone KA treatment three times – once in the hospital in India for 15 days, again for 7 days in the nursing home, and 18 days in public hospitals"* (Male, community 1)

*"Wage labour is the main source of livelihood for us. We have two kids. Both of us, husband and wife, work as agricultural labourers, each earning Rs. 100 per day. I cannot go with her to the hospital as her caretaker. . It is not possible for us to survive if both breadwinners of the family are away from work."* (Male, community 4)

*"We have only one kid, when he became sick....next day, we went to the hospital"* (Female, community 3)

*"My father, who is 61 years old, did not want to go the hospital...he wanted to buy drugs from the drug store".* (Male, community 7)

*"My wife preferred to take rest (self care) at her parent's home when she became ill with KA,.... It was very difficult to convince her to go to the hospital"* (Male, community 4)

### **5.2.2 Summary of results in numbers**

We generated frequency tables based on exercises and analysis done by the community members. Figure 1 shows the results in a pie chart. The results suggest that individuals becoming sick with KA usually consult a healthcare provider within one week after contracting the disease. About two-fifth of consumers chose home care (or self care) for treatment of KA due to the reasons like lack of cash income, or time, their attitude and beliefs, perceived health status, etc.

Self care refers to healthcare practices that individuals initiate or perform on their own for restoring health. The self care activities vary widely, from taking rest to get the energy back; seeking advice from a local individual or family member for alleviating discomfort or pain, taking locally available herbs, using water therapy, or simply doing nothing. Self care may appear to be low cost or free but the activities do consume significant amount of time and efforts. One fourth of KA consumers preferred to consult the drug store as the first contact provider. Almost one third of KA consumers had consulted modern care including private and public health care providers. Only 13 percent of KA group went to the public hospital as their first contact healthcare provider. The range of multiple visits to different providers for the same episode of KA was found to be in between 1 to 6 visits.

The results from the exercises also indicate that four out of five consumers borrowed money for paying for the KA treatment and the rate of interest on the borrowed funds were very high, usually more than 60% per year. Despite the high rate of interest, some consumers borrowed money for treatment, especially those who consider the disease as a serious medical condition. Obviously, high rate of interest makes the poor households even poorer after the episode of KA.

Figures 5.1 Choice of providers

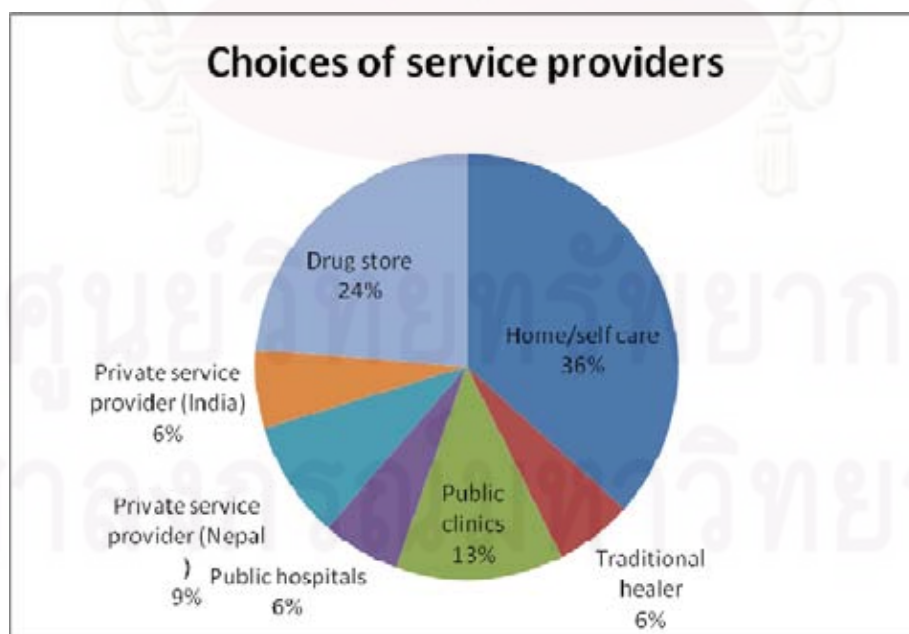
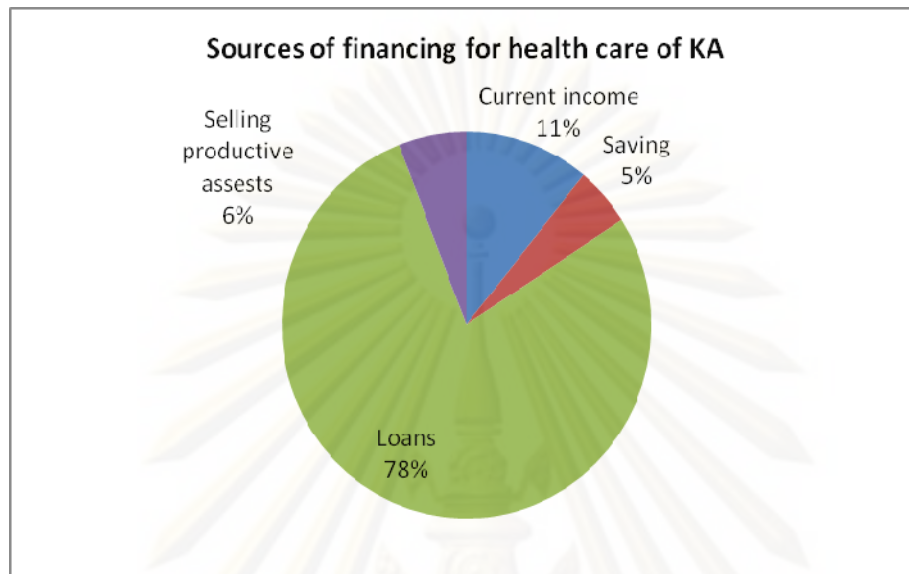


Figure 5.2 Sources of financing



### 5.3 Analysis of decision making process

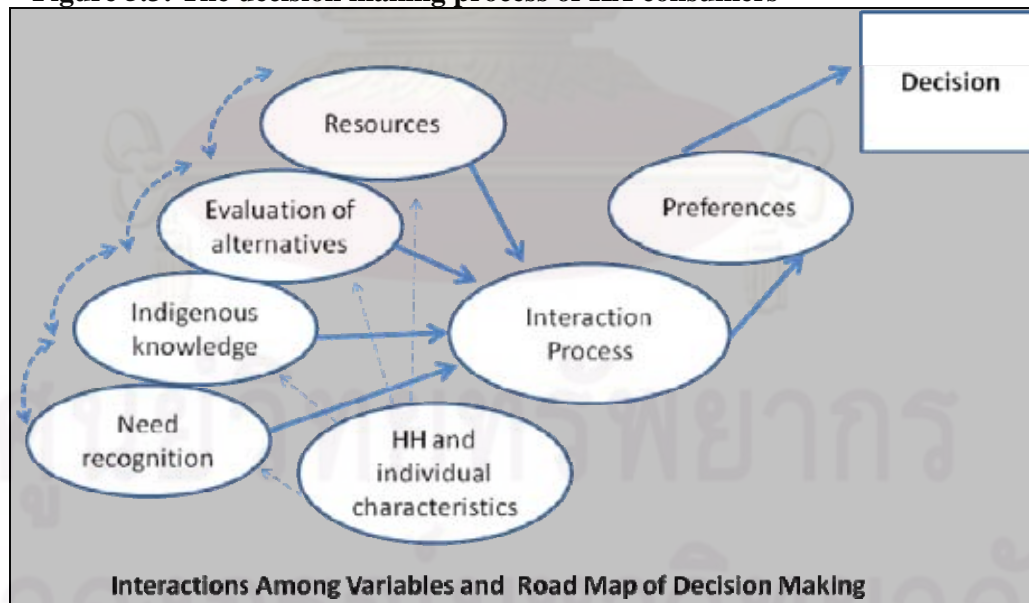
Interpreting the process of decision making based on limited number of statements or categorization of statements may not be sufficient, especially because healthcare seeking is affected by complex interactions among many individual, household, community and healthcare supply variables. We have analyzed the data through an iterative process that is continuously generating, revising and reexamining the themes.

The detail discussions and probing with the participants indicate that five groups of variables affect the final decision making on health seeking. These five groups are: health care need related factors, indigenous knowledge, choice of health care providers in the locality, resources and characteristics of individuals and households; although these categorizations are not mutually exclusive. Seeking treatment for KA is conditional on illness and therefore, recognition of the presence of illness is the first trigger of the decision making process. Age, sex, pain and suffering, physical weakness, signs and symptoms of KA determine the health status of individuals as well as indicate the degree of severity of the illness.



Once the consumers and the family members become convinced that the illness is becoming more severe, the need for medical care is created. Need for medical care does not necessarily translate into taking concrete steps for seeking medical attention. The gap between the need for care and medical care seeking is related to cost of obtaining medical care services, perceived benefit of the care, affordability of the health services, willingness to sacrifice something to meet the health care need, etc. Once need (health status) recognition occurs, consumers start searching for information on sources and types of care. The set of information obtained from past experiences, experiences of family members and friends, religious beliefs and attitudes can be defined as indigenous knowledge. Based on indigenous knowledge and new knowledge about treatment, consumers construct and evaluate available health care alternatives. The alternatives are evaluated on the basis of resource needs associated with the utilization of the alternative and the resources the household owns. This evaluation let the consumers decide where to get the medical care services from, when to seek care, what to consume and utilize or what not to utilize. The decision making process is illustrated in the figure 5.3.

**Figure 5.3: The decision making process of KA consumers**



Note: Ovals show decision making process in each level and the rectangle shows final decision on seeking care. The causal relationships are shown by solid arrows, two way interactive relationships by dashed two side arrows, and one way interactive relationship by dashed one side arrows.

The preference structure is the most important aspect that ultimately determines whether the households will seek care from outside sources for the KA consumers. In this case, central to the choice problem is the allocation of three precious resources: money, time and efforts. Households collect information on expected cost of care, time inputs needed for seeking care, travel cost and other costs related to healthcare seeking. Financial resources appear to be the most important constraint faced by the KA consumers and most KA consumers need to borrow money for obtaining care from an outside source.

There might be some conflict between convenience (place, time and credit convenience) and quality of services. For example, use of home-based care is clearly more convenience but quality of KA care would be very low at home. To increase the satisfaction of the household members, households choose the right mix of convenience and expected quality of services. Convenience can be approximated by calculating the total cost of obtaining care from a provider type including the opportunity cost of time and cost of transportation. The higher is the cost; the lower will be the degree of convenience. Quality of care is related to expected health improvement. Thus the selection of health care provider is determined by the interaction between convenience (costs) and self assessed health outcomes after the utilization of the service. If severity increases, the individual is more likely to choose better quality services.

#### **5.4 Discussion**

A considerable amount of quantitative research has been conducted to understand the healthcare seeking behaviour of consumers (Dzator and Asafu-Adjaye, 2004; Hjortsberg, 2003). Qualitative studies are rarely used to examine the decision making process related to healthcare demand and utilization (Allegri et al, 2006; Eddama and Coast, 2009). In spite of its significant contribution towards better understanding of demand patterns, quantitative analysis alone may not be sufficient to capture all the aspects of complex relationships among the underlying factors. Some sociological studies suggest that socioeconomic variables, demographic, access and

need of health related factors determine the health care utilization decisions (Shaw et al 2008; O'Donnell 2007; Syed et al, 2006; Needham et al 2004).

In this qualitative study, we find that health care need, indigenous knowledge, available health care alternatives and resources jointly determine decision making related to health seeking from outside healthcare providers. We have explored the road map of the decision making process. While discussing with the participants, it was clear that the participants viewed the decision making process at each stage as an interactive process. Due to the complexities involved, it was not possible to present all the aspects of perceived decision making in a simple diagram. It is clear, however, that the process defined at each stage represents a rational process of decision making based on the experiences, cultural values, opinions and ideas, priorities and preferences of consumers and their families in the community.

Health policy has at least two ways of changing the behavior of consumers through the provision of greater degree of choices any by lowering the financial constraints. Provision of KA treatment services free of cost is not sufficient in lowering the financial constraint enough for poor households. This is because transportation and other associated costs are relatively high and poor KA consumers find it difficult to arrange the money to afford a trip to district hospitals. Another possible way to improve access would be to make the KA treatment services available in lower level facilities. Demand side financing is another approach of encouraging consumers to seek appropriate care.

To generalize the findings of the qualitative study, it is important to compare the results with the results of a quantitative study. The qualitative study has a number of limitations as well. For example, it is possible that moderator biases are present in our qualitative study. The research team spent only two days in each of the communities for the collection of information but such a short stay may not be adequate to understand the preferences and perceptions of the rural population.

### 5.5 Conclusions

The process of decision making related to healthcare seeking follows a complex set of steps and many of the potential factors affect the decision making in a non-linear fashion. Our analysis suggests that it is possible to derive a generalized road map of decision making process starting from the recognition of healthcare needs, and modified and influenced by indigenous knowledge, healthcare alternatives and available resources. The group discussions imply that people are rational and they compare costs and benefits based on their perception, experiences, priority and preferences. In most of the discussions, the participants emphasized the importance of resource availability, availability of money and time, on the demand for medical care services. Many poor households must borrow money at relatively high interest rate to finance the out of pocket costs associated with seeking care from public hospital and clinics. Introducing demand side financing and increasing choices for KA care should be considered to encourage KA consumers to seek effective treatment.



## CHAPTER VI

### RESULT OF DETERMINANTS OF DISEASE

#### **6.1 Introduction**

The transmission of the infectious diseases is determined by the complex interactions between environmental and social factors. Environmental factors are predicted to have a significant impact on disease transmission; moreover, social factors shape the magnitude and direction of these impacts. Like other infectious diseases, incidence of KA is related to various community-level and household or individual level characteristics. A number of studies have indentified community level factors like socio-economic situation of a geographic area, cultural, environmental and governance variables as important determinants of KA in poor developing societies (Wijeyaratne et al, 1994; Thakur, 2000; Pattanayak, 2001; Sharma et al, 2004; Alvar et al, 2006). Poverty is a cause as well as an important consequence of KA and this vicious cycle of poverty and disease makes KA one of the most intractable disease in poor communities (Alvar et al, 2006; Adhikari et al, 2009; Rijal et al, 2006). Despite the fact that the disease is preventable and treatable, a host of environmental, socioeconomic, health care and health behaviour related factors hinder its successful control and eradication. KA in Nepal continues to create poor health outcomes, illness, disability, death, and poverty despite the availability of effective treatment program.

In this study, we examine the characteristics of KA consumers in endemic regions of Nepal. Identifying the key characteristics of KA consumers is important for at least two reasons. First, it helps policy makers to become more aware of the distinctive characteristics of infection reservoir and the potential interactions between KA subjects and others in the society. Second, it can identify a number of individual and household level factors like education, socioeconomic status, health-seeking behavior, demographic variables, etc., which affect the probability of the disease and thus could be useful in designing effective control policies or interventions. The literature has already established that the determinants of the disease are

systematically associated with social disadvantage and marginalization (Desjeux, 2001; Remme et al, 2006). A number of studies strongly support the conclusion that poverty is the root cause of a number of tropical diseases including KA, malaria, tuberculosis, and dengue (Wijeyaratne et al, 1994; Adhikari et al, 2009; Remme et al, 2006; Rosenfield et al, 1981). Although the poverty-disease link has been documented, we know very little about the magnitude of the effects of poverty on disease incidence (Marmot, 2009). Only a few studies (Ranjan et al 2005; Bern et al, 2005) have attempted to analyze the risk factors of KA by utilizing household level data but none estimates in quantitative terms the potential effects of a specific determinant such as poverty incidence on the probability of KA in endemic regions.

This study contributes to the literature by assessing the importance of demographic and socioeconomic factors on the probability of KA. Specifically, the study answers three questions through the empirical analysis: (1) do the community characteristics determine the community incidence of KA?; (2) do household and individual characteristics affect the probability of having KA?; (3) what will be the effect of interactions between poverty and other household characteristics on the probability of having KA?

## **6.2 Determinants of community characteristics**

Average KA incidence for the years 2004, 2005 and 2006 was found to be about 2.43 per ten thousand population in the 12 KA endemic districts of Nepal. Average poverty incidence in these communities was 27 percent. We used poverty incidence, intensity and severity that suggest head count, depth and severity of poverty respectively. More than 90 percent people had access to drinking water. Less than 50 percent people were literate. Almost 30 percent population were categorized as disadvantaged and minority population. Descriptive statistics for other community level variables are presented in table 6.1.

**Table 6.1: Descriptive results**

Community Variables	Observations	Mean	Std. Dev.	Min.	Max.
<b>Average KA ( 04, 05, &amp;06)</b>	204	02.43	3.64	0.00	21.91
<b>Poverty incidence</b>	204	26.94	10.29	6.50	67.70
<b>Poverty intensity</b>	204	06.65	3.55	1.30	23.60
<b>Poverty severity</b>	204	02.42	1.61	0.40	10.60
<b>Drinking water</b>	204	91.02	6.80	69.71	97.10
<b>Road density</b>	204	31.89	10.50	09.65	50.59
<b>Population density</b>	204	455.55	95.41	139.00	569.00
<b>Govt. Devt. Expend.</b>	204	673.78	497.62	307.00	2051.00
<b>CPR</b>	204	38.90	10.77	25.14	60.05
<b>Percent pop disadvantaged</b>	204	29.65	14.99	10.11	65.40
<b>Literacy</b>	204	47.63	10.61	32.74	67.14

Sources: Calculated from the data set assembled for the study.

Among the variables listed, we expect that poverty and population density should have positive impact on KA incidence. By contrast preventive measures, road, education, government expenditure and drinking water should reduce the incidence of KA. We have used CPR as a proxy for health knowledge and willingness to utilize health services in general. Since it is not specific to KA, this may not turn out to be important in empirical estimation. The percent of population disadvantaged, defined as minority population group with low educational attainment, may capture some aspects of social exclusion and disparity. Table 6.2 reports the estimated coefficients of the regression model.

**Table 6.2: Estimated influences of community variables on KA incidence**

Variables	Coefficients	Std. Err.	Elasticity	Std. Err.
<b>Poverty incidence</b>	*0.14	0.0382	*1.60	0.4497
<b>Drinking water</b>	*-0.25	0.0742	*-9.44	2.9196
<b>Road density</b>	***-0.11	0.0635	** -1.48	0.8441
<b>Population density</b>	*0.03	0.0091	*5.74	1.7895
<b>Govt. Devt. Exp.</b>	***-0.01	0.0009	***-0.43	0.2639
<b>CPR</b>	*0.26	0.0868	*4.22	1.4447
<b>% disadvantaged</b>	*-0.09	0.0279	*-4.42	1.5953
<b>Literacy</b>	*-0.23	0.0786	*-1.12	0.3570
<b>Constant</b>	**15.40	6.9411		

		Elasticities	after
		regress	Fitted values (predict)
<b>F( 8, 195)</b>	=	6.1400	
<b>Prob &gt; F</b>	=	0.0000	2.4326454
<b>R-squared</b>	=	0.2012	
<b>Adj R-squared</b>	=	0.1685	
<b>Root MSE</b>	=	3.3208	

Note: \* significant at 1% level, \*\* 5% level and \*\*\* 10 % level

Source: estimated

F statistic of the regression equation shows that the independent variables are jointly statistically significant at 1% level. Although the  $R^2$  value is not very low, it is lower than what is expected for cross-sectional geographic analysis. All independent variables are statistically significant in a two-tailed test at 1% or 5% or 10% significance levels. The results of the regression model suggest that poverty incidence rate, population density and CPR affect the KA incidence rates across the small areas positively. The direction of the coefficient of CPR in the model was not expected. This probably indicates that the measure is not a good proxy for access to healthcare services in the area.

For easy interpretation of the coefficients estimated, we have calculated the elasticity measures from the coefficients. The elasticity measures are independent of scale of measurement of the dependent and independent variables and can be interpreted or compared easily. The elasticity measures indicate that one percent increase in poverty incidence rate increase the KA rate by 1.6% while one percent increase in population density increases the KA rate by 5.74 percent. Access to quality drinking water, higher road density, higher literacy or increased governmental expenditures in development activities all reduce the incidence of KA. Increased governmental development expenditure per capita or higher road density per area can also reduce the KA incidence rates but these variables will have relatively small impact on KA.



We estimated impact of incidence, intensity and severity of poverty on KA incidence. We found similar magnitude and direction of these impacts and have reached conclusion on that poverty incidence only can efficiently measure the link between poverty and the disease.

### 6.3 Determinants of individual and household characteristics

In our sample of surveyed individuals, we have almost equal number of KA and Non-KA consumers. This is clearly not what the underlying probability of KA in the community. As mentioned in the methodology section, we have calculated and used sample weights based on population proportion suffering from KA in the community. After using the individual weights and using the national poverty line of Nepal (Rupee 9,948 per person per year) for the year 2007/8, poverty incidence for the sample becomes twenty-eight percent. Average age of the subjects was 35 years. Almost 33 percent in the surveyed individuals belonged to the so-called “lower caste” and disadvantaged ethnic groups. Table 6.3 reports the basic descriptive statistics for the sample. Note that the weighted incidence rate of KA becomes 7.0 per 10,000 population, which is the incidence of the disease in the five KA endemic districts of the country.

**Table 6.3: Descriptive statistics for the surveyed individuals**

<b>Variables</b>	<b>Number of Observation</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>KA</b>	720	0.0007	0.0259	0	1
<b>Poverty</b>	720	0.2788	0.4487	0	1
<b>Lower Caste</b>	720	0.3285	0.4700	0	1
<b>Household size</b>	720	5.4748	1.9469	1	20
<b>Age</b>	720	34.3577	17.2517	2	80
<b>Gender (male)</b>	720	0.5305	0.4994	0	1
<b>Illiteracy</b>	720	0.4094	0.4921	0	1
<b>Agriculture</b>	720	0.4684	0.4993	0	1
<b>Service and small trade</b>	720	0.0838	0.2774	0	1
<b>Student</b>	720	0.0871	0.2821	0	1
<b>Labour</b>	720	0.0565	0.2310	0	1
<b>Housewife and doing nothing</b>	720	0.3041	0.4604	0	1

Source: Survey of KA and non-KA consumers from six hospitals in Nepal

We estimated the logit regression and elasticities for model (1). The results suggest that compared to non-KA consumer, KA consumers are more likely to be poor, illiterate and from disadvantaged ethnic groups. A person belonging to a larger household size, after controlling for poverty, literacy and other factors, is more likely to have KA. The probability of having KA tends to decline with increasing age. None of the occupations produced any significant difference in KA incidence compared to the KA rate for those involved in agricultural activities. We dropped insignificant variables through iteration process and presented better model in table 6.4.

Wald  $\chi^2$  statistic shows that the independent variables are jointly statistically significant at 1 percent level. At the same time, much of the variation is unexplained with Pseudo R<sup>2</sup> being equal to 20 percent. In cross-sectional models, the R-square values are usually quite low, indicating the difficulty of explaining inter-household distribution of KA cases. All independent variables are statistically significant in a two-tailed test at 1% level, except for gender and occupation-related variables. We estimated robust standard errors because this is the preferred empirical method for cross sectional data for robust regression analysis (Cameron and Trivedi, 2009)

**Table 6.4: Estimated effects of household and individual characteristics on probability of KA**

Variables	Coefficients	Robust Std. Err.	Elasticity	Std Err.
Poverty incidence	*3.13	0.3599	*0.87	0.1003
Caste category	*1.61	0.3571	*0.53	0.1173
Household size	*0.28	0.0749	*1.56	0.4103
Age of the subjects	*-0.06	0.0138	*-2.22	0.4755
Illiteracy	*1.43	0.3655	*0.58	0.1496
Constant	*-10.81	0.6542	Elasticity after logit	
Number of obs	=	720	KA NonKA (predict)=	
Wald chi2(7)	=	*85.25	.00007534	
Prob > chi2	=	0.0000		
Pseudo R2	=	0.2021		
Log Pseudo likelihood	=	-3.1958		

Note: \* significant at 1 % level

Source: Regression result using survey data.

Since it is difficult to interpret the results based on the coefficients of the logit model, we have calculated the elasticity values for each of the coefficients estimated. The elasticity values are not affected by changes in the scale of measurements and describe the relationship in terms of percent change of the dependent variable due to one percent change in each of the independent variables. The results indicate that increase in poverty incidence by ten percent will increase the probability of being suffering from KA by 8.7%. Similarly, if illiteracy increases by 10 percent, the probability of being a KA consumer increases by 5.8%. Increase in the age by 10 percent reduces the probability of having KA by about 22%.

### 6.3.1 Interactions between poverty and household characteristics

One of the primary interests of this research is to explore how the incidence of poverty interacts with other individual and household characteristics to affect the probability of KA. We identified key variables that determine the incidence of KA through iteration process. The results of the best empirical model when interaction terms are considered are reported in table 6.5.

**Table 6.5: Results of household characteristics interaction with poverty**

<b>Interactions variables</b>	<b>Coefficients</b>	<b>Robust Std. Err.</b>	<b>Elasticities</b>	<b>Std. Err.</b>
Poverty incidence	*3.36	0.6117	*0.94	0.1705
Caste category	*1.61	0.3833	*0.53	0.1259
Household size	*0.32	0.0784	*1.73	0.4294
Age of subjects	** -0.02	0.0112	** -0.86	0.3840
Poverty_ *_ Age	** -0.05	0.0196	** -0.45	0.1891
Poverty *_ Literacy	*1.58	0.4209	*0.17	0.0461
<b>Constant</b>	*-11.19	0.6840	Elasticities after logit	
<b>Log pseudo likelihood</b>	=	-3.1814	y = Pr(KA/NonKA)	
<b>Number of obs</b>	=	720.0000	(predict) .00010867	
<b>Wald chi2(5)</b>	=	141.7400		
<b>Prob &gt; chi2</b>	=	0.0000		
<b>Pseudo R2</b>	=	0.2056		

Note: \* significant at 1 % level \*\*significant at 5 % level

The results suggest that poverty, caste, household size and age affect KA incidence and poverty modifies the coefficients of age and literacy. Surprisingly, probability of KA declines with age and for poor individuals, the probability declines at a faster rate, given the age. Higher literacy does not affect the probability of KA for

non-poor individuals although the probability increases with literacy among the poor. Higher household size also increases the probability of KA, given the incidence of poverty and illiteracy rate.

#### **6.4 Discussion**

KA remains a major public health problem in Nepal. One of the difficulties associated with reducing and eradicating KA incident cases is that a combination of diverse factors affects the transmission of the disease in poor communities. The important risk factors of KA ranges from environmental and geographic features to poverty, access to health care services, population density, infrastructure development, etc. In this analysis, we found that a number of community level variables are important in explaining the regional variation of KA in the endemic districts of Nepal. Poverty incidence in an area is associated with the KA incidence rate. One percent reduction in poverty incidence should reduce KA incidence by about 1.6%, implying that poverty reduction will be a very effective mechanism of reducing KA in the area. Another intervention that can reduce KA rate significantly is the improvements in access to safe drinking water; increase in access to clean water by one percent is likely to reduce KA incidence rate by 9.4%. Improving access to clean water can be attained relatively easily using low-cost clean water supply strategies.

Generating, synthesizing and interpreting evidence on the social determinants of infectious disease is feasible and quantifying the underlying determinants of KA and their elasticity is possible but addressing the KA incidence remains difficult and challenging. One of the difficulties is that the links between the disease and the socio economic factors are multiple and complex and often the inter-correlations among the community level factors make it difficult to identify the proximate causes or factors (Rosenfield et al, 1981; Wijeyaratne et al, 194; Alvar et al, 2006). The precise causal pathways from various socioeconomic factors to disease incidence are not fully understood and this gap in our knowledge has affected our ability to identify the most important determinants of KA. Untangling the relationship between burden of disease and socioeconomic status has proven to be a difficult process. For example, the



association between poverty and infectious disease reflects causality running in both directions: poverty breeds disease, and disease keeps poor people poor. Unless longitudinal data are used, it is not possible to quantify the effects of the variables on KA incidence and the effect of KA incidence on the potential socioeconomic factors.

Finally, we should mention some of the limitations of the study methodology and data. The most important limitation is the lack of reliable data on KA disease incidence rates by community. This study has used information collected at the health facility level to generate geographic distribution of the disease. Although about 80% of KA cases show up in health facilities (IOM, 2008), it is still a significant underestimation of community level incidence. Proportion of KA consumers seeking care from health facilities may also be different for different communities, thus distorting the community level incidence rates. Another limitation of the study is that not all variables are available in Nepal for the small areas used as the unit of analysis here. For example, a number of variables are actually district specific and we have assigned district level average values to the small areas in the district.

This study is also based on data collected in hospital settings. Although we have defined and used individual level sample weights to reflect underlying incidence of KA at the community level, the non-KA consumers seeking care from hospitals do not represent the general non-KA population in the community. In the analysis, we have implicitly assumed that the KA and non-KA consumers in the hospitals represent the population in the community.

The multivariate analysis confirmed that burden of KA is disproportionately borne by vulnerable and marginalized groups. KA is most entrenched in the poorest communities. Poverty in the community is one of the primary determinants of KA. If the incidence of poverty declines by 10 percent, it will lead to reduction in KA incidence by 16% at the community level. This result contradicts the results reported by Bern et al, 2005 who found that income, land ownership and other assets were not important as determinants of KA in Bangladesh (Bern et al, 2005). Some studies did find poverty and infectious disease links Wijeyaratne et al, 194; Alvar et al, 2006

;Thakur, 2000; Pattanayak 2001; Sharma et al, 2004; Holveck et al, 2007; Conteh et al, 2010). In the analysis of KA, poverty-disease incidence link is difficult to establish due to the interactions between these two variables (Alvar et al, 2006 ;Thakur, 2000; Pattanayak 2001; Sharma et al, 2004; Holveck et al, 2007 Ahluwalia et al, 2003). The findings strongly suggested that preventive and curative strategies adopted by the WHO and the governments (MOHP, 2009; Kishore et al, 2006; SEARO/WHO, 2005) for the elimination of KA from endemic countries should be able to achieve the target if combined with a number of socioeconomic development interventions. For example, in Nepal, if the poverty incidence can be reduced from the existing level of 27 percent to about 16 percent, the KA target rate can be achieved by 2015. In addition to poverty reduction, improvements in water supply, literacy, governmental expenditure can also help in reducing KA incidence rates in the area. Therefore, a holistic approach rather than traditional disease-centered approach can break the links between poverty and KA and can help Nepal and other KA endemic countries of the region to reduce and eliminate KA.

We found that poverty interacts with other household characteristics to affect the probability of KA; however, it is difficult to describe the clear pathway from socioeconomic factors to KA (Wijeyaratne et al, 1994; Thakur, 2000; Pattanayak, 2001; Sharma et al, 2004; Alvar et al, 2006; Conteh et al, 2010; Holveck, et al 2007; Baker et al, 2010). Some studies have tried to define and identify the complex inter-relationships between poverty and infectious diseases (Alvar et al, 2006; Holveck, et al 2007) but still the relationship remains difficult to define in concrete steps.

The results suggest that a number of individual and household characteristics affect the probability of having KA. Poverty affects KA incidence directly as well as indirectly through its interaction with other household level variables. It is interesting to note that the magnitude of the estimated coefficients for individual and household variables are quite low, indicating that most important policy interventions for reducing and eradicating KA are not related to individual and household characteristics. Complete eradication of poverty and illiteracy will have significant impact on KA incidence but eradication of the disease will require interventions at the community level as well. Even with the limitations of the study, we can say that

traditional disease control mechanism that focuses on preventive and curative services at the community level (Kishore et al, 2006) are not sufficient to reduce KA incidence rapidly enough to achieve eradication. To ensure successful control and eradication of KA in endemic regions, the disease control mechanisms at the community level must be complemented by individual level interventions for reducing poverty incidence and illiteracy rate.

## **6.5 Conclusions**

Although qualitative analyses have identified a number of determinants of KA, little is known about the complex relationship among poverty, inequality and KA incidence. Our empirical analyses found that poverty is one of the most important factors affecting the incidence of KA in endemic regions. Poverty rate affects KA directly and it also modifies the marginal effects of many other variables like family size, illiteracy, etc. on disease incidence. The present study explored the impact of individual poverty and its interaction with other household characteristics on the incidence of KA. The analysis suggests that being poor, being a member of disadvantaged ethnic groups, large household size and being illiterate increases the probability of KA.

The multivariate analysis has confirmed that some of the community characteristics, for example, poverty, population density, contribute to increase incidence of KA; however, access to safe drinking water, infrastructure development, literacy contribute to reduce incidence of KA. Government expenditure plays roles in supply side efficiency in producing public services. The association between poverty and KA reflects causality running in both directions: poverty multiplies KA incidence and KA pushes poor into marginal poor or further poverty. The strategy for disease control or elimination should shift from traditional disease-centered approaches to a holistic approach that can break the links between poverty and KA. Therefore, poverty alleviation strategies should be considered complementary to community level disease control interventions in Nepal and in other endemic regions. The combined effect of community level disease control and poverty alleviation strategies on KA incidence rate is expected to be significantly higher than the effect of individual intervention types.

## CHAPTER VII

### RESULT OF DEMAND FOR HEALTH CARE

#### 7.1 Introduction

A number of research studies have been conducted to understand demand for medical care services in developing countries (Akin et al., 1981; Heller, 1982; Gertler et al., 1987; Mwabu et al (1993); Sanh et al (2003), Borah, (2006). Despite, the interest of empirical regression in demand analysis, econometric methodologies and findings have differed widely. Most analyses tend to simplify the demand analysis by assuming homogeneous “medical care services”. Prices used in demand functions are often inadequate and do not represent the “prices” consumer’s face. For example, some studies used standard fee schedule, some used expenditures per medical visit and few of them used hedonic prices (Akin et al., 1981; Heller, 1982; Gertler et al., 1987; Mwabu et al 1993; Bartholome and Vosti, 1995; Sanh et al 2003, Borah, 2006; Sharma, 2009). Policy implications related to price and cost cannot be derived unless the empirical model use appropriate price measures. In addition to the price effects, other factors affecting demand for medical care are also crucial for designing effective health policy for developing countries. Although many of the tropical diseases are endemic in south Asia, disease specific demand analyses using regional data are still quite rare.

A number of studies primarily focused on demand for health care with first consultation of health care providers; however, the consumers have made several visits to the providers without referral from the first provider (Ward et al, 1997; Gertler, et al. 2000). A number of qualitative studies for example, Ryan 1998; Nyamongo, 2002 have systematically explored the sequential health care utilization patterns. Sequential utilization of health care services is not new in the literature. A number of studies on doctor shopping or hospital shopping or provider shopping have been found in the literature (Boscarino and Stelber, 1982; Good 1987; Savigny et al, 2004; Aikins, 2005). Surprisingly, demand analysis based on sequential visits has rarely found in the literature. The demand analysis based on first consultation of health care providers has a number of limitations, for example, it underestimates the



cost of health care services and it does not fully capture the health care utilization patterns. One of the primary challenges in developing countries is that public health care services are underutilized and the poor people than the better off are less likely to utilize the services even though the public health services are targeted to them (O'Donnell, 2007). Therefore, we estimated demand for health care of KA based on first consultation of health services and multiple consultations of health services.

## **7.2 Demand for first consultation of health services**

The study is based on information collected in KA endemic areas of Nepal to explore the factors affecting utilization of KA services as well as differential effects of prices on demand for services by poor households. This study has estimated a multinomial logit model to identify factors affecting consumer choice of alternative health care providers, namely public hospital, public clinics, private providers, drug stores and self care. Beyond the usual variables like prices of health care, income and information, we also investigate a set of individual and household characteristics that may provide important insights into the potential opportunity and challenges of Kala Azar control policy.

For the empirical analysis, all KA service providers are categorized into five provider-types to define the dependent variable of the demand model. The choices or options are: self-care, drug store, public clinic, private clinic/hospitals and public hospitals. Actions taken by individuals or family members in response to illnesses are considered "self care". Self-care includes various types of home-based care, use of homemade traditional medicine, consultation with traditional healers, getting traditional medicines from the market, etc. Public clinic providers in Nepal are the sub-health posts, health posts and primary health care centers. Private providers include clinic service providers, private hospitals and nursing homes. Drug store is also an important source of care. Consumers often obtain drugs directly from the drug store at the recommendation of the store personnel. Public hospital providers are the district and zonal hospitals.

Individual characteristics, such as age, sex, health status, belief system and health needs affect demand for healthcare services. It is usually assumed that there exists a u-shaped relationship between health care use and age (Akin et al, 1985). Perceived need of health services (health status) is a subjective evaluation of individual's physical symptoms or health status. If the consumers feel that the need for healthcare is high, they are more likely to seek care from outside sources. Similarly, likelihood of obtaining care from healthcare providers will be higher if the self-reported health status is categorized as "severe". Perceptions of the respondent about their risk of contracting KA and attitude or beliefs related to modern health care services are defined as binary or categorical variables.

In developing countries, estimating the prices of healthcare services is often quite problematic. Transportation and other related costs, in many cases, far exceed the actual out-of-pocket fee charged by health facilities. In most of the previous studies, prices of medical care were estimated using very narrow definition of cost. Unlike the previous studies, we have collected detailed information on cost components so that full price of medical care options can be derived. Therefore, price of health care have been calculated by including costs of medical care services, drugs, transportation, travel time, waiting time, unofficial charges such as tips and bribes, etc. Most of these cost items are available in monetary terms but travel time and waiting time require conversion of time into money values. In most cases, two alternative approaches can be used for valuing time of individuals (Drummomd, et al, 2005; Kooreman and Wunderink, 1996). In this analysis, we have used opportunity cost method to estimate the monetary value of time (Asenso-Okyere, and Dzator (1997) Attanayake, et al (2000); Chima, et al (2003). The opportunity cost of time is defined by market wage rate, or in absence of wage information, minimum wage rate set by the government can be used as a proxy.

Knowledge about health and disease is an important factor affecting the decision making of consumers (Kenkel, 1990). Poorly informed consumers may underestimate the marginal benefit of prevention and treatment. Individuals receive health information from various sources such as radio, television, poster, etc. on

symptoms of disease, disease vectors, preventive and curative measures. Since health information is of various types, the degree of health knowledge of an individual can be measured by obtaining data on signs and symptoms of disease, sources of information on the disease, service availability, mode of transmission, preventive approaches, etc. For constructing the knowledge index, we have assigned one point for each of the correct responses and negative one point for each wrong answer. Sum of all the points define the knowledge index. Individuals who answered all the questions correctly receive a score of 38 and who provided all incorrect answers receive -38. Therefore, the knowledge index ranges from +38 to -38.

Table 7.1 reports the descriptive statistics of the variables included in the empirical model. Note that self care was the choice of about one-fourth of all KA consumers in the sample, followed by drug store as the first contact healthcare provider. Only 16 percent consumers sought care from the public hospitals as the first contact provider. It is interesting that more than 80% of households reported borrowing money for the treatment of KA, although the KA care is provided free of charge at public hospitals. In our sample, about 50% of consumers are from disadvantaged ethnic groups. Almost 60 percent consumers reported that the reason for the choice of service provider was the quality of services rendered. Only 34 percent of the consumers had favorable or positive attitude towards modern public facilities, particularly hospital care. More than 50 percent reported that they were aware of their relatively high risk of contracting the disease.

**Table 7.1: Descriptive statistics for the variables used in demand analysis**

<i>Variables</i>	<i>Category</i>	<i>N</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
<b>Log of consumption (price)</b>	Continuous	367	0.02	0.03	0.00*	0.16
<b>Log cons. square (income)</b>	Continuous	367	0.43	0.50	0.00*	2.84
<b>Disadvantaged groups</b>	Dummy	367	0.49	0.50	0.00	1.00

<b>Household size</b>	Continuous	367	6.58	2.42	2.00	20.00
<b>Age of consumer</b>	Continuous	367	23.68	16.51	2.00	80.00
<b>Square of age</b>	Continuous	367	832.52	1026.65	4.00	6400
<b>Male</b>	Dummy	367	0.58	0.49	0.00	1.00
<b>Highest educational level</b>	Continuous	367	3.76	3.84	0.00	15.00
<b>Information Index</b>	Continuous	367	9.17	12.03	-20.0	36.00
<b>Borrowed money</b>	Dummy	367	0.84	0.37	0.00	1.00
<b>Quality service as reason</b>	Dummy	367	0.58	0.49	0.00	1.00
<b>Health status severe</b>	Dummy	367	0.45	0.50	0.00	1.00
<b>Positive attitude (belief)</b>	Dummy	367	0.34	0.47	0.00	1.00
<b>Perceived risk of KA</b>	Dummy	367	0.56	0.50	0.00	1.00

\*Numbers became very close to zero after logarithmic transformation.

Source: Survey of Kala Azar consumers in the district hospitals.

### 7.2.1 Results of maximum likelihood estimation

The results of the multinomial logistic model are reported in table 7.2. The estimated coefficients suggest that prices incurred for accessing healthcare and household income significantly affect the decision making on the choice of providers. The higher is the price associated with obtaining care from a provider-type, the less likely are the consumers to seek care from the type compared to self care. The consumers from higher income households are more likely to utilize any type of health care facilities compared to self care. Consumers who have better knowledge about Kala Azar and its prognosis are more likely to utilize public hospitals. The positive attitude of consumers towards modern western care in the treatment of KA (compared to the base category that modern western care is not effective) increases the probability of using public hospitals. The household with higher family size is less likely to utilize the public hospital.



Education does not seem to be associated with the use of public hospitals and clinics. People living with poor health status are more likely to use public facilities than the individuals who report their health status as moderate. Disadvantaged population groups are less likely to use public hospital, although the coefficient is marginally significant. The empirical estimation indicates that consumers who need loans for the treatment of KA are less likely to visit public health services, although the KA services are provided free. Clearly, cost of accessing services from public hospitals is relatively high due to relatively high distance from KA consumer residences. Perceived good quality of provider-type also affects the likelihood of seeking care from the type. The belief system is also an important determinant of obtaining care from public hospitals.

The statistical tests related to model fitting and diagnostics are quite encouraging. Pseudo  $R^2$  is found to be high and Hausman test has confirmed that there is no significant IIA problem in the model. Most of the estimated coefficients are statistically significant and are of expected signs. Wald test, a diagnostic test for identifying the influence of omitted variables, indicates that omitted variable bias may not be an important concern for the model.

**Table 7.2: Factors affecting choice of provider-type by KA consumers in Nepal - Results of the Multinomial Logit Model (Reference category= self or home care)**

Variables	Drug stores	Private providers	Public clinics	Public hospitals
	Coeff. (Std.Err.)	Coeff. (Std.Err.)	Coeff. (Std.Err.)	Coeff. (Std.Err.)
<b>Log consumption</b>	-*10001.38 (2227.31)	*-10638.31 (2230.36)	*-9714.54 (2225.28)	*-10640.41 (2236.65)
<b>Log consumption square</b>	*583.76 (126.7511)	*621.76 (126.9264)	*567.24 (126.6326)	*620.74 (127.2788)
<b>Disadvantaged group</b>	-0.12 (0.7767)	-1.06 (0.8551)	-0.51 (0.7754)	***-1.80 (1.1128)
<b>Household size</b>	-0.02 (0.1973)	0.11 (0.2088)	0.10 (0.1964)	** -0.59 (0.2729)
<b>Age</b>	***-0.12 (0.0764)	-0.11 (0.0861)	-0.07 (0.0812)	***-0.17 (0.0994)
<b>Age square</b>	**0.00 (0.0011)	0.00 (0.0013)	0.00 (0.0012)	0.00 (0.0015)

<b>Male</b>	-0.36 (0.7822)	-0.25 (0.8480)	-0.44 (0.7758)	-0.24 (1.0159)
<b>Highest education</b>	-0.05 (0.1187)	-0.06 (0.1271)	-0.09 (0.1181)	0.00 (0.1435)
<b>Index of knowledge about KA</b>	0.05 (0.0376)	0.05 (0.0402)	**0.08 (0.0373)	*0.16 (0.0498)
<b>Borrowed money</b>	*-19.70 (2.8483)	*-19.43 (2.9412)	*-19.30 (2.9178)	*-24.91 (2.7710)
<b>Quality as the reason for choice</b>	-0.31 (0.7752)	1.54 (0.8676)	0.57 (0.7672)	*3.18 (1.1782)
<b>Severe health status</b>	0.40 (0.8408)	1.62 (0.9157)	0.14 (0.8415)	0.97 (1.0756)
<b>Positive attitude towards modern care</b>	***1.52 (0.9091)	1.34 (0.9770)	***1.72 (0.8962)	*2.74 (1.1087)
<b>Risk of KA</b>	-0.27 (0.9316)	0.89 (1.0014)	0.49 (0.9361)	1.35 (1.1810)
<b>Constant</b>	*14.87 (2.0710)	*9.20 (2.1764)	*13.17 (2.1847)	14.81 (dropped)
<b>LR (56)</b>		= 691.69	Number of iterations= 19	
<b>Prob. &gt; <math>\chi^2</math></b>		= 0.00	Hausman test of IIA	
<b>Pseudo R<sup>2</sup></b>		= 0.59	$\chi^2(8) =$	50.87
<b>Log likelihood</b>		= -241.48	Prob > $\chi^2 =$	0.00

\*Significant at 1% level, \*\* significant at 5 % level \*\*\* significant at 10 % level

From the regression coefficients reported in table 7.2, elasticity values can be estimated at the mean or at the median values of the independent variables. Since median would be a better reflection of changes expected due to changes in price and income, median values were used to calculate the elasticities. Table 7.3 reports the estimates of own price and income elasticity of demand derived from the coefficients estimated for the choice model. The results indicate that services of public hospitals and private providers are highly price elastic. A one percent increase in the full price of public hospital or private provider services reduces the use of the provider-types by about 8%. Income effect is also quite high and almost similar for both public and private health care services. If income is increased by one percent, demand for public hospital medical care is expected to increase by about 9% on the average. The elasticity numbers are quite unexpected for public clinic services. Utilization of public clinics decline with the increase in income and the price effect for the public clinic services is also found to be positive. It appears that public clinics in Nepal are considered inferior by KA consumers. Similarly, price elasticity is positive for drug

store while the income elasticity is negative. For both these sources of care, public clinic and drug store, the negative income effect is so large that the price effect becomes positive.

**Table 7.3: Own price elasticity of demand and Income elasticity**

<i>Variables</i>	<i>Public hospital</i>	<i>Public clinic</i>	<i>Private provider</i>	<i>Drug Store</i>
<b>Price</b>	*-8.04	*3.88	*-8.01	*6.37
<b>Income</b>	*9.25	*-4.56	*9.51	*-16.11

\*1% level of significant,

### 7.2.2 Policy simulations

Using the results reported above, we can conduct a number of policy simulations. In this section, we analyze two short term policy instruments to encourage the use of public facilities for KA consumers. These two policy options are: a) introduction of demand side financing; and b) improving knowledge about KA. The demand side financing (DSF) mechanism provides money to consumers to encourage utilization of desired medical care services. The introduction of DSF for KA care is logical because the use of the standard care provided through the public hospitals appear to be highly price elastic. In recent years, Government of Nepal is planning to implement demand side financing for KA care services. Another variable found to be important in our empirical analysis is the knowledge index for KA consumers or their family members. We use these two policy instruments to simulate the ceteris paribus effect of these policies on the use of public hospitals for the treatment of KA.

#### a. Demand side financing

DSF or direct cash payment to the KA consumers for accessing services from public hospitals can help improve the choice of appropriate kind of medical intervention. How successful a DSF program would be will depend on the type of incentives adopted, i.e., whether the DSF increases the income of households or reduces the full price of the desirable medical care options or both. Given that the price elasticity of public hospital use is very high, subsidizing the travel cost plus reimbursement for the time spent in travelling and waiting will increase the utilization of public hospitals at a relatively high rate. Note that the demand side financing will

improve the utilization of public hospitals not only through the price effect but also through the income and borrowing effects.

For simulation purpose, we introduce five levels of cash transfer to those who seek care from public hospitals. The levels of cash transfers are: 200 Nepalese Rupees (NRs), 500 NRs, 700 NRs, 1000 NRs, and 1500 NRs. Therefore, demand for healthcare services will be affected through the changes in the price faced by consumers at district hospitals and increase in income due to cash transfers. Reduction in the price of public hospital services will shift some consumers away from self care to hospital care at the margin. As long as the cash transfer is less than the full price, changes in demand will be influenced by the price effects. If the cash transfer is greater than the full price, the excess cash will increase income of households and will create an additional income effect.

The results suggest that even with relatively high levels of cash transfer, utilization of public hospitals is unlikely to exceed the 63 percent level. In fact, 63% rate of utilization is achieved at the cash transfer level of 700 NRs. This implies that the DSF should be able to attract almost all KA consumers willing to visit district hospitals for KA treatment by providing 700 NRs per case. Higher cash transfer will have relatively small impact on public hospital utilization rate. Note that utilization will continuously increase through income effects but the effect of income on utilization rate is relatively small. The predicted probabilities due to the introduction of DSF are given in table 7.4.

**Table 7.4: Effect of Cash transfer on probability of utilizing public hospital**

<i>Price and income effects of transfers</i>	<i>Assumed cash transfer levels under demand side financing</i>				
	<i>200NRs</i>	<i>500NRs</i>	<i>700NRs</i>	<i>1000NRs</i>	<i>1500NRs</i>
<b>Baseline (0.16)</b>					
Price effect	0.20	0.35	0.63	0.63	0.63
Income effect	0.18	0.20	0.22	0.24	0.28



### b. Knowledge on KA

To simulate the changes in knowledge index, average knowledge index was set at the levels 20, 25, 30, and 35. In the multinomial choice regression model, knowledge index was important in the choice of all the healthcare alternatives. Therefore, changes in knowledge index will affect utilization of all types of medical care services. Table 7.5 reports the predicted probability of choice of providers due to improvement in the knowledge index from 20 points to 35 points.

**Table 7.5: Effects of knowledge about KA on the choice of health care providers**

<i>Value of the knowledge index</i>	<i>Healthcare options available to KA consumers</i>				
	<i>Self care</i>	<i>Drugstore</i>	<i>Private provider</i>	<i>Public clinic</i>	<i>Public Hospital</i>
<b>Baseline probability of seeking care from Elasticity with respect to knowledge index</b>	<b>0.23</b>	<b>0.22</b>	<b>0.20</b>	<b>0.19</b>	<b>0.16</b>
	<b>-0.55</b>	<b>-0.11</b>	<b>-0.08</b>	<b>0.15</b>	<b>0.94</b>
Information 20 points	0.14	0.20	0.19	0.22	0.32
Information 25 points	0.12	0.20	0.18	0.22	0.35
Information 30 points	0.11	0.20	0.18	0.22	0.37
Information 35 points	0.10	0.19	0.18	0.23	0.39

### 7.3 Demand for multiple consultation of health services

The dependent variable is events of multiple visits 1, 2, 3, 4 and 5. We found that the individuals who have made more than five attempts other than public hospital in one episode of KA, however we used data up to five events of multiple visits to make adequate sample size for analysis.

**Table 7.6: Summary results of the explanatory variables**

<b>Variable</b>	<b>Category</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
<b>Number of visits</b>	Count	2.29	0.89	1.00	5.00
<b>Log of forward looking price</b>	Continuous	6.33	0.41	5.18	7.53
<b>Log of HH income</b>	Continuous	9.91	0.79	8.61	12.23
<b>HH size</b>	Continuous	6.58	2.42	2.00	20.00
<b>Disadvantaged group</b>	Dummy	0.49	0.50	0.00	1.00
<b>Married</b>	Dummy	0.53	0.50	0.00	1.00
<b>Beliefs</b>	Dummy	0.34	0.47	0.00	1.00
<b>Information index</b>	Continuous	9.17	12.03	-20.00	36.00
<b>Age</b>	Continuous	23.68	16.51	2.00	80.00
<b>Age squared</b>	Continuous	832.52	1026.65	4.00	6400.00
<b>Male</b>	Dummy	0.58	0.49	0.00	1.00
<b>Literate</b>	Dummy	0.39	0.49	0.00	1.00
<b>healthy days</b>	Continuous	336.00	9.65	285.00	352.00

In the public hospital, diagnostic and treatment services are provided free of cost; however, individuals have to pay associated cost of treatment and medicine and travel cost. At the first consultation to the health care providers, the direct payments included treatment cost, medicine cost, consultation fee and travel for each provider: average cost for public hospital was NRs 527. Health status is measured by number of healthy days in a year. Mean healthy days of KA consumers is 336 days with 9.65 standard deviations. Most of the other variables have been already discussed in the previous section.

### 7.3.1 Results of maximum likelihood estimation

We produced results of maximum likelihood estimation and marginal effects. The interpretation of the results from maximum likelihood estimation is difficult; however, results of marginal change facilitate to interpret the results.

Wald  $\chi^2$  statistic shows that the independent variables are jointly statistically significant at 1 percent level. At the same time, much of the variation is unexplained with Pseudo  $R^2$  being equal to 7 percent. In count data models, the R-square values are usually quite low compared to other models in cross sectional data. All variables which are statistically significant provide expected results. We estimated robust standard errors because this is the preferred empirical method for cross sectional data for robust regression analysis. The cross sectional data are characterized by substantial by overdispersion. Although we donot have zero visits to providers, we performed overdispersion test. The results allow utilizing poisson model to analyze the multiple visits.

The events of multiple visits are robustly determined by the forward looking provider prices. The probability of multiple visits for health care of KA increases as increased in forward looking prices. The result confirms that the prices of public hospitals are responsible to increase the multiple visits. The income has no effects of multiple visits to the providers. Similarly, gender, disadvantaged groups, beliefs, and married variables donot have any effects on increasing or decreasing of multiple visits. HH size and age encourage in increasing the events of multiple visits however higher age can reduce the multiple visits to the providers. Education, information and healthy days have greater power to reduce the multiple visits. The individuals who have information about KA from different sources for example, mass media, health professional, are more likely to visit directly to the public hospitals. The good health status can reduce the multiple visits. The individuals who have better health status, means they have better time to get the information or second opinion about treatment from other sources, that make better decision making for diagnosis and treatment of KA

**Table 7.7: Results of maximum likelihood estimation and marginal change**

Variable	Coeff.	Robust Std. Err.	dy/dx	Std. Err.
<b>LN forward looking price</b>	*0.0829	0.0357	*0.1821	0.0783
<b>LN HH income</b>	0.0086	0.0171	0.0189	0.0375
<b>HH size</b>	*0.0154	0.0049	*0.0339	0.0107
<b>Disadvantaged group</b>	-0.0180	0.0255	-0.0395	0.0561
<b>Married</b>	0.0036	0.0506	0.0080	0.1112
<b>Beliefs</b>	-0.0202	0.0348	-0.0442	0.0758
<b>Information index</b>	*-0.0036	0.0012	*-0.0079	0.0026
<b>Age</b>	**0.0065	0.0035	*0.0143	0.0077
<b>Age squared</b>	*-0.0001	0	*-0.0003	0.0001
<b>Male</b>	-0.0093	0.0256	-0.0205	0.0564
<b>Literate</b>	*-0.0740	0.0319	*-0.1612	0.0687
<b>healthy days</b>	*-0.0244	0.002	*-0.0537	0.0044
<b>Constant</b>	*8.3211	0.7612		
<b>Number of obs</b>	=	367.00	No problem of over dispersion	
<b>Wald chi2(12)</b>	=	356.32		
<b>Prob &gt; chi2</b>	=	0.00		
<b>Pseudo R2</b>	=	0.07		
<b>Log pseudolikelihood</b>	=	-513.59		

\*P&lt;0.01 \*\*P&lt;0.10

**Elasticity**

The elasticity measures the sensitivity analysis of demand for health care of KA that provides percentage change in price that leads to change in demand for multiple visits, however marginal effects are independent of percentage interpretation. The results demonstrate that demand for multiple visits is less sensitive with prices. If the price increased in one percent in the public hospital, it leads to less than one percent increase in multiple visits. If the price of forward looking provider, public hospital is reduced in one percent, there is probability of reducing multiple visits at a half percent point.

Table 7.8 Elasticity of forward looking price

Variables	Elasticity	Standard error
Price	*0.53	0.23
Income	0.08	0.17

\*P&lt;0.01



## 7.4 Discussion

In this study, we have used a demand framework widely used in the literature to analyze the demand for health care by KA consumers. In general, the KA consumers are relatively poor in the community and in our sample 90% of the KA consumers belonged to poor households (households below the official poverty line). Most of the KA consumers live in rural areas but the recommended treatment is available only in urban district hospitals, creating significant access problems for the KA consumers in Nepal. To estimate a model to explain the choice of healthcare providers, we have used the standard MNL regression with five alternative options. One of the potential problems of using multinomial logistic model is the assumption of IIA and Hausman test indicates that there is no significant IIA problem in the model.

The regression results indicate that prices of healthcare options, income of households, knowledge of KA, borrowing money for treatment, caste and other minority status, age of the person, perceived quality of services provided, trust in public hospitals, etc. affect the demand for health care. The coefficients of all the variables considered in the model are of expected signs. Our result is consistent with other studies that improved knowledge about the disease increases the utilization of desired type of health care facilities. Lack of information often leads to wrong decisions, which may adversely affect health outcomes and wellbeing of consumers.

Socio-demographic variables like age and gender of consumers, household size, education, belief system, etc., affect the choice of healthcare types but the directions of the effects cannot be defined by a priori considerations. The directions of the effects depend upon the nature of the study, illness being considered, severity of symptoms and probability of survival. In our study, there was no effect of education on health care utilization. The reason for this unexpected result could be because of the low educational attainments of KA consumers in general. Most of the KA consumers and their family members are either illiterate or have less than five years of education.

In developing countries, borrowing money to finance health expenses is very common (Van Damme et al, 2004, Adhikari et al, 2009). Lack of financial resources directly influences utilization of healthcare services. We find that borrowing money for the treatment of KA significantly lowers the likelihood of seeking care from public hospitals. In many empirical studies, information on borrowing for paying healthcare expenses is not considered and therefore, in many cases, empirical studies underestimate the total cost of healthcare services. Most studies concentrate on the impact of user fees on utilization but taking out a loan to pay for medical care services adds additional expenses with the user fees and has longer term impacts on economic and social wellbeing of the household (Van Damme et al, 2004, Adhikari et a, 2009).

Most of the households in our sample are extremely poor and poor individuals are likely to be more price sensitive (Ching 1995; Sauerborn et al, 1994). We find that the absolute values of price and income elasticity are relatively large for the sample. Given that we have considered five alternatives in the model, we expected relatively high elasticity numbers. However, the elasticity numbers are very high, probably because of the very low income levels of the households in the sample as well as our use of full price as the measure of medical care costs. Full price is calculated by adding the various cost items like cost of medical care and drugs, transportation cost and opportunity cost of time. A number of studies (Gertler and van der Gaag, 1990; Sauerborn et al 1994; Ching 1995; Borah, 2006) have used official price of services ignoring other cost items and in one case (Sahn et al, 2003), the researchers have used opportunity cost of time only for approximate the cost of seeking medical care. Therefore, our study has used more realistic measure of cost or price. Official prices of many health services are almost zero in many developing countries of the world but households spend quite significant amount of resources for receiving the services. In many cases, informal payment is high in many public facilities.

Due to high price elasticity of KA care and high spillover effects of KA on the society, policy makers may consider demand side financing (DSF) as an instrument to encourage utilization of public hospitals. We analyzed introduction of DSF with different levels of monetary incentives. The results suggest that it is difficult to

change the behaviour of people who consult drug store or other lower-level facilities through the incentive mechanism created by DSF. The incentives will significantly lower the use of self care and increase the utilization of public hospitals. Similarly, we have used knowledge index as another policy variable. In a poor developing country, knowledge about the illness can be improved significantly through health education interventions. If knowledge indices can be improved, the use of public hospitals will also increase significantly.

Better understanding the underlying process of demand for health care is quite important for producing desired outcomes from the public intervention in the health sector. When the individuals have got sick due to KA, they have to decide whether to seek medical care. The medical care is one of the inputs to improve the health status, while the cost of medical care reduces the consumption of other goods and services. The most important issue is that the individual not only have to decide whether to seek care but also what type of care they wish to demand. But there is no certain of expected health outcome from the choices (Arrow, 1963). There are possibilities of visiting different health providers to find the effective care subject to cost constraint. It is important to analyze decision-making process in several steps to look at the utilization patterns of health care services. Multiple care seeking events and switching between the types of providers are common in the developing countries (Mwabu et al, 1993; Savigny et al, 2004), not only due to the uncertainty of health outcomes but also supply constraints.

It is assumed in the first consultation of demand analysis that utilization is satisfied demand, it is independent with supply. Indeed, the reality is different, due the supply constraints; utilization is not equal to demand. There are many factors that make supply constraints, for example, limited opening time for out patient services, limited services available in the rural health care providers, or essential health services concentrated to one provider located to urban area have made supply constraints. The public hospitals have provided services at free of cost because the patients are willing to travel to more distance hospital to receive earlier treatment. But, travel time is quite high to come in the public hospital from the remote village.

They have intended to consult to the public hospitals but due to limited opening time for out patient care, eventually they have consulted other providers. In this case, demand is not equal to utilization of services and if we analyze the demand for health care based on first visit to the health care provider that will produce partial information and health care cost will be under estimated. But due to third party payment, the situation is different in developed countries; people have a propensity to bypass rural hospitals in favor of larger urban hospitals to consume additional services ( Varkevisser and van der Geest 2007; Escarce and Kapur 2009 ).

The paper has empirically examined the pattern of utilization of health care. The main findings of the study are: the prices of forward looking provider has significant positive effects on events of multiple visits, and the events of multiple visits have directly positive relation with the total cost of medical care. Although public hospital provides free services due to the limited access and choices of effective health care of KA, in terms of total medical care people are paying more. The out of pocket payment for KA is, therefore, higher than other tropical diseases and it has greater catastrophic and impoverishing impacts on household (Adhikari et al, 2009b).

We find that information has greater power to make the better decision to utilize the health services. We find the result similar to Kenkel (1990) that health information increases the utilization of health care facilities. Sufficient health information has greater role in decision making process and may help to increase the individual welfare (Thomson and Dixon, 2006).

The results conclude that there is provision of exemption for KA patient in the public hospital however most of the poor are less likely to visit public facilities. The similar study has supported the results that the poorest income quintile group is most likely to seek treatment in the informal sector in Nepal (Sharma, et al, 2004). Introduction of demand side financing can encourage to utilize public hospital services who got KA. There is evidence to introduce demand side financing to increase health care utilization in developing countries (Ensor and Cooper, 2004).



## 7.5 Conclusions

At least five points are worth highlighting the contributions of this section. First, little is known about the elasticity of demand for health care among the absolute poor groups and the impact of limited choices health services although services are provided at free of charge. The multinomial logit model without IIA problem confirmed by the Hausman test has exploited to analyze the demand for health care of KA and confirmed that prices of health care are highly sensitive among the absolute poor. Household income, access to information, household size, caste, attitude about modern health care among others are determining factors of demand for health care of KA; however, education is not a important factor to determine the utilization of health care of KA. Second, we used full price (both direct payment and opportunity cost of time) of health services; however, a number of studies have used either direct payment (excluding transportation cost) or opportunity cost of time to analyze the demand for health that grossly underestimate the price responsiveness. Third, we introduce the impact of access to information and DSF to determine the demand for health care. The body of literature on demand for health care explores the impact of prices of health care on health demand; however, impact of monetary incentive on health care demand is rarely found. Fourth, we find two most powerful policy instruments: DSF and access to information to increase the utilization of health services, particularly to absolute poor people. DSF scheme might be appropriate only in where a spillover effect is quite high.

Fifth, we extended the conventional empirical method of analyzing the demand for health care in like Nepal. This approach covers the multi stage decision making behavior to utilize the health care services for KA. This analysis has produced the pieces of information on the factors determining the demand for health care but also how the out of pocket payment has been increasing in the developing countries although government is still investing huge amount of money in the health sector. Limited choices of health care services and lack of information are the primary factors to increase the multiple visits and out of pocket payment. Expansion of the services for KA or introducing demand side financing for the neglected tropical diseases, like KA are the appropriate policy options for producing better results.

## CHAPTER VIII

### CONCLUSIONS LIMITATIONS AND FUTURE RESEARCH

#### 8.1 Conclusions

Decision making involves complex variables including cues and barriers to action that triggers specific patterns of behaviour. Resources, indigenous knowledge, perception, individual and household characteristics, among others may affect the decision making preferences. This study explores these influences and choices of providers in a specific population in KA endemic districts of Nepal. The government has provided free care services at the public hospitals; however, it is not clear why services are not at first preference for the people, quality is not a primary issue because, KA care is only available in these public hospitals. A number of studies related to demand for health care are found in the literature; however, they failed to fully explain the complex decision making behaviour to seek health care, particularly, poor people. The evidences clearly support that KA is a disease of poor communities and households; therefore, the study is poor community focused study. Following points are worth highlighting the contributions of this study.

1. The transmission of the infectious diseases is determined by the complex interactions between environmental and socioeconomic factors. Environmental factors are predicted to have a significant impact on disease transmission; moreover, socioeconomic factors modify the magnitude and direction of these impacts. A number of studies have examined possible determinants of KA in endemic countries of the world; however, most of them appear to have used either qualitative approaches or subjective speculations. None of the studies indicates in quantitative terms the potential effects of poverty-alleviation programs on the incidence of KA. The multivariate analysis has confirmed that burden of KA is disproportionately borne by vulnerable and marginalized groups. KA is most entrenched in the poorest communities. Elimination of KA is directly related to poverty alleviation because if the poverty incidence reduces by 10 percent, it will lead to reduction of KA incidence by 16 percent. The strategy for disease control or elimination should shift from traditional disease-centered approaches to a holistic approach that can break the links between poverty and

KA. To achieve the target of elimination of KA in Nepal by 2015, the poverty incidence should be reduced from existing poverty 27 percent to at least 16 percent in KA endemic areas. The association between poverty and KA reflects causality running in both directions: poverty multiplies KA incidence and KA pushes poor into marginal poor or further poverty.

2. The disease is preventable, but various environmental, socioeconomic, health care and health behaviour related variables affect its transmission. In an endemic region, unfavourable household characteristics can magnify the magnitude and direction of KA incidence. Logistic regressions are used to identify individual and household characteristics affecting the probability of having KA. Poverty incidence, being a member of disadvantaged population group, size of family and literacy are important in explaining the likelihood of having KA. Poverty influences the likelihood of KA directly and modifies the magnitude and direction of the effects of other variables. Poverty and illiteracy magnifies the problem of KA at the community level and simultaneous implementation of KA control interventions with effective poverty alleviation strategies is likely to be much more effective than the traditional disease control program alone.
3. This study uses a qualitative study framework to analyze the decision making process followed by households experiencing Kala Azar in accessing healthcare services. KA consumers can seek care from different providers and economic and social factors affect their choice. The study used a descriptive-explanatory design and information was collected through focus group discussions and in-depth interviews. The results suggest that the decision making related to seeking healthcare for KA treatment is a complex, interactive process. It appears that consumers and family members follow a well-defined road map for decision making. The process of decision making starts from the recognition of healthcare needs and then modified by a number of other factors like indigenous knowledge, healthcare alternatives and available resources. Household and individual characteristics also play important role in facilitating the process of decision making. The group discussion and in-depth interview results are consistent with the idea that KA consumers and family members follow rational approach of weighing the costs against the benefits of using specific types of medical care.

When the perceived cost of KA is considered high, households do not hesitate to borrow money at a very high interest rate. Since this is an investment versus future consumption type decision, it is likely that poor households would be more open to the idea of borrowing if the KA consumer is an important income earner for the family.

4. Analysis of demand for healthcare services for specific diseases is important for designing interventions for effective control of the diseases. This study examines the choice of healthcare providers for treating Kala Azar in Nepal. Information was collected from clinically diagnosed KA consumers seeking care from public hospitals located in KA endemic districts of the country. The survey collected information from more than 25 percent of total KA cases in the country. For empirical estimation of probability of choosing a provider-type as a first contact healthcare provider, a multinomial logit model was defined with five alternative options with self care as the reference category. About 90% of KA consumers in the sample belonged to very poor households. Since most of the KA consumers live in rural areas, they face very high cost of accessing public hospitals where effective KA treatment is available free of charge. About 80% of KA consumers reported borrowing money for paying medical care costs associated with KA treatment. Only 16 percent of KA consumers consulted the public hospital as the first contact provider. Almost 60 percent of KA consumers reported choosing the option which they thought provided quality healthcare services. Only 34 percent of KA consumers in the sample had positive impressions and opinions about modern care services, especially the care provided by public hospitals. The empirical model found that price of medical care services, income of households, knowledge of consumers on KA and KA treatment, borrowing money, age of consumer, perceived quality of provider types, etc. determine the likelihood of seeking care from the alternative options considered in the analysis. All variables have expected signs and are consistent with earlier studies. The price and income elasticity were found to be very high indicating that poorer households are very sensitive to price and income changes, even for a severe disease like KA. For policy analysis, we have explored two policy instruments: demand side financing and interventions to improve the knowledge index about KA. It is interesting to



note that financial incentives needed to encourage KA consumers to seek care from public hospitals is found to be about 700 NRs, much lower than the level Nepalese Ministry of Health is proposing for KA treatment. The results also indicate that improved knowledge on KA will also increase the utilization of public hospitals.

5. Conventional utility theory does not capture the complex situation of multiple visits to different health care provider to find the better quality. We use pragmatic method of demand analysis to capture some parts of complex situation. The study focuses on determinants of multiple visits to the providers. All KA patients should visit to the public hospital to get standard care, therefore, price of public hospital that is known as forward looking price can determine the multiple visits to the providers. The results suggest that the events of multiple visits are robustly determined by the forward looking provider prices. The income and some other variables, for example, gender, disadvantaged groups, beliefs, married and other have no effects of multiple visits to the providers. HH size and age encourage in increasing the events of multiple visits however higher age can reduce the multiple visits to the providers. Education, information and healthy days have greater power to reduce the multiple visits. The elasticity of forward looking price is not found quite high, but it has effects on utilization of public hospital.

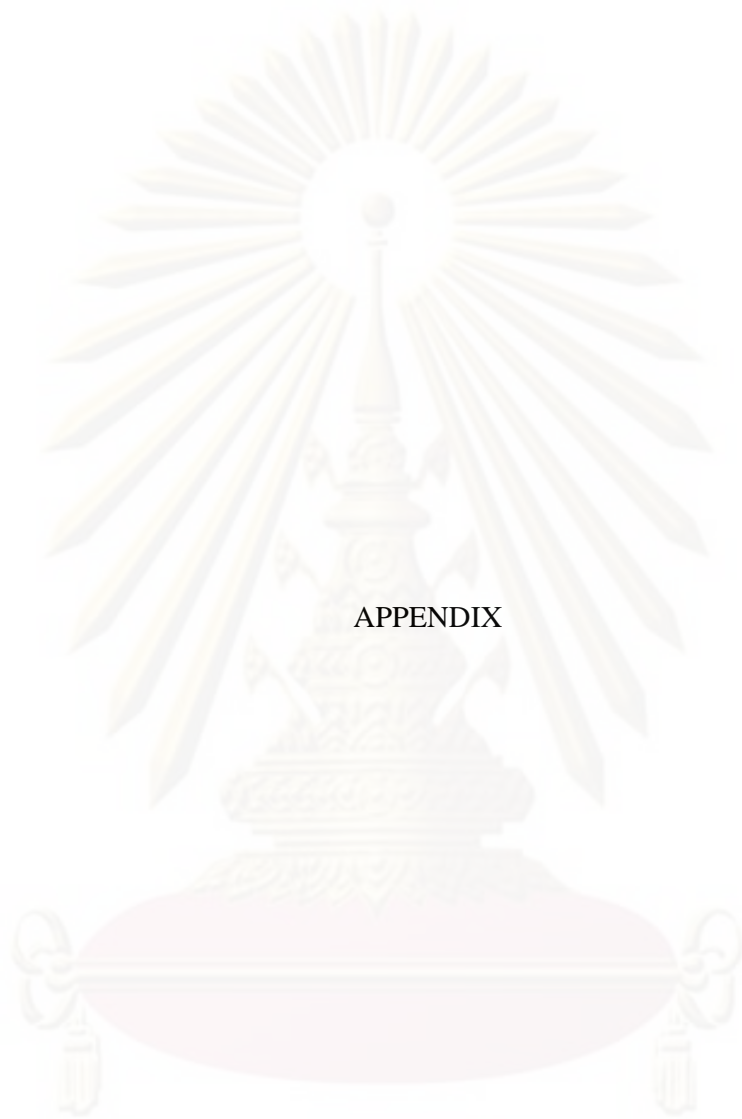
## **8.2 Limitations**

The outcomes of the study should be viewed, nevertheless, in light of some limitations. Specially, data were collected from hospitals the KA consumer who are still in communities may not be represented in this study. Data collection form door-to-door visit in the community can minimize the over or under-estimation of HH income data through crosschecking observable assets of the HHs. There might be information biased in collection of data from the hospital due to various reasons such as medical treatment error, identification of case (KA subjects) and control (non-KA subjects) variables. Methodological problem, particularly, was found in analysis of multiple visits to the providers. It is difficult to establish the utility maximization model in demand for multiple visits to health care providers. We used demand

characteristics in demand analysis, but incorporation of supply side characteristics, for example, number of staff, technology used, and other facilities in the hospitals may give better results in demand analysis. We analyzed the determinants of burden of disease by utilizing community and household characteristics; however, we could not use interaction of community and household variable that might explore better results. It is unlikely that the results can be generalized to the rural poor in Nepal or elsewhere; however, the findings are likely to be applicable in KA endemic areas of Bangladesh and India.

### **8.3 Future research**

This study has explored the quantitative relationships between community level characteristics and individual and household characteristics with incidence of disease; however, due to limitation of data, the study could not explain the impact of interaction of household and community characteristics on incidence of disease. The comprehensive study in this area can explore new dimension in disease control. Similarly, demand side financing is going to be introduced for KA treatment, we analysed through policy simulation model among the hospital service consumers; however, real impact in the community of the scheme can be found in the impact evaluation study. We explore the room for new study in demand for health by utilizing multiple visits to providers. This study is related to disease specific study. Such a study is also important in general health care demand as well.



APPENDIX

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

**Informed Consent Form for KA patient/ Non KA patient/ participants of FDG and in-depth analysis**

**DEMAND FOR MEDICAL CARE: AN ECONOMIC ANALYSIS OF KALA AZAR IN NEPAL**

I am Shiva Raj Adhikari and doing research study for academic purpose on the disease Kala-azar (KA), which, as you know, is a disease causing weakness for a long time or even death of the patient, affecting 12 of the 75 districts of Nepal and over one quarter of the nation's population.

Purpose of the research: KA is an important cause of illness in the Terai region of Nepal. In order to find ways for effective prevention and therapy measures to reduce the effects of KA in the future, we need a better understanding of what are the social, economic, cultural and behavioral factors that affects the availability of health care facilities for KA. We also need an understanding of what are the costs of treatment and how many days the affected household members cannot go for work and the loss of income to the household. We need to know what impacts have been imposed by these factors on the household economy. The information you provide on the basis of your experience as a KA household will help to make policies related to elimination of KA.

Procedure: The interviewer will inform about the study to the KA patient/ care taker/ household members. If the requested respondent agree to participate, the interview will proceed with signing in the Informed Consent Form by the concerned KA patient/ care taker/ household members or by some independent literate witness selected by the household members and who has no relation with the study team, in case of illiterate households. The interviewer will conduct the interview in the presence of the KA patient, household head and the caretakers. If the KA patient is a child, the information should be collected only in the presence of the parent or the caretaker.



The interviewer will not provide options while asking questions and will circle from among the alternatives or fill in the blank space provided in the questionnaire as mentioned by the informants. The interviewer will continue to probe until a response is obtained from the informants. If the informants are not willing to answer any question, the interviewer will move to the next question.

You are being requested to take part in this discussion because we feel that your experience as a KA household can be of much help to this research. You will be asked about your availability of health care facilities to you, health seeking behaviour, the cost of treatment of KA, workdays lost in course of the treatment, your household income etc.

If you do not wish to answer any of the questions asked to you during the interview/survey, you may say no and the interviewer will move on to the next question/skip that part of the question. The interview will be conducted in your local language. The information recorded is considered confidential, and no one else except Shiva Raj Adhikari can get the information documented during your interview.

**Risks and Discomforts:** There may be a slight discomfort when you have to recall your experiences related to treatment seeking behaviour of people. Similarly, there is a slight risk in sharing some confidential household information about your household income, loans borrowed in course of KA treatment etc. However, we do not wish this to happen, and you may refuse to answer any question or not take part in a portion of the interview if you feel the question(s) are personal or if [talking/writing] about them makes you uncomfortable.

**Benefits/ Incentives:** There will be no direct benefit to you, but your participation is likely to help us for better understanding the situation of availability of health care facilities, utilization and economic loss from KA on the community so that it will help in making policies for increasing health care facilities for KA as well as elimination of KA in the future. You will not be provided any monetary benefits to take part in the research.

**Confidentiality:** The information that we collect from this research for academic purpose will be kept confidential. Information about you that will be collected from the study will be stored in a file that will not have your name on it, but a number

given to it instead. The name associated with the number given to each file will be kept under lock and the key will not be allowed to anyone except Shiva Raj Adhikari. Right to refuse or withdraw: You do not have to take part in this research if you do not wish to do so, and refusing to participate will not affect your right to prevention and treatment at the health facilities in your community in any way in the future.

You may stop participating in the interview at any time, and refusing to participate will not affect your right to prevention and treatment at the health facilities in the community in any way in the future.

Who to contact: If you have any questions you may ask those now or later. If you wish to ask questions later, you may contact any of the following: Shiva Raj Adhikari, Nepal Health Economics Association, Maharajgunj, Kathmandu, Tel: (00977-1) 4413503, fax: (00977-1) 4373054 email: [nhea@wlink.com.np](mailto:nhea@wlink.com.np)

This proposal has been reviewed and approved by Nepal Health Research Council (NHRC), Ramsah Path Kathmandu, which is a committee whose task it is to make sure that research participants are protected from harm. If you wish to find about more about this study, Please contact Dr Sarad Onta, Member secretary, Nepal Health Research Council (NHRC), Ramsah Path Kathmandu, Nepal,

Tel: (00977-1) 4254220, (00977-1) 4227460, Fax: (00977-1) 4262469, (00977-1) 4268284; Email: [nhrc@healthnet.org.np](mailto:nhrc@healthnet.org.np)

The expected duration of the interview is about 60-70 minutes.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

**Certificate of Informed Consent for KA patient/non KA patient/ participants of FDG and in-depth analysis**

I have been requested to take part in the research on “Demand for medical care: An Economic Analysis of Kala Azar in Nepal”. I have been told that the purpose of this research is to provide new insights into the decision-making behaviour of the people for KA care and recommendations for appropriate policy for control or elimination of KA in Nepal.

I have been told that as a research participant with experience of KA, I will be interviewed by an interviewer / asked to fill out a survey, containing various types of questions related to behaviour, treatment and diagnosis costs, visit to health care services, knowledge and information, loan borrowing for treatment, household income etc. I have been informed that it takes about 60-70 minutes to complete the interview/ discussion.

I have been informed that there might be risk and discomfort in sharing my personal or confidential experiences and if I do not wish to take part in the discussion, I may say so and keep quiet. I can also leave in the middle of the discussion.

I understand that there will be no direct benefit to me, but my participation is likely to help the in understanding the situation of availability of health facilities for KA and economic loss in the community so that policies can be prepared for control or elimination of KA in the future. This will benefit my community at large.

I have been assured that the information collected will be kept confidential. My name will be kept confidential if I do not want to reveal my identity and I shall not be called by my name during the discussion. The information collected from the study will be stored in a file that will not have my name on it, but a number assigned to it instead. The name associated with the number assigned to each file will be kept under lock and the key will not be allowed to anyone except Shiva Raj Adhikari. The tapes will be disposed after publication of the final report.

If I have any questions I can ask those now or later. If I wish to ask questions later, I may contact to:

Shiva Raj Adhikari, Nepal Health Economics Association, Maharajgunj, kathmandu,  
Tel: (00977-1) 4413503, fax: (00977-1) 4373054 email: nhea@wlink.com.np





## A. Questionnaire for Hospitalized KA Patients

DEMAND FOR MEDICAL CARE: AN ECONOMIC ANALYSIS OF KALA AZAR  
IN NEPAL

Name of the Interviewer:—

Name of Supervisor: –

Serial No. of Questionnaire: –

Name of hospitals:



ศูนย์วิจัยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย

## A. Out Patient and other related information

## Identification

Name of interviewer:

Date of interview:

Time interview started:

Time interview

concluded:

District:

VDC:

Ward No:

Village/Tole:

House No/ Identification:

Hospital ID No:

## Informant:

Mention the household (HH) head, Kala-azar (KA) patient, caretaker and persons involved in providing information.

Name:

S.N	Name	Number of schooling *	Sex	Age	Occupation **	Relation with patient
1						
2						
3						
4						
5						
6						
7						
8						

	a					

Name of the KA Patient

b. Name of HH head:

c. Name of caretaker:

**1. General Information**

1. Information on HH members

1.1 Caste/Ethnic Group: .....

1.2 Size of family:.....

1.3 Education/sex/ age of family members

Code:\* 0 for no education, 1for either just read or write their name and other completing years of education

\*\* 1= work in farm or agriculture field or, 2= Services (teacher, public or private or I/NGOs etc); 3= small business; 4= student; 5= manual labour; 6= housewife; 7= doing nothing (children or more than 60 years); 8= work in out side country; 9= others ( specify).....

**2. General information about the patient:**

Age: .....Years      1.1.2 Sex      a)Male      b) Female

1.1.3 Education: ..... 1.1.4      Weight      (while hospitalization).....

1.1.5 Current marital status: a) Single    b) Married    c) Divorce    d) Widow  
e) Other .....

1.1.6 If married, Education of spouse (years of schooling completed).....

1.1.7 If child, education of mother (completed).....

1.1.8 If child, education of father (completed).....

- 2 What kind of work do you do?
- 2.1 Agriculture (work in field or agriculture labour)
  - 2.2 Service (in government or private, teacher, NGO, INGO etc)
  - 2.3 Business
  - 2.4 Student
  - 2.5 Manual labour
  - 2.6 Housewife
  - 2.7 Others (specify) .....
  - 2.8 Doing nothing (if child and 60+ age)
- 3 How much do you earn per day? (wage rate or per day income from any sources) indicate in per day)
- a) .....
  - b) If housewife, how much you have to pay for your work if you hire a person from the market?.....
- 4 When did you know you have KA?
- Year..... / Month..... / Day.....
- 5 Did you get illness a few months before KA?
- a) Yes
  - b) No
- 6 If yes, where did you visit for treatment?
1. Self-care/ people practicing medicine
  2. Traditional healer
  3. Quacks
  4. Drug store
  5. Private clinic
  6. Sub- health post
  7. Health post
  8. Health centre
  9. Private Hospital
  10. Nursing home
  11. Government hospitals
  12. Other specify.....



7 How many days did you feel illness in last 12 months due to all type of disease?

Days

.....  
.

Please write number of days when patient did not work due to illness during the period of 12 months

### 3. Cost of treatment and diagnosis of Kala Azar

1. Where did you consult after feeling unwell within two weeks at the first time for the treatment?

1. Self-care/ people practicing medicine
2. Traditional healer
3. Quacks
4. Drug store
5. Private clinic
6. Sub- health post
7. Health post
8. Health centre
9. Private Hospital/ Nursing home

10. Government hospitals

If government hospital, please go to Qu:6

11.

Other

specify.....

1.1 when did you go with this provider?

Year... month..... day.....

1.2 What were the expenses incurred in the following headings?

S. No.	Items of expenditure	Cost (Rs.)
1.		
2.		
3.		
4.		
5.		

	Total	
--	-------	--

- 1.2 Transportation Costs/ time:
1. transportation cost:
    - a. Means of transportation.....
    - b. One way travel cost for a person.....NRs
    - c. Number of persons went along with the patient .....
  - 2 One way travel time for visiting to health provider.....minutes
  3. Waiting time to see service provider.....minutes
- 1.4 What is the main source of medical expenditure for this health provider?
1. Household income
  2. Personal income
  3. Borrowing loans
  4. Past savings
  5. Selling assets such as livestock
  6. Other specify.....
- 1.4.1 if borrowed loan from whom.....
- 1.4.2 if borrowed, amount of loan.....
- 1.4.3 if borrowed, annual rate of interest.....
- 1.5 How many days were spent in course of treatment in this health provider?
- (a) Patient.....days
  - (b) Male caretaker: .....days; existing market wage rate  
Rs.....
  - (c) Female caretaker: .....days; existing market wage rate  
Rs.....
  - d) If housewife, how much you have to pay for your work if you hire a person  
from the market?.....
- 1.6 Why did you visit to this provider?
1. Nearer from household
  2. Beliefs with this provider

Please ask cross questions to make sure taking loans for treatment.
------------------------------------------------------------------------

3. Suggested by others
4. Appropriate provider for treatment
5. Quality of services (perceived quality of services)
6. Cheaper than other providers
7. Other (specify).....

If suggested by others,  
please go to Qu.1.7

1.7 If suggested by others, who suggested to consult this services?

1. Spouse
2. Parents
3. Parents in law
4. Other family members
5. Neighbour
6. Health workers
7. Other (specify).....

1.8 In what time did you consult the health care providers?

- a) Before 10 am
- b) 10 am to 1 pm
- c) 1 pm to 4 pm
- d) After 4 pm

1.9 What did you rate your health status (bad health) at that time?

- (a) Unrecognized sickness
- (b) Mild
- (c) Moderate
- (d) Severe

2. Where did you approach second for the treatment of KA?

1. Where did you consult the second time for the treatment?

1. Self-care/ people practicing medicine
2. Traditional healer
3. Quacks
4. Drug store
5. Private clinic

- 6. Sub- health post
- 7. Health post
- 8. Health centre
- 9. Private Hospital/ Nursing home
- 10. Government hospitals
- 11. Other

If government hospital, please go to Qu:6

specify.....

1.1 When did you go with this provider?

Year... .. month..... day.....

1.2 What were the expenses incurred in the following headings?

S. No.	Items of expenditure	Cost (Rs.)
1.		
2.		
3.		
4.		
5.		
	Total	

a. Transportation Costs/ time:

1. transportation cost:

a. Means of transportation.....

b. One way travel cost for a person.....NRs

c. Number of persons went along with the patient .....

2. One way travel time for visiting to health provider.....minutes

3. Waiting time to see service provider.....minutes

1.4 What is the main source of medical expenditure for this health provider?

- 1. Household income
- 2. Personal income
- 3. Borrowing loans
- 4. Past savings
- 5. Selling assets such as livestock

Please ask cross questions to make sure taking loans for treatment.



6. Other specify.....
- 1.4.1 If borrowed loan from whom.....
- 1.4.2 If borrowed, amount of loan.....
- 1.4.3 If borrowed, annual rate of interest.....
1. 5 How many days were spent in course of treatment in this health provider?
- (a) Patient.....days
- (b) Male caretaker: .....days; existing market wage rate  
Rs.....
- (c) Female caretaker: .....days; existing market wage rate  
Rs.....
- d) If housewife, how much you have to pay for your work if you hire a person  
from the market?.....
- 1.6 Why did you visit to this provider?
1. Nearer from household
  2. Beliefs with this provider
  3. Suggested by others
  4. Appropriate provider for treatment
  5. Quality of services (perceived quality of  
services)
  6. Cheaper than other providers
  7. Other (specify).....
- If suggested by others,  
please go to Qu.1.7
- 1.7 If suggested by others, who suggested to consult this services?
1. Spouse
  2. Parents
  3. Parents in law
  4. Other family members
  5. Neighbour
  6. Health workers
  7. Other (specify).....
- 1.8 In what time did you consult the health care providers?
- a) Before 10 am

- b) 10 am to 1 pm
- c) 1 pm to 4 pm
- d) After 4 pm

1.9 What did you rate your health status (bad health) at that time?

- (a) Unrecognized sickness
- (b) Mild
- (c) Moderate
- (d) Severe

3. Where did you approach third for the treatment of KA?

1. Where did you consult the third time for the treatment?

- 1. Self-care/ people practicing medicine
- 2. Traditional healer
- 3. Quacks
- 4. Drug store
- 5. Private clinic
- 6. Sub- health post
- 7. Health post
- 8. Health centre
- 9. Private Hospital/ Nursing home
- 10. Government hospitals
- 11. Other

If government hospital, please go to Qu:6

specify.....

1.1 When did you go with this provider?

Year... month..... day.....

1.2 What were the expenses incurred in the following headings?

S. No.	Items of expenditure	Cost (Rs.)
1.		
2.		
3.		
4.		

5.		
	Total	

Transportation Costs/ time:

1. transportation cost:
  - a. Means of transportation.....
  - b. One way travel cost for a person.....NRs
  - c. Number of persons went along with the patient.....
2. One way travel time for visiting to health provider.....minutes
3. Waiting time to see service provider.....minutes

1.4 What is the main source of medical expenditure for this health provider?

1. Household income
2. Personal income
3. Borrowing loans
4. Past savings
5. Selling assets such as livestock
6. Other specify.....

Please ask cross questions to make sure taking loans for treatment.

1.4.1 if borrowed loan from whom.....

1.4.2 if borrowed, amount of loan.....

1.4.3 if borrowed, annual rate of interest.....

1.5 How many days were spent in course of treatment in this health provider?

- (a) Patient.....days
- (b) Male caretaker: .....days; existing market wage rate Rs.....
- (c) Female caretaker: .....days; existing market wage rate Rs.....
- d) If housewife, how much you have to pay for your work if you hire a person from the market?.....

1.6 Why did you visit to this provider?

1. Nearer from household
2. Beliefs with this provider

3. Suggested by others
4. Appropriate provider for treatment
5. Quality of services (perceived quality of services)
6. Cheaper than other providers
7. Other (specify).....

If suggested by others,  
please go to Qu.1.7

1.7 If suggested by others, who suggested to consult this services?

1. Spouse
2. Parents
3. Parents in law
4. Other family members
5. Neighbour
6. Health workers
7. Other (specify).....

1.8 In what time did you consult the health care providers?

- a) Before 10 am
- b) 10 am to 1 pm
- c) 1 pm to 4 pm
- d) After 4 pm

1.9 What did you rate your health status (bad health) at that time?

- (a) Unrecognized sickness
- (b) Mild
- (c) Moderate
- (d) Severe

4. Where did you approach fourth for the treatment of KA?

1. Where did you consult the fourth time for the treatment?

1. Self-care/ people practicing medicine
2. Traditional healer
3. Quacks
4. Drug store
5. Private clinic



- 6. Sub- health post
- 7. Health post
- 8. Health centre
- 9. Private Hospital/ Nursing home
- 10. Government hospitals
- 11. Other

If government hospital, please go to Qu:6

specify.....

1.1 When did you go with this provider?  
 Year... .. month..... day.....

1.2 What were the expenses incurred in the following headings?

S. No.	Items of expenditure	Cost (Rs.)
1.		
2.		
3.		
4.		
5.		
	Total	

a. Transportation Costs/ time:

1. transportation cost:

- a. Means of transportation.....
- b. One way travel cost for a person.....NRs
- c. Number of persons went along with the patient.....

2. One way travel time for visiting to health provider.....minutes

3. Waiting time to see service provider.....minutes

1.4 What is the main source of medical expenditure for this health provider?

- 1. Household income
- 2. Personal income
- 3. Borrowing loans
- 4. Past savings

Please ask cross questions to make sure taking loans for treatment.

5. Selling assets such as livestock
6. Other specify.....
- 1.4.1 If borrowed loan from whom.....
- 1.4.2 If borrowed, amount of loan.....
- 1.4.3 If borrowed, annual rate of interest.....
- 1.5 How many days were spent in course of treatment in this health provider?
  - (a) Patient.....days
  - (b) Male caretaker: .....days; existing market wage rate  
Rs.....
  - (c) Female caretaker: .....days; existing market wage rate  
Rs.....
  - d) If housewife, how much you have to pay for your work if you hire a person  
from the market?.....
- 1.6 Why did you visit to this provider?
  1. Nearer from household
  2. Beliefs with this provider
  3. Suggested by others
  4. Appropriate provider for treatment
  5. Quality of services (perceived quality of  
services)
  6. Cheaper than other providers
  7. Other (specify).....
- 1.7 If suggested by others, who suggested to consult this services?
  1. Spouse
  2. Parents
  3. Parents in law
  4. Other family members
  5. Neighbour
  6. Health workers
  7. Other (specify).....

If suggested by others, please go to Qu.1.7
------------------------------------------------

1.8 In what time did you consult the health care providers?

- a) Before 10 am
- b) 10 am to 1 pm
- c) 1 pm to 4 pm
- d) After 4 pm

1.9 What did you rate your health status (bad health) at that time?

- (a) Unrecognized sickness
- (b) Mild
- (c) Moderate
- (d) Severe

5. Where did you approach fifth for the treatment of KA?

1. Where did you consult the fifth time for the treatment?

- 1. Self-care/ people practicing medicine
- 2. Traditional healer
- 3. Quacks
- 4. Drug store
- 5. Private clinic
- 6. Sub- health post
- 7. Health post
- 8. Health centre
- 9. Private Hospital/ Nursing home

10. Government hospitals

If government hospital, please go to Qu:6

11. Other

specify.....

1.1 When did you go with this provider?

Year... month..... day.....

1.2 What were the expenses incurred in the following headings?

S. No.	Items of expenditure	Cost (Rs.)
1.		
2.		
3.		

4.		
5.		
	Total	

1. Transportation Costs/ time:
  - a. transportation cost:
  - b. Means of transportation.....
  - c. One way travel cost for a person.....NRs
  - d. Number of persons went along with the patient.....
2. One way travel time for visiting to health provider.....minutes
3. Waiting time to see service provider.....minutes

1.4 What is the main source of medical expenditure for this health provider?

1. Household income
2. Personal income
3. Borrowing loans
4. Past savings
5. Selling assets such as livestock
6. Other specify.....

Please ask cross questions to make sure taking loans for treatment.

1.4.1 If borrowed loan from whom.....

1.4.2 If borrowed, amount of loan.....

1.4.3 If borrowed, annual rate of interest.....

1.5 How many days were spent in course of treatment in this health provider?

- (a) Patient.....days
- (b) Male caretaker: .....days; existing market wage rate Rs.....
- (c) Female caretaker: .....days; existing market wage rate Rs.....

d) If housewife, how much you have to pay for your work if you hire a person from the market?.....

1.6 Why did you visit to this provider?

1. Nearer from household



- 2. Beliefs with this provider
- 3. Suggested by others
- 4. Appropriate provider for treatment
- 5. Quality of services (perceived quality of services)
- 6. Cheaper than other providers
- 7. Other (specify).....

If suggested by others,  
please go to Qu.1.7

1.7 If suggested by others, who suggested to consult this services?

- 1. Spouse
- 2. Parents
- 3. Parents in law
- 4. Other family members
- 5. Neighbour
- 6. Health workers
- 7. Other (specify).....

1.8 In what time did you consult the health care providers?

- a) Before 10 am
- b) 10 am to 1 pm
- c) 1 pm to 4 pm
- d) After 4 pm

1.9 What did you rate your health status (bad health) at that time?

- (a) Unrecognized sickness
- (b) Mild
- (c) Moderate
- (d) Severe

6. How many health providers were visited before consulting the district or zonal hospitals, please write detail story.

.....  
.....  
.....  
.....

## 7. Expenditures in the Public hospital (District or Zonal hospital)

## 7.1 When did you go with this provider?

Year... .. month..... day.....

## 7.2 Out Patient service Costs of consulting public hospital

S. No	Headings	Costs Rs.
1.	Cost of Registration at hospital	
2.	Other (Specify)	
	Total Cost:	

## 7.3 Transportation Costs and time

## 1. Transportation Costs/ time:

- a. transportation cost:
- b. Means of transportation.....
- c. One way travel cost for a person.....NRs
- d. Number of persons went along with the patient.....

2. One way travel time for visiting to health provider.....minutes

3. Waiting time to see service provider.....minutes

## 7.4 What is the main source of medical expenditure for this health provider as outpatient?

1. Household income
2. Personal income
3. Borrowing loans
4. Past savings
5. Selling assets such as livestock
6. Other specify.....

Please ask cross questions to make sure taking loans for treatment.

7.4.1 If borrowed loan from whom.....

7.4.2 If borrowed, amount of loan.....

7.4.3 If borrowed, annual rate of interest.....

7. 5 Why did you visit to this provider?

1. Nearer from household
2. Beliefs with this provider
3. Suggested by others
4. Appropriate provider for treatment
5. Quality of services (perceived quality of services)
6. Cheaper than other providers
7. Other (specify).....

If suggested by others,  
please go to Qu.7.6

7.6 If suggested by others, who suggested to consult this services?

- a) Spouse
- b) Parents
- c) Parents in law
- d) Other family members
- e) Neighbour
- f) Health workers
- g) Other (specify).....

8.1.6 In what time did you consult the health care providers?

- a) Before 10 am
- b) 10 am to 1 pm
- c) 1 pm to 4 pm
- d) After 4 pm

8.1.7 What did you rate your health status (bad health) at that time?

- (a) Unrecognized sickness
- (b) Mild
- (c) Moderate
- (d) Severe

**B. Inpatients related cost (hospitalization costs)(This is for daily activity related to cost of KA)**

1. When you hospitalized the District Hospital or Zonal Hospital, what were the expenses on Medical costs? (Please follow hospital records too)

Medical costs of hospitalization (date of hospitalization.....)

S. No	Date (dd/m m/yy)	Headings	Costs Rs.
1.			
2.			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
		Total Cost:	

2. What were the expenditures made on food items for patient and caretaker (except those food item brought from the patients home)



## Food expenses during the hospitalization

S. No	Date (dd/mm/yy)	Headings	Costs Rs.
1.			
2.			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
		Total Cost:	

3. Did you incur any other costs during treatment there? Mention.

## Other expenses during the hospitalization

S. No	Date (dd/mm/y y)	Headings	Costs Rs.
1.			

2.			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
		Total Cost:	

4. What was the expenditure incurred in course of discharge from hospital (drugs, supplementary drugs etc)? Rs.....

5. Did you sell any of your properties to meet treatment expenses (gold, silver, land, domestic animals etc)? (*Please circle*)

(a) Yes      (b) No

5.1 If yes, what property? .....

5.2 In what quantity?.....

5.3 What was the total amount? Rs.....

*C. Beliefs for treatment and Perception about disease*

1 What did you do after feeling unwell?







- 5) Did you receive any information from health workers about KA?
- a) Yes
  - b) No
- 6) Did you receive any information from any other sources of information (teachers, friends, seeing patient, neighbour etc about KA?
- a) Yes
  - b) No
- 7) Is Continuous fever more than two week one of the signs and symptoms of KA?
- a) Yes
  - b) No
- 8) Is blackening of skin of hand, legs and face one of the signs and symptoms of KA?
- a) Yes
  - b) No
- 9) Is abdominal pain one of the signs and symptoms of KA?
- a) Yes
  - b) No
- 10) Is hepatosplenomegaly (liver and spleen enlargement) one of the signs and symptoms of KA?
- a) Yes
  - b) No
- 11) What causes KA infectious?
- a) Mosquito bite
  - b) Sandfly bite
- 12) Is animal shed the breeding places of sandfly?
- a) Yes
  - b) No
- 13) Are cracks and crevices the breeding places of sandfly?
- a) Yes
  - b) No

- 14) Are rotten things the breeding places of sandfly?  
a) Yes  
b) No
- 15) Do we control sandfly population?  
a) Yes  
b) No
- 16) Do we control through removal of the water collected in ditches sandfly population?  
a) Yes  
b) No
- 17) Do we control sandfly population filling and plastering cracks and crevices?  
a) Yes  
b) No
- 18) Do we control sandfly population through spraying insecticides sandfly population?  
a) Yes  
b) No
- 19) Do we control sandfly population through using insecticide bed net sandfly population?  
a) Yes  
b) No
- 20) Does KA transmitted by mosquito bite?  
a) Yes  
b) No
- 21) Does dirty environment facilitate KA transmission?  
a) Yes  
b) No
- 22) Does staying with KA patient transmit KA?  
a) Yes  
b) No
- 23) Can people prevent themselves from KA?

- a) Yes  
b) No
- 24) Can people protect themselves from KA?  
a) Yes  
b) No
- 25) Can sandfly bite be prevented by sleeping in the upstairs?  
a) Yes  
b) No
- 26) Can sandfly bite be prevented by not sleeping in the animal shed?  
a) Yes  
b) No
- 27) Can sandfly bite be prevented by wearing full sleeve dress?  
a) Yes  
b) No
- 28) Can sandfly bite be prevented by avoiding staying outside in the evenings ?  
a) Yes  
b) No
- 29) Can sandfly bite be prevented by massage of mustard oil on exposed parts of the body?  
a) Yes  
b) No
- 30) Can sandfly bite be prevented by keeping domestic animals away from living places?  
a) Yes  
b) No
- 31) Can sandfly bite be prevented by cleaning environment?  
a) Yes  
b) No
- 32) Can sandfly bite be prevented by plastering the wall/floor?  
a) Yes  
b) No





Maize			
Wheat			
Barley			
Potato			
Oil Seeds			
Black Gram			
Masuro			
Arahar			
Vegetables			
Tobacco			
Sugarcane			
Fruits			
Others(specify)			
	Total Income from Agriculture		

2. Is your land rented in?

a) yes                      b) no

2.1. If yes, please indicate the area of land.....

2.2 If yes, how much do you produce and how much do you give to property owner?

Income from the production of crops

Name of Crops	Production Quantity (Indicate Unit of Measurement)	Amount to give to the Property owner	Local Selling Price (Rs.)	Income (Rs.) (remaining quantity of production *)

				price)
Paddy				
Maize				
Wheat				
Barley				
Potato				
Oil Seeds				
Black Gram				
Masuro				
Arahar				
Vegetables				
Tobacco				
Sugarcane				
Fruits				
Others(specify)				
	Total Income from Agriculture			

### 2.3 Cost of cultivation

Name of Crops	Seeds	Local Selling Price (Rs.)	Fertilizer (Rs)	Hired labour (in Rs)	Cost of tractor/ox (in Rs)	Other costs
Paddy						
Maize						
Wheat						

Barley						
Potato						
Oil Seeds						
Black Gram						
Masuro						
Arahar						
Vegetabl es						
Tobacco						
Sugarcan e						
Fruits						
Others(s pecify)						
Total						

Net income (Rs) = total Amount of production- total amount given to property owner-  
cost of cultivation .....

3. Do you have own land?

a) yes                      b) no

3.1. If yes, please indicate the area of land.....

3.2 If yes, how much do you produce?

Income from the production of crops

Name of Crops	Production Quantity (Indicate Unit of Measurement)	Local Selling Price (Rs.)	Income (Rs.)
Paddy			
Maize			





Masuro						
Arahar						
Vegetables						
Tobacco						
Sugar cane						
Fruits						
Others(specify)						
Total						

Net income (Rs) = total production- cost of cultivation .....

3.4 Did you receive money from rented out tractor or craft animal in the past 12 months?

- a) Yes
- b) No

3.5 If yes, amount in NRS.....

4. Income from Livestock

Do you have livestock?

- a) Yes
- b) No

If yes, list of the livestock.

(a) Annual earning (last 12 months) from sales of livestock Rs.....

(b) Annual earning from selling eggs (Rs).....

(c) Annual earning selling dairy products (Rs) .....

(d) Other (please mention).....(Rs).....

4.1 Livestock expenditures

(a) Fodder (Rs).....

(b) Veterinary services (Rs).....

(c) Purchasing cost of livestock (Rs).....

4.2 Net income from livestock =.....

## 5. Earnings from Wage and Salary

SN	Name of the workers in the household	Type of works (permanent/ daily wage/ contract/ piece rate/ other	Wage rate (monthly/ daily) please indicate		Annual income	Remarks
			In kind	In Rs		
1						
2						
3						
4						
5						
6						
		Total income				

## 6. Non-farm enterprises income

## 6.1 Gross revenues from non-agriculture/enterprises/ activities during past 12 months

(Rs).....

## 6.2.1 Cost of enterprises

a) Labor cost of enterprises (Rs).....

b) Energy cost (Rs).....

c) Expenditure on raw materials (Rs).....

d) Other operating cost (Rs).....

e) Share of revenues paid to partners (Rs) .....

f) Other (please mention).....(Rs).....

Net income = gross income- cost =.....

## 7. Income from speculation

a) Income from interest rate (Rs) .....

b) Income from Dividends (Rs) .....

c) Profit earning from shares and savings/ deposits (Rs) .....

d) Commission and royalties.....

## 8. Transfer income

b) Income from Remittance (Rs) .....

c) In-kind transfer from government

- i) Oil from government through school children .....  
in Rs.....
- ii) Launch box through school children.....  
in Rs.....
- c) Pension income.....
- d) income from social security ( allowance for widow and old age people).....
- e) Other specify.....

9. Intra- household transfer income (for example received from patents in law)

(NRS)

S N	Particular (please mention name of items)	Any things received as gift from another household ( market value)	Any things received as gift from another household (Market value)	Net income

10. Miscellaneous income (mention details)

Revenue from sales assets: .....

Rental income.....

.....

.....

B. Questionnaire for non-KA Patients

DEMAND FOR MEDICAL CARE: AN ECONOMIC ANALYSIS OF KALA AZAR  
IN NEPAL

Name of the Interviewer:–

Name of Supervisor: –

Serial No. of Questionnaire: –

Name of hospitals:

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย



### A. General information

#### Identification

Name of interviewer:

Date of interview:

Time interview started:

Time

interview

concluded:

District:

VDC:

Ward No:

Village/Tole:

House No/ Identification:

Hospital ID No:

Informant:

Mention the household (HH) head, non-KA patient, caretaker and persons involved in providing information.

Name:

- a. Name of the non- KA Patient
- b. Name of HH head:
- c. Name of caretaker:
- d. Other members of the HH:

#### General Information

##### 1. Information on HH members

1.3 Caste/Ethnic Group: .....

1.4 Size of family:.....

##### 1.3 Education/sex/ age of family members

S.N	Name	Numb er of school ing	Sex	Age	Occupatio n	Relation with patient
1						

2						
3						
4						
5						
6						
7						
8						

### Treatment seeking and Treatment Expenditure

#### 1. General information

##### 1.1 General information about the patient:

Age: .....Years

1.1.2 Sex a)Male

b) Female

i. Education: ..... 1.1.4 Weight (while hospitalization).....

ii. Current marital status: a) Single b) Married c) Divorce d) Widow e) Other .....

iii. If married, Education of spouse (years of schooling completed).....

iv. If child, education of mother (completed).....

v. If child, education of father (completed).....

##### 1.2 What kind of work do you do?

(a) Work in the field (ones own or for wage)

(b) Service (in government or private, teacher, NGO, INGO etc)

(c) Business

(d) Study

(e) Manual labour



- (f) Sub- health post
- (g) Health post
- (h) Health centre
- (i) Private Hospital
- (i) Nursing home
- (k) Government hospitals
- (l) Other specify.....

Costs related first consultation

2.1.1 What were the expenses incurred in the following headings?

S. No.	Items of expenditure	Cost (Rs.)
1.		
2.		
3.		
4.		
5.		
	Total	

2.1.2 Transportation Costs/ time:                      Means of transportation:

Items	Rs/ time	No of persons
Cost of one way transportation (Rs.)		
Travel time in minutes		
Waiting time in minutes		

2.1.3 What is the main source of medical expenditure for this health provider?

- a) Household income
- b) Personal income



- c) Borrowing loans
- d) Past savings
- e) Selling assets such as livestock
- f) Other specify.....

2.1.4 How many days were spent in course of treatment in this health provider?

- (a) Patient.....days
- (b) Male caretaker: .....days; existing market wage rate  
Rs.....
- (c) Female caretaker: .....days; existing market wage rate  
Rs.....
- d) If housewife, how much you have to pay for your work if you hire a person  
from the market?.....

2.1.5 Why did you visit to this provider?

- (a) Nearer from household
- (b) Beliefs with this provider
- (c) Suggested by others
- (d) Appropriate provider for treatment
- (e) Quality of services (perceived quality of services)
- (f) No cost
- (g) Cheaper than other providers
- (i) Other (specify).....

2.1.6 If suggested by others, who suggested to consult this services?

- a) Spouse
- b) Parents
- c) Parents in law
- d) Other family members
- e) Neighbour
- f) Health workers
- g) Other (specify).....

2.1.7 In what time did you consult the health care providers?

- a) Before 10 am

- b) 10 am to 1 pm
- c) 1 pm to 4 pm
- d) After 4 pm

2.1.8 What did you rate your health status (bad health) at that time?

- (a) Unrecognized sickness
- (b) Mild
- (c) Moderate
- (d) Severe

#### Information on Household Income

##### Farm income

1. Is your land rented out?

- a) Yes
- b) No

2. If yes, please indicate the area of land.....

3. How much do you receive income (in kind or amount) from rented land?

##### Income from the production of crops

Name of Crops	Production Quantity (Indicate Unit of Measurement)	Local Selling Price (Rs.)	Incom e (Rs.)
Paddy			
Maize			
Wheat			
Barley			
Potato			
Oil Seeds			
Black Gram			
Masuro			
Arahar			
Vegetables			
Tobacco			

Sugarcane			
Fruits			
Others(specify)			
	Total Income from Agriculture		

2. Is your land rented in?

a) yes                      b) no

2.1. If yes, please indicate the area of land.....

2.2 If yes, how much do you produce and how much do you give to property owner?

Income from the production of crops

Name of Crops	Production Quantity (Indicate Unit of Measurement)	Amount to give to the Property owner	Local Selling Price (Rs.)	Income (Rs.) (remaining quantity of production * price)
Paddy				
Maize				
Wheat				
Barley				
Potato				
Oil Seeds				
Black Gram				
Masuro				
Arahar				
Vegetables				

Tobacco				
Sugarcane				
Fruits				
Others(specify)				
	Total Income from Agriculture			

### 2.3 Cost of cultivation

Name of Crops	Seeds	Local Selling Price (Rs.)	Fertilizer (Rs)	Hired labour (in Rs)	Cost of tractor/ox (in Rs)	Other costs
Paddy						
Maize						
Wheat						
Barley						
Potato						
Oil Seeds						
Black Gram						
Masuro						
Arahar						
Vegetables						
Tobacco						
Sugarcane						



e						
Fruits						
Others(s pecify)						
Total						

Net income (Rs) = total Amount of production- total amount given to property owner-  
cost of cultivation

3. Do you have own land?

a) yes                      b) no

3.1. If yes, please indicate the area of land.....

3.2 If yes, how much do you produce?

Income from the production of crops

Name of Crops	Production Quantity (Indicate Unit of Measurement)	Local Selling Price (Rs.)	Income (Rs.)
Paddy			
Maize			
Wheat			
Barley			
Potato			
Oil Seeds			
Black Gram			
Masuro			
Arahar			
Vegetable s			
Tobacco			
Sugarcane			
Fruits			

Others(specify)			
	Total Income from Agriculture		

## 3.3. Cost of cultivation

Name of Crops	Seeds	Local Selling Price (Rs.)	Fertilizer (Rs)	Hired labour (in Rs)	Cost of tractor/ox (in Rs)	Other costs
Paddy						
Maize						
Wheat						
Barley						
Potato						
Oil Seeds						
Black Gram						
Masuro						
Arahar						
Vegetables						
Tobacco						
Sugarcane						
Fruits						
Others(specify)						



		Total income		
--	--	--------------	--	--

## 6. Non-farm enterprises income

6.1 Gross revenues from non-agriculture/enterprises/ activities during past 12 months (Rs).....

## 6.2.1 Cost of enterprises

a) Labor cost of enterprises (Rs).....

b) Energy cost (Rs).....

c) Expenditure on raw materials (Rs).....

d) Other operating cost (Rs).....

e) Share of revenues paid to partners (Rs) .....

f) Other (please mention).....(Rs).....

Net income = gross income- cost =.....

## 7. Income from speculation

a) Income from interest rate (Rs) .....

b) Income from Dividends (Rs) .....

c) Profit earning from shares and savings/ deposits (Rs) .....

d) Commission and royalties.....

## 8. Transfer income

d) Income from Remittance (Rs) .....

e) In-kind transfer from government

iii) Oil from government through school children .....

in Rs.....

iv) Launch box through school children.....

in Rs.....

c) Pension income.....

d) Income from social security (allowance for widow and old age people).....

e) Other specify.....

9. Intra- household transfer income (for example received from patents in law)

(in NRS)

S	Particul	Any	things	Any	things	Net income
---	----------	-----	--------	-----	--------	------------



N	ar (please mention name of items)	received as gift from another household (market value)	received as gift from another household (Market value)	

10. Miscellaneous income (mention details)

Revenue from sales assets: .....

Rental income.....

.....

.....

E. Inpatients related cost (hospitalization costs)

1. When you hospitalized the District Hospital or Zonal Hospital, what were the expenses on Medical costs? (Please follow hospital records too)

Medical costs of hospitalization (date of hospitalization.....)

S. No	Date (dd/mm/yy)	Headings	Costs Rs.
1.			
2.			
3			
4			
5			
6			
7			
8			
9			

10			
11			
12			
13			
14			
15			
16			
17			
		Total Cost:	

2. What were the expenditures made on food items for patient and caretaker (except those food item brought from the patients home)

Food expenses during the hospitalization

S. No	Date (dd/mm/yy)	Headings	Costs Rs.
1.			
2.			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

15			
16			
17			
		Total Cost:	

3. Did you incur any other costs during treatment there? Mention.

Other expenses during the hospitalization

S. No	Date (dd/mm/yy)	Headings	Costs Rs.
1.			
2.			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
		Total Cost:	

4. What was the expenditure incurred in course of discharge from hospital (drugs, supplementary drugs etc)? Rs.....

5. Did you borrow any loan for the treatment? (*Please circle*)

(a) Yes (b) No

5.1 Please provide details: when, for whom to visit, from where, in what amount and how much interest rate?

SN	Service providers	date	From where (e.g. landlord, relatives...)	amount	Interest rate	Remarks
1	(a) Traditional healer/ self-care/ people practicing medicine					
2	(b) quacks					
3	(c) drug store					
4	(d) private clinic					
5	(e) sub-health post					
6	(f) health post					
7	(g) health centre					
8	(h) Private					





Potato			
Oil Seeds			
Black Gram			
Masuro			
Arahar			
Vegetables			
Tobacco			
Sugarcane			
Fruits			
Others(specify)			
	Total Income from Agriculture		

2. Is your land rented in?

a) yes                      b) no

2.1. If yes, please indicate the area of land.....

2.2 If yes, how much do you produce and how much do you give to property owner?

Income from the production of crops

Name of Crops	Production Quantity (Indicate Unit of Measurement)	Amount to give to the Property owner	Local Selling Price (Rs.)	Income (Rs.) (remaining quantity of production * price)
Paddy				
Maize				
Wheat				

Barley				
Potato				
Oil Seeds				
Black Gram				
Masuro				
Arahar				
Vegetabl es				
Tobacco				
Sugarcan e				
Fruits				
Others(s pecify)				
	Total Income from Agriculture			

### 2.3 Cost of cultivation

Name of Crops	Seeds	Local Selling Price (Rs.)	Fertilize r (Rs)	Hired labour (in Rs)	Cost of tractor/ ox (in Rs)	Other costs
Paddy						
Maize						
Wheat						
Barley						
Potato						

Oil Seeds						
Black Gram						
Masuro						
Arahar						
Vegetabl es						
Tobacco						
Sugarcan e						
Fruits						
Others(s pecify)						
Total						

Net income (Rs) = total Amount of production- total amount given to property owner-  
cost of cultivation

3. Do you have own land?

a) yes                      b) no

3.1. If yes, please indicate the area of land.....

3.2 If yes, how much do you produce?

Income from the production of crops

Name of Crops	Production Quantity (Indicate Unit of Measurement)	Local Price (Rs.)	Selling Price (Rs.)	Income (Rs.)
Paddy				
Maize				
Wheat				

Barley			
Potato			
Oil Seeds			
Black Gram			
Masuro			
Arahar			
Vegetables			
Tobacco			
Sugarcane			
Fruits			
Others(specify)			
	Total Income from Agriculture		

### 3.3. Cost of cultivation

Name of Crops	Seeds	Local Selling Price (Rs.)	Fertilizer (Rs)	Hired labour (in Rs)	Cost of tractor/ ox (in Rs)	Other costs
Paddy						
Maize						
Wheat						
Barley						
Potato						
Oil Seeds						
Black Gram						





(c) Purchasing cost of livestock (Rs).....

5. Earnings from Wage and Salary

SN	Name of the workers in the household	Type of works (permanent/ daily wage/ contract/ piece rate/ other	Wage rate (monthly/ daily) please indicate		Annual income	Remarks
			In kind	In Rs		
1						
2						
3						
4						
5						
6						
		Total income				

6. Non-farm enterprises income

6.1 Gross revenues from non-agriculture/enterprises/ activities during past 12 months (Rs).....

6.2.1 Cost of enterprises

- a) Labor cost of enterprises (Rs).....
- b) Energy cost (Rs).....
- c) Expenditure on raw materials (Rs).....
- d) Other operating cost (Rs).....
- e) Share of revenues paid to partners (Rs) .....
- f) Other (please mention).....(Rs).....

Net income = gross income- cost =.....

7. Income from speculation

- a) Income from interest rate (Rs) .....
- b) Income from Dividends (Rs) .....
- c) Profit earning from shares and savings/ deposits (Rs) .....
- d) Commission and royalties.....

8. Transfer income

- f) Income from Remittance (Rs) .....
- g) In-kind transfer from government
  - v) Oil from government through school children .....  
in Rs.....
  - vi) Launch box through school children.....  
in Rs.....
- c) Pension income.....
- d) income from social security ( allowance for widow and old age people).....
- e) Other specify.....

9. Intra- household transfer income (for example received from patents in law)

(in NRS)

S N	Particular (please mention name of items)	Any things received as gift from another household ( market value)	Any things received as gift from another household (Market value)	Net income

10. Miscellaneous income (mention details)

Revenue from sales assets: .....

Rental income.....

.....

.....

จุฬาลงกรณ์มหาวิทยาลัย

## C. Questionnaire for In-depth interview in the community

DEMAND FOR HEALTH CARE: AN ECONOMIC ANALYSIS OF KALA AZAR  
IN NEPAL

Name of the Interviewer:–

Name of Supervisor : –

Serial No. of Questionnaire: –

Questionnaire

*1. Identification*

Name of interviewer:

Date of interview:

Time interview started:

Time interview

concluded:

District:

VDC:

Ward No:

Village/Tole:

House No/ Identification:

Hospital ID No:

*2. Informant:*

Mention the household (HH) head, Kala-azar (KA) patient, caretaker and persons involved in providing information.

Name:

- a. Name of the KA Patient
- b. Name of HH head:
- c. Name of caretaker:
- e. Other members of the HH:

## General Information

## 1. Information on HH members

1.5 Caste/Ethnic Group: .....

1.6 Size of family:.....

## 1.3 Education/sex/ age of family members

S.N	Name	Number of schooling	Sex	Age	Occupation	Relation with patient
1						
2						
3						
4						
5						
6						
7						
8						

## Treatment seeking and Treatment Expenditure

## 1. General information

## 1.2 General information about the patient:

Age: .....Years      1.1.2 Sex      a) Male      b) Female

vi. Education: .....

vii. Current marital status: a) Single    b) Married    c) Divorce    d) Widow    e) Other .....

viii. If married, Education of spouse (years of schooling completed).....

ix. If child, education of mother (completed).....

x. If child, education of father (completed).....

## 1.2 What kind of work do you do?

- (a) Work in the field (ones own or for wage)
- (b) Service (in government or private, teacher, NGO, INGO etc)
- (c) Business
- (d) Study
- (e) Manual labour
- (f) Housewife
- (g) Others (specify) .....
- (h) Doing nothing (if child and old age)

1.3 How much do your earn per month/week/ day? (Please indicate time dimension, if possible, please indicate in per day)

- a) .....
- b) If housewife, how much you have to pay for your work if you hire a person from the market?.....

1.4 When did you have illness?

Year..... / Month..... / Day.....

1. 5 Did you get illness last 12 month?

- a) Yes
  - b) No
- If yes, date: dd/mm/yy.....

2. Where did you approach at that time for treatment?

- (a) Self-care/ people practicing medicine
- (b) Traditional healer
- (c) Quacks
- (d) Drug store
- (e) Private clinic
- (f) Sub- health post
- (g) Health post
- (h) Health centre
- (i) Private Hospital
- (j) Nursing home
- (k) Government hospitals
- (l) Other specify.....



3. What are the signs and symptoms of illness (please consult with physician to find the possible KA)

- a) Fever (two daily spikes, abrupt or gradual in onset)
- b) Fever persists for one to six weeks and then disappears, only to reappear at irregular intervals without any prostration
- c) Progressive weakness
- d) Pallor
- e) Weight loss
- f) Gastrointestinal disturbances like nausea, vomiting and diarrhea
- g) Enlargement of spleen and liver

4. Why didn't you visit to the hospital for treatment? (Multiple answers possible)

- a) This was not serious case
- b) There was financial problem
- c) Hospitals are very far
- d) Family member not allowed to consult hospitals
- e) Any other (specify).....

5. Details of each reason (write in details)

5.1 Serious disease (why not serious):

.....  
 .....

5.2 Financial problems (what types, taking loans, too much costs).....

.....

5.3 Hospital too far (what are the consequences of this).....

.....

5.4 Other family member not allow to visit (why, and particularly who, what are the consequences).....

.....

6. How is far public hospital from this area in term of travel time?

- a) Less than half an hour
- b) ½ hr to 1 hr
- c) one to 2 hrs



D. Checklist for Focus Group Discussion in the community

DEMAND FOR MEDICAL CARE: AN ECONOMIC ANALYSIS OF KALA AZAR  
IN NEPAL

Name of the Moderator:–

Name of Transcribers: –

1.....

2.....

Focus groups are informal sessions in which participants are asked to discuss their perception on Kala azar disease, externalities, risk, and public goods. Moderator will chair the session and encourage in discussing on concerned topics in the following points. Two researchers will note down their views in systematic ways.

- Types of disease  
What types of infectious disease appeared in this area?  
(such as malaria, Kala azar, Japanese ensephitis, dengue etc.)
- History of disease  
When did occur KA in first time?  
Time interval of KA occurrence?
- Pattern of disease  
Is the trend of KA increasing, constant or decreasing?  
What determine the trend of KA?
- Burden of disease  
How many numbers of KA cases was in last 12 months?  
How many death cases were found in last 12 months?  
Why death occurred? Not visited to the hospitals? Or treatment failure?
- Signs and symptom of KA  
What are the signs and symptoms of KA?  
How do you know locally about KA?  
Is possible to know KA by local people?
- Risk of KA  
How did you rate the degree of risk about KA?

Is this very dangerous or fatal or normal disease?

- Treatment seeking behaviour
  - If you know you have signs and symptoms of KA where did you visit first time for treatment?
  - Generally where did you first time visit when you got illness?
  - Why did you visit the health care provider?
  - Is this related affordability?
  - Is this related to beliefs and culture?
- Perception of quality of services in public health providers
  - Why did you visit other than public hospitals?
  - What are factors not visiting to public hospital for treatment at first?
  - Time? Waiting time, travel time, and opening time for the hospital.....
  - Quality of services? .....
- Beliefs
  - Beliefs about KA, do you believe modern treatment in hospitals?
- Elimination of KA
  - Did you know about the elimination of KA?
  - What do you mean by elimination?
- KA Private/ Public goods
  - Who are the responsible for treatment of KA, patient her or himself or society?
- Community role for providing information
  - Did you know about the KA before?
  - From where did you receive information?
  - Did you share this information to the other people?
  - Why did not you share?
  - Did you encourage to consulting hospitals for treatment who is possible of KA patients.
- Health facilities
  - What are the experiences of consulting public health care services?

How far public health is available?

- Sources of income

What are the main sources of income of this community?

Is there significant amount of remittance in this community?

- Occupation

What are the primary occupations of this community?

- Poverty situation

How many households are poor, are they risk of KA?

- Education

Education status of the community:

How many schools, how many local teachers, how many illiterate people, illiteracy skewed to the lower caste people?

- Other public facilities

Other facilities, electricity, schools, roads, irrigation facilities,

- Any other issues raised by the communities



## BIOGRAPGY

Mr. Shiva Raj Adhikari was born on April 23, 1967, in Palpa Nepal. He graduated from high school at 16! He earned his Bachelor Degrees in Economics at Tribhuvan Multiple Campus, Palpa. In 1992, He received his Master of Art in Economics from Tribhuvan University Nepal. He joined Tribhuvan University as a lecturer of economics in 1997. Mr. Adhikari involved several research activities in economics and published articles in national and international journals. He was awarded a scholarship from UNICEF/UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases (TDR), Geneva for his PhD training in July 2005. Then he joined the Doctor of Philisophy Program in Economics, Chulalongkorn University in September 2005.



ศูนย์วิทยทรัพยากร  
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