J Vector Borne Dis 49, December 2012, pp. 242–248

An assessment of a substitute or complement for inpatient and outpatient care of visceral leishmaniasis in Nepal

Shiva Raj Adhikari

Patan Multiple Campus, Department of Economics, Patan Dhoka Lalitpur, Nepal

ABSTRACT

Background & objectives: The burden of visceral leishmaniasis (VL) in Nepal, as in other developing countries, falls disproportionately upon the rural poor. Promoting use of outpatient (OP) care, an alternative to inpatient (IP) care has long been advocated to reduce cost of care in both the demand and supply sides as substitution of relatively cheaper resources for expensive resources in the production of health care services. The paper aims to assess the intensity of demand for VL care and explore possibilities of the substitutability or complementation patterns between OP care and IP care of VL.

Methods: In order to explore the possibility of substitute (or complement) of OP care for IP care, we exploited the ordinary least squared method by utilizing recently collected data from the VL endemic districts of Nepal. The sample size represented >25% of the population of VL of the country. The paper measured the sensitivity analysis of demand for OP and IP cares using appropriate demand models.

Results: The coefficients of demand models gave negative relationship between quantity demanded for health care and their prices. It is plausible that OP price has strong power than IP price to determine the respective quantity demanded for health care. As expected, income has negative sign, but not significant that means income has no effect on determining the demand for health care because VL is a disease of poor.

Conclusion: Recently, improvements in treatment and diagnostic techniques suggest a substitute of OP care for IP care; however, the OP and IP cares are complements due to behavioural factors.

Key words Complement; demand; Nepal; price; substitution; visceral leishmaniasis

INTRODUCTION

Visceral leishmaniasis (VL) is re-emerging as a devastating and impoverishing disease. The burden of disease in Nepal, as in other developing countries, falls disproportionately upon the rural poor. VL is mainly confined to the southern plains of eastern and central regions of Nepal and more than eight million people are at risk[1]. In recognition of significant public health problem and its consequences, the Government of Nepal has codified a provision of exemption of VL-related treatment and diagnosis costs for the people in the public hospital. Because of its impact on society, the disease specific studies have dedicated substantial effort on economic burden and its consequences on household economy (e.g. few published papers[2–8]); however, there are limited studies which assess the burden of diseases on the health system[9]. This is important because burden on health system can reduce quality of treatment which may exacerbate the impact of diseases to affected households and can increase costs of care both in supply and demand sides. A number of studies suggested that hospital-based care has significant economic consequences on household economy[2–4, 8, 10].

Promoting use of outpatient (OP) care, an alternative to inpatient (IP) care has long been advocated to reduce cost of care in both the demand and supply sides as substitution of relatively cheaper resources for expensive resources in the production of health care services[11,12]. Most of the studies (for example, few published papers[11–13]) examined the substitutability patterns between OP and IP cares in general health; however, such studies remain important in diseases-specific study because of homogeneous nature of treatment procedures. From an extensive search of literature, no effort had been made on the cost containment treatment strategies on the specific disease through exploring the substitutability patterns between OP and IP cares. On the other hand, previous studies included medical cost of treatment, as a price variable; but in developing countries, prices of medical services are heavily subsidized or even provided free of cost. In this case, the quality of services has greater influence in substitutability of health care[14]. The assessment of substitution of OP care for IP care can explore the alternative strategies to ensure the quality of health care services. The degree of substitutability can help to explore the innovative method of designing the treatment strategies[15, 16]. The

evidences can provide the support to make the allocative and technical efficiencies in production and distribution of health care services. The societal costs (sum of costs of providers and consumers) of treatment can be reduced by changing the behaviour patterns of demanders and suppliers of VL care services.

The assessment of substitution of OP care for IP care is not straightforward. Many factors, for example, new innovation in technology, drugs, diagnostic tools, prices and access to services, case management strategies, among others determine the degree of substitutability of health care[11]. Effective case management technologies, field-level serological diagnosis tool (dipstick rk39) and new oral drug–Miltefocine[17, 18] among others technically assure some degree of substitution between OP and IP cares in VL treatment. In addition to this, behavioural factors are important to determine the degree of substitutability between OP and IP cares. Again, there are several possible mechanisms by which IP care could be a complement with OP care. We know that complementary cares are those that tend to be delivered/consumed together. If the use of OP care increases the use of IP care, there is complementary effect on OP care. Similarly, if the use of OP care decreases the use of IP care, there is substitution effect on OP care. OP and IP cares are independent of each other when OP and IP cares are non-related. The change in the demand for OP care in response to the change in price of IP care represents the cross elasticity of demand of OP care for IP care. The cross elasticity of demand between the two substitute cares is positive, that is, in response to the price of one service, the demand for the other service rises. On the other hand, when two services are complementary with each other, the rise in price of one service brings about the decrease in demand for other service. Therefore, cross elasticity of demand between the two complementary services is negative. In the given situation, it is not clear whether increased use of OP care decreases (or increases) the use of IP care. Thus, additional research into this policy relevant issue is critically needed.

This paper contributes to the aforementioned literature with assessment of the substitution of OP care for IP care of VL. Specifically, the paper answers two questions from a demand analysis: (i) Do prices of VL care determine the utilization of IP and OP care?; and (ii) Is there substitutability of OP care for IP care of VL? The paper aims to assess the intensity of demand for VL care and to explore possibilities of the substitutability patterns between OP care and IP care of VL. In order to explore the substitute (or complement) of OP care for IP care, we exploited the ordinary least squared method by utilizing recently collected data from primary sources in Nepal. Prices of IP and OP cares robustly determine the quantity demanded for OP and IP cares; however, income has no effect in both type of cares. Similarly, price elasticities of OP and IP cares are highly significant. Cross-elasticity of OP with respect to IP price is negative, indicating that OP and IP cares are complementary. Cross-elasticity of IP with respect to OP price (e_{ipop}) is positive but it is not economically significant; the coefficient is too small. The results, therefore, suggest that the OP and IP cares are complements due to behavioural factors.

METHODS

Sampling procedure and data collection

Probability and non-probability sampling procedures were applied to collect the required data from the primary survey. The five districts: Siraha, Saptari, Dhanusha, Mahottari and Sarlahi out of 12 endemic districts of Nepal were purposively selected from the previous year hospital recorded data where the incidences were higher than 1.5 per 10,000 risk population. There are six public hospitals; and these institutions have the sole facility in their respective districts for diagnosis and treatment of VL.

A mix of qualitative and quantitative study design was used to ensure the valid and reliable data collection. Focus group discussion and in-depth interview, in eight communities, were conducted before designing the questionnaire and conducting the survey. All VL subjects who received care from the hospitals of sampled districts during the study period (October to December 2008) were respondents of the study; however, all the respondents were not captured due to various reasons, for example, some of them were not interested to participate in the study, some of them could not provide the required information, among others. Eventually, we collected required information from 367 (out of 379) respondents and the response rate was 96.8%. The reported total VL cases in Nepal for the year 2007–08 were 1371[1]; based on these data, the sample size thus represented more than one quarter of the population of VL. We observed daily activity by developing the roster for all subjects, who were hospitalized in these hospitals. The author of the paper along with trained and experienced researchers involved in collecting data including cost of care, socioeconomic characteristics of individual and household related to an episode of VL treatment through administration of a pre-designed and pre-tested questionnaire to the household head as a financer, adult patient, or caretakers, to all, as far as possible to minimize the recall bias. Ethical clearance for this study was obtained from WHO/TDR, Geneva

and Nepal Health Research Council, Kathmandu, Nepal.

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. SPSS version 11.5 was primarily used for data management and STATA version 11.2 was used for data analysis.

Model specification

The pragmatic approach of demand analysis is used in this analysis, similar to others[11–13]; demand for both OP and IP cares are postulated to depend on various factors, including prices of care, household income, education, information, healthy days, caste, perception, beliefs, gender, household size, age, and marital status among others. We estimated four different implications of the prices: (a) Quantity demanded for OP care; (b) Influence of IP price on demand for OP care; (c) Quantity demanded for IP care; and (d) Influence of OP price on demand for IP care. Ordinary least squares (OLS) regression analysis was used to estimate the demand for OP and IP cares. In summary, demand for OP visits and IP days can be written as in equations (1) and (2) respectively:

$$D_i^{op} = f(P_i^{OP}, P_i^{IP}, INC_i, INF_i, SIZE_i, AGE_i, EDU_i, HDAY_i, CASTE_i, G_i, M_i, BLF_i, PER_i) \quad \text{.....(1)}$$

$$D_i^{ip} = f(P_i^{OP}, P_i^{IP}, INC_i, INF_i, SIZE_i, AGE_i, EDU_i, HDAY_i, CASTE_i, G_i, M_i, BLF_i, PER_i) \quad \text{.....(2)}$$

Where, D_i^{op} = Quantity demanded for OP care (in visits) for individual i; D_i^{ip} = Quantity demanded for IP care (in days) for individual i; P_i^{OP} = Price of OP care; P_i^{IP} = Price of IP care; INC_i = Household income for individual i; INF_i = Information about VL for individual i; $SIZE_i$ = Household size for individual i; AGE_i = Age of the individual i; EDU_i = Highest education in the household in years of schooling; $HDAY_i$ = Total healthy days in a year for the individual i; $CASTE_i$ = Caste of the individual i, dummy variable: dalit (=1) and non-dalit (= 0); G_i = Gender of the individual i, dummy variable: male (=1) and female (= 0); BLF_i = Belief (attitude) about modern health care i, dummy variable: positive (=1) and attitude (=0); and PER_i = Perception about risk of VL i, dummy variable: risk (=1) and no risk (=0).

We took natural log for dependent and primary interest of independent variables. Dependent variables are OP care and IP care. Demand for OP care is measured in number of visits to health care providers after having signs and symptoms of VL. Demand for IP care is measured in number of days hospitalized in the public hospitals to get the treatment of VL. Own price of the care is expected to have the usual negative relationship with quantity of health care demanded. However, the cross prices may have positive or negative relation with OP or IP care. We estimated price elasticity to measure the sensitivity of quantity demanded for health care with respect to own price. The coefficient of price elasticity of demand for health service measures, the percentage change in the quantity of the service demanded for per episode (per unit of time) resulting from a given percentage change in price of the services. Since price and quantity demanded are inversely related, the coefficient of elasticity of demand is a negative number. We estimated elasticity similar to other demand equation by exploiting the following formula.

$$\text{Elasticity} = \text{Marginal change} \times \frac{\text{Mean of own price}}{\text{Mean of dependent variable}}$$

Where, marginal change = Change in dependent variable/change in own price.

We estimated the cross price elasticity using similar method to know whether OP and IP cases are complement or substitute or independent. The coefficient of cross elasticity of demand of OP care with respect to IP care measures the percentage change in the amount of OP care utilized per unit of time resulting in percentage change in price of IP care. The coefficient of cross elasticity may be positive (if cares are substitute) or negative (if cares are complements) or zero (if cares are non-related). For the cross price elasticity, cross prices were used, for example, the price of IP care is used as independent variable if the dependent variable is OP care.

Measurement of variables and summary results

It is difficult to measure the prices of health care for VL because the amount of money paid to the VL care can not represent the true price, due to at least two reasons: first, health services are provided free of charge but associated costs are paid by the consumers and second, quality of VL services in the providers varies among the service providers because standard care of VL only available in public hospital. Again, quality of care is a complex issue[19] and this can be treated as technical quality that is available in the providers, as well as perceived quality that is detected by the consumers. In this paper, total ex-

penditures made on treatment, diagnosis, drugs, transportation, and food among others consider as prices of health care; however, there is still a problem in quality adjusted prices. The quality adjusted price means here proper treatment of VL and the actual price of the services. It is assumed that prices paid to the public hospital represent the gold standard of quality adjusted price for VL because standard care of VL is only available in the public hospitals. We estimated the quality adjusted price index by utilizing Herfildahl index. The index measures the monopoly power based on the size of firms in the health industry[20,21]. Similarly, the public hospitals have monopoly power in terms of providing standard care of VL. The index provides an indicator of the amount of competition among them; higher value of concentration index means higher monopoly power. In the health care market, there is positive relation between price and concentration index[21]. Hence, higher price index ensures higher quality adjusted prices. It is believed that the index captures both technical quality and perceived quality of the providers. The first choice of health provider has highest perceived quality of care from the consumer perspective; however, it is not sure whether it has technical quality or not. If the consumer visits other than public hospital for VL care, there might be the lower technical quality for VL; but there remains significant percentage of perceived quality. The following formula, thus, ensures quality adjusted price for OP care.

$$P_q^o = \Sigma_{i=1}^n S_i^2$$

Where, n= Number of visits to the providers, S= Share of payment for the provider i out of total health care payment to all the providers. We took natural log of the quality adjusted price. Average logarithm value for quality adjusted price is 1.19.

Problem remains in price of IP care as well. Beds, some drugs, and given listed meals for VL patients are provided at free of charge or at heavily subsidized prices in public hospitals; however, the consumers should pay for associated medical cost, some drugs from the market, food and accommodation cost while they are hospitalized for IP care. Therefore, paid amount of money cannot represent the actual (or market) price of IP care. On the other hand, price of IP care may be varied with intensity of care. The hospitals generally used age and body weight of the individual to provide IP care. The degree of severity determines the amount of administrating drug, nursing care, doctor's care among others. Primary initial indicators of degree of severity are weight and age. We estimated the quality adjusted price for IP care by using weighted of multiplication of age and body weight. Hence, quality adjusted price for IP care be:

$$P_q^i = \frac{1}{\omega} \Sigma_{i=1}^n Ci$$

Where, ω = Weight of IP care (age × body weight at the admission time); C = Component of cost i, for example associated cost, food cost, etc; and average logarithm value for quality adjusted price for IP care is 2.73.

Household income is also a determinant of demand for health care. The household income is based on annual income cycle that captures all sources of incomes including home production of the household, wage and salary, income from wealth, remittances, livestock, rent, among others. The relationship between demand for health care

Table 1. Summary results of the variables

Variables	Definition and category of data	Mean	S.D.	Min	Max
OP service	Number of visits & continuous	0.73	0.3783	0	1.79
IP service	Hospitalized days & continuous	2.84	0.1789	2.48	3.22
Price of OP	Quality adjusted OP price & continuous	1.19	1.8027	–3.85	5.58
Price of IP	Quality adjusted IP price & continuous	2.73	1.4075	–0.8002	6.51
HH income	Annual household income & continuous	9.91	0.7897	8.61	12.23
HH size	Household size & continuous	6.58	2.4165	2	20
Age	Age of the patient & continuous	23.68	16.5143	2	80
Education	Highest years of schooling & continuous	3.76	3.8366	0	15
Information	Information index & continuous	9.17	12.0341	–20	36
Healthy days	Healthy days in a year & continuous	336	9.6523	285	352
Caste	Caste category & dummy	0.49	0.5006	0	1
Gender	Gender of patient & dummy	0.58	0.4946	0	1
Marital status	Marital status of patient & dummy	0.53	0.5000	0	1
Beliefs	Attitude on modern care & dummy	0.66	0.4727	0	1
Perceptions	Risk perception about VL & dummy	0.56	0.4972	0	1

Source: Estimated from survey data.

and income may be either positive or negative because health services can be luxurious good or necessary goods from the consumer perspective. Higher income groups can utilize more health care, as a result of higher income, there may be positive income effect; however, VL is disease of the poor, it is more likely to have negative effect. The log value of average income is 9.91 (Table 1). Information for the individual is an index that is derived from 38 questions. We gave +1 for correct answer and –1 for incorrect answer. The sum of the marks gives us an information index. The index varies from –20 to +36 and the mean value is 9.17 (Table 1). Information about VL will have positive effect on health care demand. All the other variables are self-explanatory. Beliefs and perceptions have positive impact on demand for health care; however, for remaining variables, it is difficult to determine prior to estimation.

RESULTS

The demand for both OP and IP cares is postulated to depend upon various economic and sociodemographic factors. Table 2 provides the log linear regression estimates of demand for OP and IP cares. Overall explanatory power of the regression for OP care is high; however, it is quite low for IP care. The OLS regression results are reported in Table 2. Most of the OLS parameter estimates for OP and IP cares are significant with expected sign. The specification tests for both the models are satisfied that there are no omitting variable problems in the model. We produce robust standard errors that help to correct heteroskedasticity problem. The coefficients of both price variables give a strong support for the hypothesis that there is negative relationship between quantity demanded for health care and their prices.

It is plausible that OP price has a strong power than IP price to determine the respective demand for health care. As expected because VL is disease of poor, income has negative sign, but not significant that means income has no effect on determining the demand for health care. Information on VL has negative effect on OP visits. The individual or household who has information about VL directly consulted to public hospital that makes lower visits for OP care. It is plausible that the individual who has information consumes more IP services. Obviously, healthy people have lower demand for health care. Caste is also an important determinant for demand of both OP and IP cares for VL. Gender, marital status, perception don't have any effect on determining demand for health care. Positive attitude or belief about modern care is more likely to visit health care providers.

Elasticity

The elasticity measures the sensitivity analysis of de-

Table 2. Results of log linear regression estimates of demand for OP and IP cares

Variables	Outpatient care		Variables	Inpatient care	
	Coefficients	Robust S.E.		Coefficients	Robust S.E.
Price of OP	–0.1074^{+}	0.0061	Price of IP	–0.0282*	0.0124
HH income	–0.0189	0.0139	HH income	–0.0013	0.0127
HH size	0.0150^{+}	0.0043	HH size	–0.0068	0.0038
Age	0	0.0010	Age	–0.0011	0.0010
Education	–0.0003	0.0032	Education	–0.0034	0.0025
Information	–0.0026^{+}	0.0008	Information	0.0032^{+}	0.0008
Healthy days	–0.0158^{+}	0.0014	Healthy days	–0.0077^{+}	0.0013
Caste	0.0626^{+}	0.0208	Caste	–0.0657^{+}	0.0172
Gender	–0.0219	0.0203	Gender	–0.0101	0.0179
Marital status	0.0031	0.0336	Marital status	–0.0267	0.0296
Beliefs	0.0733^{+}	0.0242	Beliefs	–0.0178	0.0191
Perceptions	0.0232	0.0205	Perceptions	–0.0013	0.0177
Constant	6.1946	0.4906	Constant	5.6392^{+}	0.4452
F (12, 354)	=	69.86	F(12, 354)	=	6.93
Prob > F	=	0	Prob > F	=	0
R-squared	=	0.7569	R-squared	=	0.1957
Root MSE	=	0.18967	Root MSE	=	0.16318
Model specification test			Model specification test		
F (3, 351)	=	37.19	F(3, 351)	=	4.88
Prob > F	=	0	Prob > F	=	0.0024

*Significant at 5% level; $^{+}$Significant at 1% level; S.E.= Standard error. *Source:* Estimated from survey data.

Table 3. Own and cross price elasticity

Prices	OP care		IP care	
	Elasticity	S.E.	Elasticity	S.E.
OP price	–0.17527	0.01031	–0.10459	0.05291
IP price	0.005468	0.00247	–0.02702	0.01192

All are significant at 1% level. *Source:* Estimated from survey data.

mand for OP and IP cares that provides percentage change in price that leads to change in demand for care. The results of estimation of elasticity are shown in Table 3. Own price elasticities of both OP and IP cares are negative, indicating negative association between price and quantity demanded of health care. If the price of OP care increased by 10% that leads to decrease in demand for OP care by 17%. Similarly, if the price of IP care is increased by 10%, the demand for IP care will decrease by almost 2%. It is plausible that the demand for OP care is more price sensitive than IP care. The effect of a change in the price of OP care on the demand for IP care is also estimated. A negative cross price elasticity, e_{opip}, (OP price and demand for IP care) confirms that OP and IP cares are complements from OP perspective. The cross price elasticity from IP price and demand for OP care is positive, indicating that both are substitutes from IP perspective; however, it is not economically significant. The coefficient of cross elasticity, e_{ipop}, is approached to zero. Therefore, IP and OP cares are almost independent of each other from IP perspective.

DISCUSSION & CONCLUSION

The substitutability among different types of medical services is an important one for the health program because right mix of OP and IP care can reduce the health care cost. Several possibilities of substitution are found in the process of treatment, for example, one drug can be substituted for another; patient can be moved from one hospital to another hospital; preventive can be substituted for treatment when a new vaccine is developed. Substitution always occurs for better quality, reduction cost or health improvement. The substitution may arise from several sources such as technological innovation, medical knowledge, changed in social organization, behaviour of the people; and development of treatment procedures among others.

This paper determined whether new case management designed to increased use of OP care results in decrease (substitution) or increase (complementation) usage of IP care because of effective case management technologies, field-level serological diagnosis tool, among others are recently improved in VL treatment[18]. In order to explore the possibility of inducing the substitution of IP for OP care, demand functions for outpatient visits and inpatient days are estimated by OLS methods using recently collected data.

It is plausible that OP price has a strong power than IP price to determine the respective demand for health care. This is logical too because people have greater choices among the health providers based on prices, but there is limited choices for IP care. Quantity demanded for IP care and its price has negative association. The elasticity of IP care demanded with respect to IP price is 3% that is lower than the elasticity of OP demand. Price effect of OP care is larger than IP care. It is clear that price of care determines the choice of health service providers. The cross elasticity is negative and statistically significant at 1% level. It indicates that OP and IP cares are complements. Technically, there is possibility of substitution of OP care for IP care as mentioned above; however, present situation of health care market and behaviour of VL patients suggested OP and IP cares are complements. The results are supported by the findings of some other similar cross-sectional studies of Gill *et al*[22]. Some of the studies produced conflicting results with this finding[23–25].

ACKNOWLEDGEMENTS

The author is thankful to Pirom Kamol-Ratanakul, Mahmud Khan and Siripen Supakankunti and two anonymous reviewers for their valuable comments and suggestions on this paper. Financial support for this training is provided by UNICEF/UNDP/World Bank/WHO Special Program for Research and Training in Tropical Diseases (TDR), Geneva.

REFERENCES

1. *Annual Report 2007–08*. Kathmandu, Nepal: Department of Health Services, Ministry of Health and Population, Government of Nepal 2009.
2. Ayieko P, Akumu AO, Griffiths UK, English M. The economic burden of inpatient paediatric care in Kenya: Household and provider costs for treatment of pneumonia, malaria and meningitis. *Cost Effectiveness Resource Allocation* 2009; *7:* 3 doi:10.1186/1478-7547-7-3.
3. Rijal S, Koirala S, Van der Stuyft P, Boelaert M. The economic burden of visceral leishmaniasis for households in Nepal. *Trans R Soc Trop Med Hyg* 2006; *100:* 838–41.
4. Sharma A, Bern C, Varghese B, Chowdhury R, Haque R, Ali M, *et al*. The economic impact of visceral leishmaniasis on households in Bangladesh. *Trop Med Int Health* 2006; *11*(5): 757–64.
5. Sharma BP, Maskay NM, Adhikari SR, Andrews JR, Joshi AB,

Wijeyaratne P, *et al*. Socio-economic determinants of kala-azar in Nepal. *J Nepal Health Res Council* 2004; *2*(1): 35–42.
6. Asenso-Okyere WK, Dzator JA. Household cost of seeking malaria care: A retrospective study of two districts in Ghana. *Social Sci Med* 1997; *45:* 659–67.
7. Russell S. The economic burden of illness for households in developing countries: A review of studies focusing on malaria, tuberculosis, and human immunodeficiency virus/acquired immunodeficiency syndrome. *Am J Trop Med Hyg* 2004; *71*(Suppl. 2): 147–55.
8. Adhikari SR, Maskay NM, Sharma BP. Paying for hospital-based care of kala-azar in Nepal: Assessing catastrophe, impoverishment and economic consequences. *Health Policy Planning* 2009; *24*(2): 129–39.
9. Adhikari SR, Maskay NM, Sharma BP. Burden of kala-azar on the local health system in the Danusha and Mahottari districts of Nepal. *J Inst Med* 2001; *23* (1&2): 11–6.
10. Flores G, Krishnakumar J, O'Donnell O, van Doorslaer E. Coping with health-care costs: Implications for the measurement of catastrophic expenditures and poverty. *Health Econ* 2008; *17*(12): 1393–412.
11. Freiberg. Substitution of hospital outpatient care for inpatient care: Problem and experience. *J Health Politics Policy Law* 1979; *3*(4): 497.
12. Davis K, Russell LB. Substitution of hospital outpatient care for inpatient care. *Rev Econ Stat* 1972; *54*(2): 109–20.
13. Fortney JC, Steffick DE, Burgess JF Jr., Maciejewski ML, Petersen LA. Are primary care services a substitute or complement for specialty and inpatient services? *Health Services Res* 2005; *40*(1)*:* 5.
14. Vitikainen K, Linna M, Street A. Substituting inpatient for outpatient care: What is the impact on hospital costs and efficiency? *Eur J Health Econ* 2010; *11*(4): 395–404.
15. Briggs A, Gray, Alastair HM. Methods in health service research: Handling uncertainty in economic evaluations of healthcare interventions. *Br Med J* 1999; *319:* 635–8.
16. John Hartz. Public health policy decisions on medical innovations: What role can early economic evaluation play? *Health Policy* 2009; *89:* 184–92.
17. Bhattacharya SK, Sur D, Sinha PK, Karbwang J. Elimination of leishmaniasis (kala-azar) from the Indian subcontinent is technically feasible and operationally achievable. *Indian J Med Res* 2006; *123:* 195–6.
18. Sunder S, Kumar A. Challenges in the management of visceral leishmaniasis. *Indian Pediatr* 2005; *42*(6)*:* 523–6.
19. Mwabu G, Ainsworth M, Nyamete A. Quality of medical care and choice of medical treatment in Kenya: An empirical analysis. *J Hum Resour* 1993; *28:* 838–62.
20. Burgess JF Jr, Carey K, Young GJ. The effect of network arrangements on hospital pricing behaviour. *J Health Econ* 2005; *24:* 391–405.
21. Krishnan R. Market restructuring and pricing in the hospital industry. *J Health Econ* 2001; *20:* 213–37.
22. Gill JM, Mainous AG III, Nsereko M. The effect of continuity of care on emergency department use. *Archives Family Med* 2000; *9:* 333–8.
23. Bindman AB, Grumbach K, Osmond D, Komaromy M, Vranizan K, Lurie N, Billings J, Stewart A. Preventable hospitalizations and access to health care. *J Amer Med Assoc* 1995; *274*(4): 305–11.
24. Gill JM, Mainous AG III. The role of provider continuity in preventing hospitalizations. *Archives Family Med* 1998; *7:* 352–7.
25. Falik M, Needleman J, Wells BL, Korb J. Ambulatory care sensitive hospitalizations and emergency visits: Experiences of medicaid patients using federally qualified health centers. *Medical Care* 2001; *39:* 551–61.

Correspondence to: Dr Shiva Raj Adhikari, Patan Multiple Campus, Department of Economics, Patan Dhoka Lalitpur, Nepal.
E-mail: sssadhikari@yahoo.com

Received: 25 April 2012 *Accepted in revised form:* 17 September 2012