

Out-of-Pocket Expenditure and Opportunity Cost of Leptospirosis Patients at a Tertiary Care Hospital of Gujarat, India

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Abstract

Introduction: The study investigates the cost incurred by leptospirosis patients as either out-of-pocket expenditure (OOPE) or opportunity cost (OC) and recommends accordingly for the national program on leptospirosis in India. **Objectives:** The objective of this study is to determine leptospirosis-related OOPE and OC at a government tertiary care hospital and to disaggregate the total OOPE into contributing cost domains. **Materials and Methods:** The OOPE data were collected by the personal interview of confirmed leptospirosis cases who took complete treatment at the hospital in year 2009 using a prestructured questionnaire. The patients were interviewed daily until discharge to know daily OOPE. **Results:** The mean OOPE per patient was Rs. 2157/-, Median: Rs. 1880/-, 25th-75th percentile: Rs. 1446 – Rs 2587.5). The lowest quintile for OOPE was Rs. 1330/- and the highest quintile was Rs. 2874/-. Loss of daily wages was 68% (Rs. 1458.9/-) of the total OOPE. Other major expenditure included cost of drugs Rs. 308.8/- (14%), expenditure on food Rs. 173/- (8%), and travelling expenses Rs. 204.4/- (9%). **Conclusions:** Rs. 2157/- is significant OOPE, and hence, important factor in understanding health-seeking behavior and compliance of leptospirosis patients. The OC (loss of daily wages) amounts to 68% of total OOPE which has to be addressed by the government to realize universal health coverage.

Keywords: Government, leptospirosis, opportunity cost, out-of-pocket expenditure, tertiary hospital

INTRODUCTION

Leptospirosis is an emerging infectious disease of global importance, as illustrated by large outbreaks in Asia, Central and South America, and the United States.^[1-6] The disease is caused by pathogenic leptospires and is characterized by a broad spectrum of clinical manifestations.^[7] The severe form of the disease was first described by Adolf Weil.^[8] His name is still attached to a serious form of leptospirosis called Weil's disease.^[9] From the environment contaminated with urine of rodents, the human beings acquire the infection through abraded skin or mucous membrane. In India, states with coastal line report outbreaks of leptospirosis.^[10] The major burden of the disease is shared by Gujarat, Maharashtra, Karnataka, and Tamil Nadu which report more than 500 cases annually.^[11]

The leptospirosis control program is in place in the state of Gujarat since 1994, and now it has been taken up as a national program.^[12] The case fatality is as high as 20% in Gujarat. In India under Integrated Disease Surveillance

Project, leptospirosis has been made a notifiable disease in the endemic states.^[13] Any program cannot be taken up as a national program without a clear vision on the program cost and its effectiveness. A study on cost-benefit analysis of diagnosis and the treatment of leptospirosis by Yupin *et al.* in Thailand provided an estimate of 13.3 USD for the treatment and costs between 15.3 and 17.2 USD for diagnostics test based on the complications.^[14] None of the studies are available which provide cost of treating leptospirosis in total. Even though the program was there as a state program in Gujarat for the past 15 years, there is no scientific documentation of the cost involved in the primary or secondary prevention of

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leptospirosis.^[15] Many measures have been tried as a primary prevention tool, but no documented success is available to date. The secondary prevention, i.e., early diagnosis and prompt treatment, remains the mainstay in the control of leptospirosis. The study investigates the cost incurred by the patient as either out-of-pocket expenditure (OOPE) or opportunity cost (OC) and recommend accordingly for the national program. Thus, the specific objectives of the study are to determine leptospirosis related OOPE and OC at a tertiary hospital and disaggregate the total OOPE into contributing cost domains.

MATERIALS AND METHODS

An observational study was undertaken in year 2009–2010 to calculate OOPE of patients suffering from leptospirosis in a high-volume tertiary care government hospital of Gujarat State.^[16] The study was undertaken after approval from the Human Research Ethics Committee of Government Medical College. Informed consent was obtained from all individual participants included in the study.

In public health, the sum of all fee paid by the consumer of health services directly to the provider at the time of delivery of the services is taken as definition for OOPE.^[17] It means it includes both medical expenditures such as consultation fees, drugs, investigations, ambulance, and surgical charges and nonmedical expenditure such as accommodation and transport expenses. OC definition used in the study is the value of the next-best choice available to someone who has picked between several mutually exclusive choices.^[18] In the context of this study, the loss of daily wages/earnings of the patients and patient attendee due to stay at hospital is considered as OC. A confirmed case is any suspected case of leptospirosis with one of the following: (i) Rising titre of ELISA in paired sera, (ii) Rising titer of microscopic agglutination test (MAT) in paired sera, (iii) polymerase chain reaction positive, and (iv) blood culture positive.^[19] A successful treatment is considered when any confirmed case of leptospirosis who completes the treatment and is declared as cured. Units of service do not include individuals who died, absconded or left against medical advice. The OOPE data were collected by personal interview of all confirmed cases of LEPTOSPIROSIS who took complete treatment at tertiary hospital during the year 2009 using a prestructured questionnaire. The questionnaire was pretested before it was used for the study. The patients were interviewed daily until discharge to know daily OOPE. The questionnaire for OOPE included expenses incurred for traveling, drugs, food, and investigations. The loss of daily wages of the patient and patient attendee were taken as OC from the patient's perspective. The data entry and analysis were done using the MS Excel 2003 and Mini Tab Software. Line items for OOPE included for the study: (a) Cost incurred by patient, (i) Cost of the drugs not given free of cost, (ii) Travelling Expenses during referral, (iii) Expenditure on food during hospital stay, (iv) Loss of wages due to hospital stay, (v) Cost of investigations (if any paid by patient), (b) Cost incurred by patient attendee – (i) Travelling expenses during referral

and stay at hospital (ii) Expenditure on food during hospital stay (iii) Expenditure for accommodation (if any) (iv) Loss of wages due to stay at hospital is considered as OC in the study. Descriptive statistics are used to present the data obtained in the study. The data entry and analysis were done using MS Excel 2003 (Microsoft for windows, Initial release 1987, Bill Gates, Washington, US) and Mini Tab Software (Barbara F Ryan from Pennsylvania State University, 1972, US).

RESULTS

General profile of suspected leptospirosis cases in the year 2009

Among 127 clinically suspected cases admitted at tertiary hospital, 115 cases were microbiologically confirmed as leptospirosis. Out of 115 confirmed cases, 62 cases were cured, 45 expired, and 8 absconded from the ward. The case fatality among the confirmed cases was 39%. Males constituted 73% (84 cases) and females 27% (31 cases) of confirmed leptospirosis cases. The age group between 25 and 45 years constituted 45.7% (58 cases) of the cases. The productive age group between 25 and 55 years constituted 72% of the cases ($n = 83$). Only 16.5% ($n = 19$) and 11.3% ($n = 13$) were in the age group above 55 years and below 25 years, respectively.

Out-of-pocket expenditure

Table 1 shows the mean OOPE including OC as Rs. 2157/-. The mean loss of wages (OC) of the patient and patient attendee due to stay at hospital was 68% (Rs. 1458.87) of the total cost. The average cost of drugs not given free of cost amounted to 14% (Rs. 308.77). Mean traveling expenses incurred during referral and stay at hospital accounted for 9% (Rs. 204.42). Expenditure on food during hospital stay constituted 8% (Rs. 172.98) and only 1% (Rs. 12) expenditure was attributed to cost of investigations.

Among the various components of OOPE, the loss of wages is considered as OC because it is the loss incurred by the patient due to his stay at hospital. Although the patient does not directly pay the provider at the time of utilization of service the loss is because he has not gained. If patient was not sick, he would have gone to work and gained the wages. Table 2 gives the percentile distribution of components of OOPE ($n = 62$). The 20th percentile of OOPE is Rs. 1330, 25th percentile is Rs. 1446; 50th percentile is Rs. 1880; 75th percentile is Rs. 2587.5; and 80th percentile is Rs. 2874. To know the distribution and the

Table 1: Out of pocket expenditure ($n=62$)

Line items	Mean (rupees)
Cost of drugs not given free of cost (%)	308.77 (14)
Travelling expenses during referral and stay at hospital (%)	204.42 (9)
Expenditure on food during hospital stay (%)	172.98 (8)
Loss of wages due to hospital stay (patient) (%)	684.10 (32)
Loss of wages due to stay at hospital (patient attendee) (%)	774.77 (36)
Cost of investigations (if any paid by patient) (%)	12.06 (1)
Total (%)	2157 (100)

outliers in the data set, the Box and Whisker plot of OOPE was plotted [Figure 1]. In the figure, the first (Q1), second (Q2), and the third (Q3) quartile values are represented. The outliers are shown as dots. The interval plot shows the 95% confidence interval (CI) for the mean OOPE [Figure 2].

The indirect cost incurred due to the loss of daily wages of the patient (mean Rs. 684.10) was 32% and 36% was due to daily wages of the patient's attendee (mean Rs. 774.77). Out of the total OOPE, the loss of wages contributed to 68% (Rs. 1458.87). This also amounts to the OC of the patient. In the rural areas of South Gujarat, the farm laborers are paid daily wages of an average Rs. 50, (ranges from Rs. 30/- to Rs. 75/-). The laborers get work hardly for 15 days a month. Hence, Rs. 1458.87/- will amount to 2 months income or 17% of annual income of a laborer. The mean duration of hospital stay of leptospirosis patients who took complete treatment was 12.02 days.

DISCUSSION

Even after up gradation of the Primary Health Centers and Community Health Centers, the first contact of health facility by the patient, by and large is a private hospital, it may be a quack or a multi-specialty hospital. Few practices prevail in South Gujarat wherein the private practitioners admit the patients and subject them to investigations and prescribe medications. When the patient is not able to bear the hospital charges any more he is referred to a government setup. In this study, average money spent for drugs was Rs. 308.77 (14% of total OOPE). This money was spent before reaching a government facility. After reaching the government

facility (Primary Health Centres [PHCs] to tertiary hospital), no money was spent for drugs.

Under leptospirosis control program, there is a provision for utilization of "108" ambulance services. Even though 108 services are reserved for emergency services, every case of suspected leptospirosis who needs referral can utilize its services as per the regulations of Government of Gujarat under leptospirosis Control Program. Besides, every PHCs of Valsad, Navsari, Surat, and Tapi are provided with an untied fund of Rs. 10,000 every year during the leptospirosis transmission months. The fund is to be utilized for the referral of cases of suspected leptospirosis who are in need. In spite of all such efforts, the study shows that still the patients spend money from their pocket as travel expenses (Rs. 204.42/- i.e., 9% of the total OOPE) during referral. The patients who spent for travel were not aware of 108 ambulance services. They either hired a vehicle or got ambulance from private hospital.

All the patients irrespective of their socioeconomic status are provided with food free of cost except for those patients who can afford special ward. Does it mean that there is no expenditure on food from the patient side during their stay at hospital? This study has shown that on an average a leptospirosis patient spends Rs. 172.98 (8% of total OOPE). Although food for the patient is available free, expenditure is done on foods such as fruits and coconut water.

However, the major expenditure on food is for patient attendee for whom the government has no provision. A Nongovernmental Organization (NGO) provides food for the patients' attendees

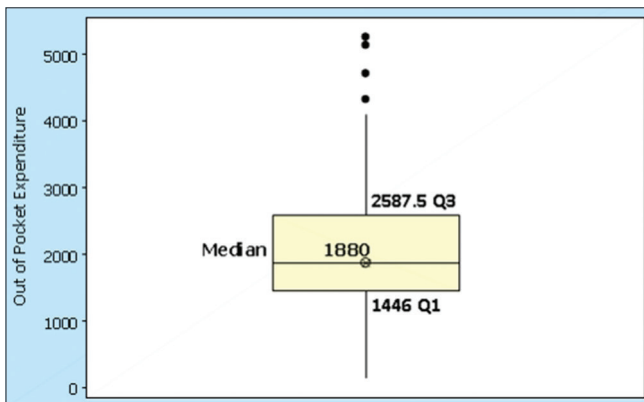


Figure 1: Box and whisker plot of out of pocket expenditure (in INR)

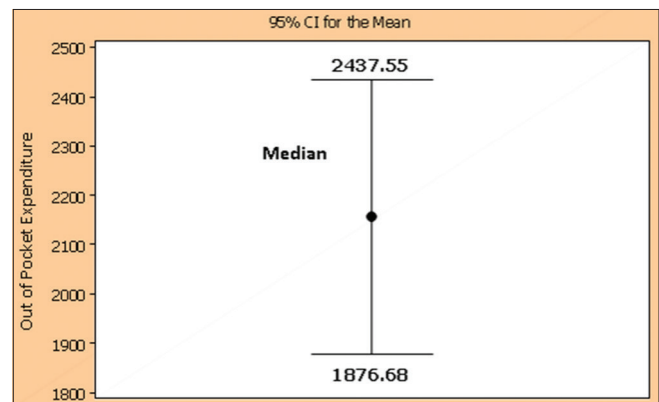


Figure 2: Interval plot of out of pocket expenditure (in INR)

Table 2: Percentile distribution of components of out-of-pocket expenditure (in rupees) (n=62)

Line items	20 th percentile	25 (Q1)	50 (Q2/median)	75 (Q3)	80 th percentile
Cost of drugs not given free of cost	0	0	37.50	362.5	530
Travelling expenses during referral and stay at hospital	0	0	20.00	195.5	280
Expenditure on food during hospital stay	0	0	110.00	282.5	309
Loss of wages due to hospital stay (patient)	468	497.5	700.00	810	954
Loss of wages due to stay at hospital (patient attendee)	388	442.5	600.00	1120	1152
Cost of investigations (if any paid by patient)	0	0	0.00	0	0
Total	1330	1446	1880	2587.5	2874

at Rs. 2/-per meal in the tertiary hospital where the study was conducted. During the initial days of admission, the patient attendee was not aware of this facility and had spent money for food from the outside. Later, they started utilizing the services provided by the NGO. However, neither the hospital nor the NGO provide food in the morning for which the patient attendee incurs expenditure on his own. The cost would be more in hospitals where there are no such NGOs who provide food at highly subsidized rate for patient attendees.

The study showed that almost none of the patient had to pay for laboratory investigations. The laboratory investigations are free of cost only for Below Poverty Line card holders in the hospital. Rests of the patients have to pay a minimal amount of fees as fixed by the government for laboratory investigations. For leptospirosis irrespective of the income all the laboratory investigations are done without any charges as per the instructions from the government. The study reports that the instruction is strictly implemented without any violation. It is thus suggested that State should continue to provide investigation services free of cost or else it will add to the OOPE. As the study was conducted in 2009–S10 if the cost is adjusted for rupee value in 2020, it would be relevant to interpret in the current context. Considering the inflation rate of 95.63% between 2010 and 2020, it means that 100 rupees in 2010 is equivalent to 195.63 rupees in 2020.^[20] After the cost adjusted to 2020, the mean OOPE of leptospirosis patients admitted at the tertiary hospital would be Rs. 4220/- (median: Rs. 3678/-, 25th–75th percentile: 2829–5062). The mean loss of daily wages is taken as the OC of the patient. Loss of wages of patient due to hospital stay is Rs. 1338/- (median: Rs. 700/-, 25th- 75th percentile: 973–1585). Loss of wages of patient attendee due to hospital stay is Rs. 1516/-(median: Rs. 600/-, 25th–75th percentile: 866–2191) As per the report of 71st round of NSS patient from the rural areas spends on an average of Rs. 5636 for hospitalized treatment due to any cause in public sector hospital and as high as Rs. 21,726 for that in a private sector hospital. As per the 75th round NSS, 79.5% of the OOPE was from household savings and 13.4% by borrowing. Thus, the OOPE is vicious cycle of illness and poverty.

CONCLUSIONS

Despite provision of services free of cost in public health facilities the OOPE is still incurred by the patient and their families. Poor families are prone for illness and become poorer for getting illness treated. Along with the insurance schemes, addressing the OOPE within the public health facilities is critical to realize universal health coverage.

Limitations of the study

Sample size (number of units of service provided)

A total of 523 cases of suspected leptospirosis in the year 2007 and 557 in the year 2008 were reported in South Gujarat. In both the years, more than 200 cases were admitted at the hospital under study. Hence, before beginning of this study, it was expected an average of 500 cases of suspected leptospirosis and around 200 admissions at tertiary hospital for the year 2009. However, in

2009, only 220 cases of suspected leptospirosis were reported with 127 admissions at the tertiary hospital, as some centers in periphery were upgraded to manage cases of leptospirosis.

Out-of-pocket expenditure

The travel expenses incurred by the patients to go back to their home once cured and discharged was not included.

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Conflicts of interest

There are no conflicts of interest.

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