Financial Burden of Treating non-Fatal Road Traffic Injuries

A Decomposition Analysis of its Causal Factors in Kerala

GODWIN S.K.

Thesis submitted to

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram

in partial fulfilment of the Doctor of Philosophy (Ph.D.) degree.

2007

Achutha Menon Centre for Health Science Studies
Sree Chitra Tirunal Institute for Medical Sciences and Technology
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Recommended by

(Thesis Supervisor)

Approved by

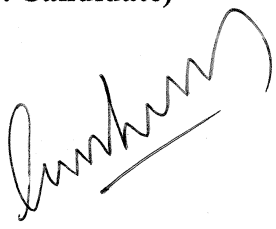
(Examiner)

Achutha Menon Centre for Health Science Studies
Sree Chitra Tirunal Institute for Medical Sciences and Technology
Thiruvananthapuram, India.

Declaration

I, Godwin S.K., hereby declare that the thesis titled ***"Financial burden of treating non-fatal road traffic injuries: A decomposition analysis of its causal factors in Kerala"*** submitted to Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram is an original work undertaken by me and has not been submitted *in toto* or in part for award of any degree in any institution or university.

GODWIN S.K.
(Ph.D. Candidate)



Thiruvananthapuram
24th December 2007.

Certificate

Certified that the thesis titled ***"Financial burden of treating non-fatal road traffic injuries: A decomposition analysis of its causal factors in Kerala"*** submitted to Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram is an original work undertaken by Godwin S.K. under my guidance and supervision.

Thesis Supervisor

Dr Rajan
26/12/07

[Dr. D. Varatharajan]

Thiruvananthapuram
26th December 2007.

*DEDICATED TO MY **GOD** WHO NEVER LEFT ME*
UNATTENDED WHEN IN NEED

The long word of formal gratitude

Since every success (if it can be called so) is the culmination of efforts by a bunch of entities, I would like to record in black and white my gratitude at the end of my Ph.D. thesis. The individuals whose names appear are a brief directory and their contribution cannot go unrecorded.

I am speechless when I think of my dearest guide, Dr. D. Varatharajan for his affectionate advices, constructive criticisms, uncompromising approach to academic excellence that often enthused my arteries. I am fortunate for being the first Ph.D. student of him and having acquired much from him, though I could never rise to his expectations.

Prof. (Dr.) K.R. Thankappan, Prof. (Dr.) K. Pushpangadan and Prof. (Dr.) B. Alwin Prakash, my Doctoral Advisory Committee Members deserve special gratitude for thier motivation and unrelenting academic assistance to me. Also appreciated is the academic contribution by my former DAC member, Dr. Achin Chakraborty.

The encouragement and support by Dr. K. Mohandas, Director, SCTIMST, is thankfully acknowledged. Thanks specially to Dr. A.V. George, Registrar, a strong motivator. I would also like to record my heart felt thanks to Mr. Sundar Jaysingh, Deputy Registrar for his interventions which helped me during my PhD programme.

Dr. Sankara Sarma's cool advices often helped me tide over critical questions. The contributions made by Dr. Kabir, Dr. Sundari Ravindran, Dr. Raman Kutty, Dr. Ajay Mahal, Dr. Peter Berman, Dr. V. Mohanan Nair, Dr. Amar Jesani, Dr. Yesudian, are greatly appreciated. I also thank Dr. Mala, Dr. Manju Nair, Dr. Biju Soman for their suggestions. Also appreciated the comments of all who were present in my different seminars.

Dr. M. Kunhaman, my mentor, the organic and original intellectual, the single personality who intellectually provoked me the most deserves special mention.

Mr. V.R. Rajeevan, Addl. Director General of Police, Dr. Asthana, IG of Police, Govt. of Kerala, for granting necessary permission to gather RTA data from State Crime Records Bureau. I am also thankful to Dr. Kuttamani, Director of Health Services, GoK, Dr. Meenu Hariharan (former Director of Medical Education, Govt. of Kerala, the Principals of government medical colleges, and other Professors of Orthopeadics, Surgery and Neurosurgeyry as well as the managers of all health facilities who have granted and denied entry.

Dr. Edwin Sam (Eddy), my dear friend, the biggest critic of mine needs special mention as well as his household and Dr. Arun (Maveli), my silent but sincere friend. The help (both academic & non-academic) by Dr. A.S. Pradeep Kumar cannot go unrecorded as well as the committed help I received from Anu, my colleague. I am also thankful to Arun (Speed) & his family and Dr. Joe, Dr. Mini, Unni Krishnan and Mohammad Irshad ("Director"), Devi chechy.

I also convey my appreciation to colleagues at KNM Govt. College, Kanjiramkulam for their support especially the Principal, Mrs. Shobha Raveendranath. The cooperation of my students in the College whose class room learning has been affected due to my absence is gratefully acknowledged.

My deep thanks are communicated to the health professionals (whose names cannot be revealed due to requested anonymity) who helped me formulate treatment protocols and assessed the medical justifications for treatment interventions.

I have been more grateful to those who have been ridiculing me, blaming me, mocking at me which strengthened my capabilities unknowingly. Besides, I extend my gratitude to all who were missed by me whose contribution are thanked time and again.

Above all, I owe unlimitedly to the hundreds of participants and their families who shared their bitter experiences with vehicles, roads and hospitals.

However, the right over errors and wrongs is exclusively mine.

Godwin SK

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List of Abbreviations

ADB	Asian Development Bank
ATP	Ability to pay
FBT	Financial Burden of Treatment
GoK	Government of Kerala
GoI	Government of India
HH	Household
HSPC	Health Status Possibility Curve
IC	Indifference Curve
LMICs	Low and Middle Income Countries
LOC	Loss of consciousness
NATPAC	National Transportation and Planning Research Centre
NCRB	National Crime Records Bureau
NSSO	National Sample Survey Organisation
OOP	Out-of-pocket payments
RTA	Road Traffic Accident
RTI	Road Traffic Injury
SCRB	State Crime Records Bureau
SID	Supplier Induced Demand
USD	US Dollar
WB	World Bank
WHO	World Health Organisation
WTP	Willingness to pay

Abstract

Financial burden of treating non-fatal road traffic injuries: A decomposition analysis of its causal factors in Kerala

Access to affordable health care has been one of the prime objectives of all health systems and among the methods of financing household out-of-pocket payments at the point of delivery of service creates the maximum barriers to effective utilisation of health care especially by the lower income groups. Road traffic injury represents one of the classic cases of uncertainty and the associated financial burden is assumed to impoverish households due to the out-of-pocket mode of financing injury care and Kerala is a high road accident zone in the country. Streamlining the "excess burden on households" by enhancing the efficiency of the health care resources forms the central motivation of the study. The study tried to decompose the role of *mediflation,* inefficiency of providers, *supplier-induced demand*, the pattern of responses adopted by households when dealing with costs of treatment, its consequences on household resources of financial burden of treating injuries. The study utilised secondary data to assess the incidence and intensity of road traffic accidents in Kerala and primary data was collected from the injured who were discharged from selected public and private health facilities from three districts of Kerala.

Majority of the injured were males in the productive age group and road traffic accidents are no more an urban phenomenon in the State. Severity of injuries was comparatively higher indicated by the higher per cent of hospitalisation and longer length of stay. Public facilities were the preferred choice of injury treatment probably due to relatively high cost, better spread of health care facilities, medico-legal issues involved etc. Majority of the injured incurred catastrophic expenditure and the financial burden of injury treatment was distributed regressively with the lower income groups bearing a very high burden. Public hospitals face adverse case-mix and length of stay was abnormally higher probably due to higher pre-surgical length of stay. Some public hospitals were found to have under-treated patients while some private hospitals had induced treatment.

CHAPTER - I

1 SETTING THE TONE

Access to affordable health care has been one of the principal objectives of all health systems and among the methods of financing household out-of-pocket payments at the point of delivery of service creates the maximum barriers to effective utilisation of health care especially by the lower income groups. The experience of majority of the countries in the world reveal that health care expenditure, if financed through private out-of-pocket leads to less than optimal health outcomes due to its implications for equity and efficiency of the health system especially in an unregulated context (World Bank 1993; Hensher 2001). Though India spends more than many other countries of similar nature, the poor rate of return could be partially attributed to the inefficiency of the system in governing and managing the available health care resources (Varatharajan et al 2002). In a country where about 80 per cent of total healthcare expenditure is paid private out-of-pocket, insurance coverage is one of the lowest in the world, hospitalised Indians spend 58 per cent of their annual expenditure on health care and an estimated 24 per cent of them getting impoverished due to costs of treatment, ill health related costs raises concerns about the economic security and welfare of households. The existence of huge inefficiencies (technical, economic and allocative) in both public and private health services, supplier as well as user induced demand, fast rising medical prices etc further aggravates the financial burden facing the patient. In India, in the context of epidemiological transition higher incidence of non-communicable diseases like cancer, heart diseases, neurological disorders, diabetes etc are on the rise that requires costly interventions on a long-term basis. Further, injuries represent another fast increasing component in the gross burden of death and disability in the country which takes a high toll on households' economic security. Though majority of the illnesses strike at uncertain times, injuries, especially road traffic injuries are a classic case of uncertainty that has widespread implications on the financial burden of treatment and livelihoods of the victims and their households.

Table 1.1

Composition of out-of-pocket payments (OOPs)[1]

	Percentage of total OOP payments in					
	THE[2]	Public sector	In patient care	Out patient care	Medicines	Traditional /home/ other
Bangladesh (2000)[3]	64.85	0.50	8.90	6.46	70.32	14.32
China (2000)	60.35	N/A	N/A	N/A	N/A	N/A
Hong Kong (96-97)	37.64	6.36	16.98	38.99	7.56	36.47
India (2002)[4]	80.00	25.61	9.26	11.15	74.72	4.87
Indonesia (2001)	57.74	23.19	12.50	52.95	34.55	0.00
Korea, Rep. (2000)	49.88	N/A	39.83	22.02	32.53	5.63
Kyrgyz Rep. (2000-01)[5]	51.68	44.52	12.21	27.94	55.85	4.00
Nepal (1994-95)[6]	75.00	N/A	N/A	N/A	N/A	N/A
Malaysia (98-99)[7]	40.20	7.17	24.82	45.41	24.66	5.11
Philippines (1999)	44.91	N/A	N/A	N/A	N/A	N/A
Sri Lanka (96-97)	49.59	0.86	10.00	31.00	47.00	12.00
Taiwan (2000)	30.15	N/A	10.89	27.71	23.14	38.26
Thailand (2000)	32.74	34.93	26.15	56.17	17.68	--

N/A – not available since survey gives aggregate OOP spending on all care only

[1] OOP as % of THE is from National Health Accounts estimates unless stated otherwise below. Shares of OOP by sector and type of care are computed from the survey data..

[2] THE - Total Health Expenditure

[3] In the top row, the shares of OOP in inpatient and ambulatory care do not include payments for medicines prescribed on receipt of care, which are included in the "medicines" column. In the bottom row, payments for prescribed medicines are included with the respective inpatient/outpatient care and the "medicines" column includes self-medication only.

[4] OOP as % of THE is estimated from World Health Report 2002, WHO. Public care % from 1995-96 Health Survey. Remainder from 1999-2000 National Sample Survey. % for medicines may be overestimated due to difficulty of distinguishing doctor charges from medicines in data.

[5] Share of OOP on public care from Kyrgyz Treasury data. Share of medicines includes payments for medicines prescribed through ambulatory care only.

[6] OOP as % of TEH from (Hotchkiss, Rous et al. 1998)

[7] OOP as % of THE is for 1999 from World Health Report 2002, WHO.

India is in 171st position among 175 countries in terms of public spending in health care (WHO 2000). Table 1.1 makes it further clear that out-of-pocket payments are a perennial feature of developing country health systems and among developing countries of Asia and Pacific region, India ranks very poorly in terms of public sector involvement in health care delivery and finance.

1.1 Research issue stated

Since curative medical expenditure by households forms one among the large number of inputs contributing to the health status of an individual, the opportunity cost of such spending in terms of foregone food consumption, savings, loss of assets for livelihood, lost wages etc would be very high especially for lower income groups. An inefficiently run and inequitably distributed public health care system accentuates household financial burden directly by providing less than optimum quality services, imposing user charges or forcing the households to pay huge amount in terms of 'access costs' (Abel-Smith 1992) and indirectly by pushing patients to seek care from the private health care market, which determines the burden, in part. On the other hand, private medical care market, though meeting majority's health care demand in the country has grown without any definite policy governing its functioning and growth for the overall benefit of the population is sub-optimal in size, infamous for its regressivity of financing and provision, medically unnecessary prescriptions (induced demand) etc leading to cost escalation in medical care (Yesudian 1994; Duggal 2002; Mahal 2002).

The inbuilt monopolistic elements present in the medical care market as well as the specific properties of health care are conducive enough to set the level of mark-up at high levels in medical care market compared to other sectors. *Mediflation* forms one of the central components of the gross financial burden of treatment facing the injured which erodes the value of health care resources depending on the rate of change of medical prices. The medical prices have been increasing rapidly than consumer price index for other goods and services for the past many decades (Feldstein 1998; Cutler 1996). The "excess medical price inflation" redistributes the welfare from the unorganised patients to suppliers of medical commodities. The past few years also saw cost of treatment rising at rapid rates in the country (at an average rate of 25-31% and 15-16% for ambulatory and inpatient care respectively {NSSO 1998}) making health

care inaccessible to great many numbers. As it is known that medical care expenditures in our economy is growing at more than 12 per cent per annum, one of the major questions is: What is the magnitude of pure price change in the total? Is this expenditure rise entirely due to quality rise or price rise? We do not have any accurate information regarding whether price of treatment for medical conditions have gone up or not? What is the extent of financial burden imposed by rising prices? How does it affect the accessibility and affordability of health care services to the needy? Whether the fast technological changes are reducing the prices or increasing the costs of treatment when we take into account quality as well? What kind of policy instruments are required to keep the *mediflation* in check? These questions assume paramount importance in injury care as due to its severity and uncertainty, the demand for injury care is more or less inelastic implying that price of treatment may be a secondary consideration and so providers are in a better position to charge a higher price than in an elastic demand market. The suppliers of care can, thus, extract the entire consumer surplus from the road traffic injury victims.

Besides *mediflation*, inefficiency on the part of providers has been exerting a strong influence on the financial burden faced by patients. Efficiency, defined here in its simplest meaning implies avoiding wastage of resources or using the scarce resource optimally. The public sector is showing higher degrees of inefficiency because of the declining allocation of government resources; technically sub optimal input-mix; misplaced priorities; lacunae in management and planning which also adds to the total financial burden of treatment on households. When inefficiency creeps in the production of health services by government, the issues from a financial burden perspective are: Whether public health services are optimally utilised? Whether the low quality of care is due to over utilisation (over-crowding) by patients from public health services or is it due to the inability of the public health services to utilise available health care resources and services optimally? Whether emphasis on efficiency will undermine the concern for equity? What is the extent of inefficiency imposed by public health services on patients? Whether a reorganisation of resources will reduce the financial burden facing the patients?

Though the private health services' generally believed to be efficient, a simple diagnosis of their costs and price determination may show that inefficiency is mostly related to the lower utilisation of existing bed capacity or the inability of the health facility to utilise the economies of scale and scope. When the size is sub-optimal and bed occupancy in private health services is based on average cost pricing, the price of treatment and consequent financial burden rises to that extent. Analyses reveal that private hospitals in India has an average bed capacity of less than 30 for 84 per cent of private health providers (CII-McKinsey 2002) at a time it is known that there exists good amount of economies of scale and scope. It is true for diagnostic services as well. This probably is the result of the growth of private health services without any policy direction governing the plans of location, requirements, regulation etc. The issue of inefficiency assumes added relevance in the context of cropping up of new hospitals without overseeing the requirements of the population. Whether the available private hospitals are fully utilised? Whether existence of inefficient hospitals adds to the financial burden on patients? How do the private hospitals determine the prices of medical services? These are some of the important questions to be asked in any analysis of efficiency of private health services.

The question of optimum utilisation of health services brings us to another very relevant issue affecting the financial burden of patient called "induced demand". In the context of information asymmetry and imperfections in the principal (patient) - agent (provider) relationship, the physician can shift the demand curve facing the patients which may benefit the physician at the cost of patients. This situation becomes prominent when the incentive structure facing the physician is fee-for-service and the number of health facilities and technologies are available beyond the normal requirements as reflected by the morbidity pattern. When patients consume more medical care than what is considered 'optimal' and such prescriptions without any scientific justification lead to what is called "flat-of-the-curve-medicine" which increases the cost of treatment without any tangible benefits to the patient. What is the implication of induced demand on household financial burden?

Finally, how the households manage their resources for health care seeking also determine the financial burden facing the patients. Since the incidence of injury or illness is uncertain and there exists little mechanisms to protect from the catastrophic costs of

medical care, the households are forced to spend through dishoarding, borrowing, distress selling etc which may affect the economic security of the households by cutting into social expenses like food, clothing, education, investment etc. In many instances, households postpone their treatment due to inability to pay for treatment which causes increased expenditure at a later stage, generally. These extra costs are the result of absence of adequate protection mechanisms or the inability of the household to buffer for contingency.

Since the household has to bear the entire cost of treatment in the context of out-of-pocket expenditure and in what ways we can reduce or streamline this expenditure is the most important motivation behind the study. From the above brief discussion, it is clear that the cost of treatment is a result of a number of factors acting from both the demand and supply sides. Going by an economic classification of components, we can visualise few components including *mediflation*, inefficiency, induced demand, the costs of absence of protection mechanisms and the ideal cost of producing health care services. In other words, what part of the total cost of treatment is contributed by *mediflation*? What is the extent of provider-side inefficiency in increasing the cost of treatment? What is the magnitude of supplier-induced demand in the total cost of treatment? And finally, what are the costs of absence of protection mechanisms for households when financing the cost of treatment? By assessing the role of each component in the financial burden, our overriding goal is to reduce the "excess burden on households and health system" so that the efficiency of the health care resources may be enhanced. A reduction in any of the components has the potential to bring down the financial burden faced by the patients.

1.2 Conceptual framework in brief

The conceptual frame of this study is primarily developed from the literature on demand for health care, willingness to pay and ability to pay literature, principal-agency theories, medical market structure and inflation, cost efficiency of health services, institutional economics, coping methods, household financing of medical care, health system, public health etc. The philosophy behind the concept of burden as used in this study is that illness or injury is a disutility which adversely affects the individual and society's health status which can be prevented or avoided, but once contracted the expenditure is unavoidable. Thus, the resources expended to cure the illness or reduce the disutility

from illness is defined here as curative health care expenditure. From an economic perspective, this is the financial burden resulting from disease burden and so it this expenditure needs to be reduced. However, the promotive and preventive health care expenditure are the ones which enhance individual health status and is not to be treated as burden. The deleterious effects that ill health and expenses associated with it has on living standards are also increasingly seen as an issue of social justice, possibly reflecting a view that income losses and health care payments associated with ill-health are involuntary and simply the consequence of unwanted health "shocks" (Wagstaff et al 2001) which sets curative care expenditure from other expenses in the household budget. The conceptualisation of burden is also associated with the question of the huge opportunity costs that such expenditure imposes upon the lives of the affected. Since medical expenditure is only one input helping the household production of health, a huge rise in it is not feasible due to the concern that other factors in health production would be unfavourably sacrificed.

1.3 Significance of the Study

The question of out-of-pocket expenditure is not only an issue of protection against treatment costs; rather it also includes how the costs of ill health affect the household ability to purchase goods and services other than health care. India is in 171st position among 175 countries in terms of public spending in health care (WHO 2000). It is also true that it is impossible to make a dent on poverty without addressing the link between the highly skewed pattern of health finance and the perpetuation of poverty (Misra et al 2003). A brief review on health seeking behaviour of households point out that not only the cost of treatment but also the indirect costs associated with seeking treatment including income loss from earnings during illness, transport costs and accommodation etc impose heavy burden on households and act as a barrier to effective treatment seeking, though majority of the health care demand studies have not considered this vital issue.

Medical inflation is predicted to contribute 27 per cent increase in the total health care expenditure by 2012 (CII-MCKinsey 2002). What is the magnitude of pure price change in the total? Is this expenditure rise entirely due to quality rise or price rise? These questions are relevant to understand the rate of change in the prices of medical care?

whether competition, which is expected to reduce the mark-up has succeeded in reducing the prices or not? Whether the increase in the supply of facilities increase/decrease prices? Such information may help policy makers to frame the means of regulation as to whether a quality or price or quantity regulation is needed? While technology has been cost reducing in many sectors, it is cost enhancing for medical care technologies (Krishnan 1999). To what extent quality has gone up and at what cost is the prime question? Little is also known about which health system characteristics protect households from facing catastrophic treatment costs or the factors that lead some households to face such payments and some are spared including highly progressive fee schedules, targeting health services to the most needy, highly subsidized or free health services, the practice of exemption mechanisms for treatment, risk pooling mechanisms, price discrimination among patients etc (Xu et al, 2003). Understanding the differential impact of injury care expenditures on different segments of the population is quite relevant to further our understanding on the regressivity of different methods of financing care. More evidence on the magnitude of the flow of resources to injury treatment can help make comparison to allocation to different ailments by the policy makers. The financial burden studies are useful for policy makers in setting priorities among diseases. Specific financial burden of treatment of injury estimates are useful for analyzing cost-effectiveness of interventions and health resource allocation modeling (Mahapatra P 2001). It also puts value for the cost of injuries prevented.

A few changes that have been taking place in the country for the past few years makes the study more interesting. One, with increasing inefficiency due to declining public financing, sub optimal allocation of resources [with salary eating away the maximum leaving very little for other inputs] and increasing underutilisation of the existing capacity, the cost of treatment has shown widespread increase on the one hand and even poorer patients are shifting to the private sector as reflected by the various rounds of national level surveys. For example, between the 42nd [1986-87] and 52nd Rounds [1995-96] of NSS Survey, the cost of treatment per outpatient case has gone up at an average rate of more than 100 per cent in the public sector and at around 150 per cent for the private sector. For inpatient, the cost of treatment spiralled by 436 per cent and 320 per cent in rural and urban areas respectively; the public-private cost ratio fell significantly forcing many to abandon the public sector in favour of an unregulated private sector

[NSSO 1998] (Table-1.2). Secondly, due to deregulation of drug prices in the 1990s, one of the major constituents of cost of treatment, recorded heavy increase in the general level of drug prices by more than 197 per cent between 1980 and 1995 for 778 drugs selected by a study [Rane 1995]. Thirdly, the 1990s increasingly saw the arrival of heavy and capital-intensive health care technologies in which higher price has become synonymous with higher quality where access has become more difficult especially for lower income groups. The rate of growth in expenses is comparatively higher than general inflation.

Table 1.2[8]

Average spending on medical care - All-India, 1995-96

	Average spending (Rs. Per episode)						Urban-Rural Ratio[9]	
	Rural			Urban				
	1986-87	1995-96	% change	1986-87	1995-96	% change	1986-87	1995-96
				OP				
Public sector	73	129	77	74	166	124	1.01	1.29
Private sector	77	186	142	80	200	150	1.04	1.08
Total	76	176	132	79	194	146	1.04	1.10
Private: Public Ratio[10]	1.05	1.44	-	1.08	1.20	-	-	-
				IP				
Public sector	320	2,080	549	385	2,195	470	1.20	1.06
Private sector	733	4,300	486	1,206	5,344	343	1.64	1.24
Total	597	3,202	436	933	3,921	320	1.56	1.22
Private: Public Ratio@	2.29	2.07	-	3.13	2.43	-	-	-

[8] **Source:** NSSO 1992, Source Table 11.00, p S-516, Statement 6, p 59.
NSSO1998, Table 4.19, p32; Table4.21, p33.

[9] Measures the urban-rural differential in average expenditure

[10] Measures the private-public differential in average expenditure

A brief overview of the existing literature points to a huge gap of qualitative and quantitative studies addressing the issue of cost of ill health from a household point of view especially on injuries. Injuries are a major public health problem in developing countries. Road traffic injuries alone are currently ranked ninth globally among the leading causes of disability adjusted life years lost, and the ranking is projected to rise to third by 2020. However, injuries are the most neglected public health problem in the world especially in developing countries (Nantulya and Reich 2002). Treatment for injuries usually requires adjusted life years lost from road traffic injuries occur in developing countries. The highest burden of injuries and fatalities is borne disproportionately by poor people in developing countries, as pedestrians, passengers of buses and minibuses, and cyclists. Further, among all the reasons of seeking treatment, from the financial burden point of view, injuries impose the highest burden due to the uncertainties in incidence and disappearance and so households may not be prepared for such contingencies. Researching the cost of treatment imposed by injuries may help policy makers recognise this growing problem as a public health crisis and design appropriate policy responses.

Although the disability and fatality associated with injuries is relatively known, the cost of treating the disease and the impact of financing the treatment on household economic security in the country is not documented at all. Knowledge about the cost of treating the disease may influence the policy makers to understand the value of prevention of a case on the one hand and may also shape the health care seeking behaviour of the people which is important for the utilization and access to formal health care institutions. An assessment of the quantum of health care resources required for treating such kind of costly illnesses may help understand the future resource requirements in the future. Considering the magnitude of the problem this is a un/under researched issue in India

1.4 Objectives

In order to operationalise the above motivation of understanding the role of different economic components in the gross medical expenditure of households regarding injuries, the following specific objectives are set out.

1. To decompose the role of *mediflation* in the total household financial burden of treatment;
2. To examine the extent of inefficiency of the private and public health services in the gross financial burden of treatment;
3. To understand the existence of *supplier-induced demand* in the household financial burden of treatment;
4. To understand the pattern of responses adopted by households when dealing with costs of treatment, its consequences on household resources and
5. To analyse the health system and non-health system factors leading to the financial burden of treatment of injuries.

1.5 Research Questions

In the context of changing epidemiological and health transition, the pattern of disease burden faced is moving towards non-infectious diseases and injuries throws fresh challenges to the country's health system. As the onset of curative medical expenses is uncertain and so unplanned, risky, usually beyond the control of the individual concerned, cost of treatment is usually known after the treatment, choice of facilities, on many occasions, is severely constrained etc have strong implications for access and financial security of households. It is expected that the issue of out-of-pocket financing may get accentuated in the time to come, the central question we are trying to address is: How to enhance the effectiveness of the household health care resources so that they may get a higher value for their scarce resources? The study envisages that existence of *mediflation*, supplier-induced as well as user induced demand, inefficiency in the private and public health services, the extra expenditure incurred by households for meeting treatment costs in the form of distress selling, borrowing at exorbitant rates of interest etc. represents a kind of "dead-weight loss" for the patients. When considering the possible implications of financial burden of treatment on the households' economic security, further questions are cropping up. What is the magnitude of catastrophic health care payments and its effect on household's economic security? To what extent, the public health care system reduces the financial burden compared to private health care services [when indirect costs are included] and what are the components of financial

burden when care is sought from public sector and private sources of care? How are the households coping with catastrophic costs of illness and its treatment and also identify the pattern of responses households make during the 'financial shock' associated with treatment?

In summary, the important questions to be addressed are:

- What are the major determinants of financial burden (income, severity, body part affected, source of treatment, provider behaviour, treatment gap, co-morbidity, insurance status,) of treating non-fatal road traffic injuries?
- What are the mechanisms by which inefficiency, *mediflation*, supplier-induced demand and costs of coping methods affect the gross financial burden of treatment?
- How does the financial burden of treatment is distributed across different income groups (differential financial burden) and what are the factors determining catastrophic expenditure?
- What is the enormity of out-of-pocket payments and the different coping methods affecting the economic security of the injured household?

1.6 Hypotheses

Since our hypothesis for private hospitals is that better-utilised hospitals shall have lower prices, and vice versa, other things remain the same, because hospitals spread the total costs into a larger number of units. However, a fuller utilisation or exploitation of efficiency gains is possible only when the health facilities attain an optimum size in terms of its material and human resources. In other words, hospitals or firms will be able to produce a commodity at its lowest cost when both technical and economic inefficiencies are reduced to the minimum, which can be called the optimum point as well. But to what extent, the benefits of producing at the lowest cost enters the user in the form of consumer surplus depends on the nature of the demand of the product in question, the market structure, third party-interventions etc.

1. A part of the financial burden of treatment for injuries is contributed by *mediflation*;

2. Technical inefficiency in public hospitals is a component in the total financial burden of treatment of different injuries;
3. The availability of formal mechanisms of credit arrangements and insurance mechanisms are limited;
4. Cost of treatment affects the economic security of the households by means of increased indebtedness, distress selling of assets;
5. Among those who sought treatment the probability that the poor did not complete a standard course of treatment is higher than the rich.

1.7 Methodology in brief

The study tried to assess the magnitude of the above discussed components of the gross financial burden using a category of morbidity called "road traffic injuries". There were essentially four steps involved toward completion of the study: review of literature regarding *mediflation*, its calculation and determinants; hospital services' efficiency; supplier induced demand and the household financing of medical care. In the review special emphasis was given to the experiences of developing countries. At a second level, in order to make meaningful comparison of the changes in the cost of treatment (*mediflation*) of a particular disease condition (injury) over different years, a protocol was developed based on the treatment pattern of a panel of physicians in different settings. Thirdly, a primary survey was conducted at the hospital level for the patients who had undergone treatment for injuries at different health facilities. The selection of facilities was from both public and private sources and included hospitals, nursing homes and facilities at different levels. Besides, the study undertook a 'decomposition analysis' in which the discharged patients from a health facility (both inpatients and out patients) was traced for understanding the financing of the cost of treatment, utilisation pattern, the nature of the financing method, costs of 'responses' adopted to manage the treatment of injuries, and its implications of household economic security etc within a given geographical limit. Fourthly, a detailed analysis of the collected data from hospitals and patients/households was undertaken.

Since patients usually demand care for an episode of illness and not specific inputs, a treatment approach to measuring medical prices was used for the study. It helped reflect the effects on prices and quality of new medical technology, new drugs, and input

substitution for providing a medical treatment. A treatment approach to measuring medical prices facilitated adjustments for changes in treatment outcomes. A standard basket or package of medical goods and services based on the expert opinion (a panel of physicians) regarding the treatment of a given type of injury was used for a comparison between prices between two different institutions. Ideally the prices for different years were to be collected from the patients who had undergone such treatment in the last few years or we should have a medical price index which captured the changes in the treatment for different medical goods and services. The study rather focussed more on a simple analysis of mark-up captured by difference in selling prices different settings. The price of diagnostic services for different years was collected from records of diagnostic centres and hospitals. The price of physician services and hospital services were collected from hospitals and physicians themselves.

Since the objective of public health services was not governed by cost minimisation or profit maximisation, and has multiple objectives including efficiency, equity, access, utilisation, quality, cost recovery etc, a single indicator like bed occupancy rate could not be taken as an indicator to assess the efficiency. To what extent, the public health facilities were utilising the available inputs (technical [in] efficiency) was the approach used in the study. Besides, it was not feasible to assess allocative efficiency of public health facilities in the study because of the type of facilities in which the study was conducted, technical inefficiency was used to evaluate the performance of public health facilities. It specifically looked at the un/under utilization of facilities due to the absence of complementary inputs or mismanagement of existing resources.

Beyond the quantitative figures, qualitative methods were used to elicit the views of health services managers regarding why things were moving in a direction as it did. It was visualised that a good amount of technical inefficiency was related to extremely micro-level clinical and administrative custom and practices. The financial burden imposed by public sector inefficiency for a particular individual patient was the difference between what the patient actually paid in different setting and what it would have cost him/her, had they treated in the same setting. The difference constituted the inefficiency component of financial burden. Variation in quality was controlled for.

We may define burden of treatment for an individual or household as the ratio of the total cost of treatment to the income of the individual or household. Or the burden of health financing on a particular individual/household is the share of health financing to its gross income. The numerator may ideally include all costs attributable to the household, including the amount of tax which the government earmarks for health expenses, the proportion which we usually are unaware of, and the employer's contribution. The denominator is a measure of the household's capacity to pay which can (in broader terms) include all sources of income, assets and other endowments which the household has at its disposal. Due to the wide difficulty in reporting wealth data, information on income was collected. The details of earned income were collected in order to avoid multi-collinearity problem. Since we know that full cost of any activity is equivalent to the sum of market prices (direct costs) and the foregone value of time used up (indirect costs) and therefore the latter should also be included in the total costs of illness treatment (Becker 1965). So, the study included both time cost and monetary cost of treatment in the analysis.

Since the study was an attempt to analyse the magnitude of financial burden of treatment on households, it was necessary to define various dimensions of it including financial catastrophe, impoverishment etc. Catastrophe can be both financial as well as medical. The proposed study defined health care payments as financially catastrophic if a household's financial contributions to the health system exceed 10 per cent of income. Two levels of poverty line can be used to determine the catastrophe of curative health care expenditure. Catastrophic health expenditure is defined at more than one levels, firstly, in terms of the actual health care expenditure vis-à-vis the actual food expenditure, secondly, total health care expenditure as a proportion of non food expenditure, thirdly, total health expenditure as a ratio of total income, and another by means of total health care expenditure as a proportion of subsistence expenditure including food plus some minimum expenditure for other necessary expenditure for survival (say, an international poverty line of $1 a day etc).

1.8 Data sources

The macro-level data regarding road traffic casualties were gathered from National Crime Records Bureau (Government of India) and the state level data has been collected

from State Crime Records Bureau (Government of Kerala). The data from National Sample Survey Organisation's 52nd and 60th Rounds on morbidity and ailments of the population were also used. The primary information regarding the injured and their health status has been culled out from hospital records and from the interviews with the patients. The following four instruments were used to collect the primary data on injury care:

- Semi-structured questionnaire for households of the injured person
- Health care facility check-list to understand treatment components provided by health care facilities and to identify relationship.
- A separate checklist was used to collect data from diagnostic firms.
- 'Participant Observation Form', was used to gather information regarding the process and various components of the treatment.

1.9 Scheme of Presentation

The thesis proceeds as follows: The following chapter analyses the burden of road traffic injuries using the existing literature and road casualties' data collected from the State Crime Records Bureau. The third chapter sets out the theoretical/conceptual framework for the entire thesis while the general methodology as well as the characteristics of the primary data is detailed in the fourth chapter. Fifth and sixth chapters exclusively deal with epidemiological characteristics of the road accident and injuries and various components of financial burden such as inefficiency, mediflation, and household costs as found by the study. The penultimate chapter is the discussion of the study results in relation to the theoretical expectations or with respect to what was found in the literature. The final chapter provides conclusions and draws certain policy implications in the light of the results.

CHAPTER – 2

2 ROAD TRAFFIC CASUALTIES: A REVIEW

Human beings' material progress has attained unprecedented heights especially during the last century largely promoted by increasing physical mobility. The change in pattern of mobility is necessitated by a general transformation in the economic structure of a country from predominantly agrarian and feudal to industrialized/tertiary sector oriented. Road Traffic Accidents (RTAs) are generally considered as a price of material progress of human beings. Historically motor vehicle accidents have been believed as 'accidents', random events that are inevitable outcomes of road transport (Gumber 1994; WHO 2002). This is an oft-heard issue in the context of discussions on the prevention and road safety, because many tend to think that when there happens an increase in income to the population and urbanization leads to increased motorization, as a consequence, there is an increased likelihood of vehicular accidents and the consequent casualties. This argument is strengthened by data from developing countries where richer areas show a high prevalence of RTAs compared to low-income areas. Another characteristic that further adds fuel to their argument is the notion that accidents happen to individuals in the higher income bracket. Do these mean road accidents are a price of modernisation? Which are the major determinants in the process of economic development that lead to road traffic accidents and the associated casualties?

However, the mobility has not been costless and over the decades, the world has lost millions of human lives. It is estimated that more than 30 million individuals lost their lives and the hopes of the 30 million's dependants perished on roads since the first pedestrian casualty reported in 1898 (IFoRCaRC 1998). A lion's share of this wastage of lives could have been avoided, indeed. It is also important to note that the distribution of injury burden is not uniform across countries and populations and severely against the low income countries and individuals from low social and economic structure. Even an untailored look at the global scenario of road transport growth (mobility) and road place casualties would take one to conclude that there exists wide inequalities in the benefits and costs of mobility with inter and intra-country dimensions. It is seen further that the beneficiaries do not always carry the costs of their actions and merely classifying the

costs as "economic externalities" would amount to oversimplification of a complex issue.

2.1 Global burden

Injuries were (not only road traffic injuries) responsible for 21.7 per cent of the global deaths and 31.1 per cent of DALYs lost in 2001 (WHO 2002). According to a World Health Organization estimate, one out of ten persons as disabled in the world; and injury was the main cause of disablement for 1 out of 7 disabled persons. According to WHO, one million deaths due to RTIs in 1998 and second leading cause of death among 15-44 years and 10 million were seriously injured on the world's roads (Murray and Lopez 1996). RTIs constitute one quarter of all injury deaths worldwide (Hofman et al 2005). Eighty five percent of it occurs in LMICs, where majority of the casualties were pedestrians, cyclists and riders of motorised two wheelers. More than a quarter of all road traffic deaths occur in South-East Asia, while Africa has the highest road traffic death rate (28.2) per 100,000 population (WHO 2002). In both high/low-income countries, unintentional injuries constitute 68 percent of total mortality due to injuries. As it is known that victims of injuries belong to the most economically active population, deaths and disability caused by injuries might be a leading cause of financial catastrophe and impoverishment among the households. Apart from death and hospitalization, injuries impose major socio-economic and psychosocial burden on children, women, survivors and families, by direct and indirect methods (Mock 2003). Injuries, many a times, start a chain of further health problems and a Bangalore based survey finds that nearly one third of the surviving members were suffering from posttraumatic problems of depression, anxiety, fear, suicidal tendencies, alcohol problems following injury, which were directly attributable to injury itself, apart from the post-injury disabilities. A hospital-based study of traumatic brain injuries observed that around 30 percent of the injured were leading a poor quality of life (Gururaj G 2004a).

According to Global Burden of Disease project, among the injured due to RTAs, 25 per cent sustain brain injuries, 20 per cent have fractures and around 10 per cent suffer open wounds (WHO 2002). In both developed and developing countries, the share of communicable diseases in total DALYs lost declines with age and that of non-communicable diseases rises. However, in case of injury, it follows an inverted U-shaped

curve with age, meaning injury affects the prime age group 5-44 the most (including the schooling children, youth and productive work force. A majority of injuries (2/3 of fatal injuries) belong to unintentional category, of which the main cause is motor vehicle accidents (Gumber 1994). In many low and middle-income countries, the burden of road traffic injuries constitute between 30 per cent and 86 per cent of all trauma admissions (Odero et al 1997; Barss et al 1998).

Besides natural disasters, road traffic accidents are one of the critical events that have got the potential to wipe out an entire household and family at a time. Globally, the distribution of accidents, associated mortality and morbidity is heavily skewed against the low and middle-income countries. For example, nearly 85 per cent of the fatalities occur in these countries having only 40 per cent of the world's motor vehicles. The poor are killed and seriously injured mainly as vulnerable road users (pedestrians, motorcyclists and cyclists). Researchers further find that poorer individuals are more vulnerable to RTIs and the outcomes are also found to be poor (Ghee et al 1997). For instance, a Vietnam study finds that 50 per cent of the injured were primary income earners and 93 per cent had a monthly income of less than USD 130 (Le Linh 2002). The poor victims contributed most to their household's earnings (average 62 per cent in urban areas and 42 per cent in rural areas), and the loss of income tipped many households into poverty. One in every 4 deaths and 1 in 6 serious injuries to the poor involved a child (under-16 years) (Aeron-Thomas et al, 2004).

2.2 Economic progress and road traffic accidents

Statistics point out that there is direct relationship between per capita income growth and road related casualties up to a certain limit and high-income countries have surpassed the stage and low- and middle-income countries (LMICs) are passing through a dangerous phase of fast rising road casualties (Table - 2.1). Nearly 80 per cent of the global road accident related deaths occur in developing countries whose share in global vehicle population is less than 75 per cent implying that they bear a disproportionate burden of deaths and disabilities due to RTAs in 2000. The fatality rate is 70 per 10,000 vehicles – 25 times higher than for any developed country (Khan 1997) implying that lot more needs to be done in the reduction of passenger safety mechanisms in the vehicle as well as in the post-accident trauma care services in poor countries. The total number of road

Table-2.1[11]

Growth of road accidents in selected countries, 1990-1997

Country	No. of accidents during		Growth rate (%) during 1990-97
	1990	1997	
Austria	46,338	39,695	-14.3
Belgium	62,446	49,007	-21.5
Bulgaria	6,478	6,018	-7.1
Canada	1,82,294	1,58,973	-12.8
France	1,62,573	1,25,200	-23.0
Germany	3,40,043	3,80,835	12.0
Hong Kong	15,255	14,776	-3.1
Hungary	27,801	19,004	-31.6
India	**2,82,602**	**2,90,855**	**2.9**
Japan	6,43,097	7,80,399	21.4
Netherlands	13,247	11,238	-15.2
Pakistan	13,683	5,905	-56.8
Poland	50,532	66,586	31.8
Singapore	6,871	6,943	1.1
Spain	1,01,507	86,607	-14.7
Sweden	13,675	15,752	15.2
Switzerland	22,956	22,076	-3.8
USA	25,40,946	22,22,280	-12.5

traffic fatalities and injuries is forecast to rise by some 65 per cent between 2000 and 2020 (Murray & Lopez 1996; Koptis & Cropper 2003) and in low- and middle-income countries, deaths are expected to rise by about 80 per cent (Table - 2.2).. On the contrary, they are expected to come down by 30 per cent in high-income countries (Peden et al 2004). According to the World Bank's Traffic Fatalities and Economic Growth (TFEG) project, between 2000 and 2020, South Asia is predicted to record a 144 per cent increase in road traffic fatalities. If the LMICs follow the general trend of rich

[11] **Source:** International Road Federation

industrialized countries, the former's fatality rates will begin to fall in the future, but would cost immensely. As per the model's predictions, India is anticipated to start its decline in road traffic related fatality rates after 2042. The broader message of these predictions is that should current trends move on and new effective interventions are not undertaken, then more casualties will be experienced.

Table-2.2[12]

Road traffic injury mortality rates per annum (per 100,000 population) in WHO regions, 2002

WHO Region	Low- & middle-income countries	High-income countries
Africa	28.3	None
Americas	16.2	14.8
South-east Asia	18.6	None
Europe	17.4	11.0
Eastern Mediterranean	26.4	19.0
Western Pacific	18.5	12.0

The aforesaid facts and figures raise some important and critical questions. How does one explain relationship between road traffic accidents and fatalities vis-à-vis economic growth across developing and developed societies? Is the trend unavoidable and inevitable and should we allow the trend to carry forward as a matter of luck and destiny? Who are the beneficiaries of income growth and who are at the receiving end? What are the lessons we need to learn from the societies which reversed the so-called trend rather than allowing the countries to cost lives? How does one address the issue of road related casualties in the context where societies are fundamentally divided among economic lines and so on.

2.2.1 Biphasic relationship

Studies have recorded a biphasic relationship between the incidence of road traffic casualties and economic progress with casualties rising for the low-income countries and

[12] **Source:** Peden et al, 2004

declining for the industrialized countries (Van Beeck et al 2000). Why there exists an inverted U-shaped relationship between incidence of road accidents and economic development has been a question of perennial interest among injury researchers. The reasons are not far to seek: a number of complementary and competing explanations are at work. In a primitive society agriculture is the mainstay of livelihood for the majority and most of it is used for own-consumption (subsistence) and not much marketable surplus is generated. However, in the later stages, commercialization of agriculture (production of agricultural goods for the market) necessitates mobility of factor inputs and outputs requiring expansion of roads and vehicles in a given society. Since modernization of agriculture requires industries to supply large number of inputs like fertilizers, equipments, etc and processing of agro-goods, industrial sector also gains momentum leading to an enhanced pace of growth of motor vehicles and their paths. The tertiary sector (banking and financial services, communication, insurance, computer software etc) acts as a lubricant in the process of agricultural and industrial expansion and tertiary sector requires the fast movement of goods & services. If no effective measures are taken, casualties resulting from the movement of traffic would be the highest when industrial and service sector attains a very high rate of growth. Now let's see what happens to the type of motor vehicles on the roads. In the first phase when agriculture was the mainstay of the economy, individuals used to possess slow moving vehicles including vehicles requiring manual effort like cycles, cycle-rickshaws, bullock-carts, etc as they are cheaper with less priority for safety measures. In the first stage, road accidents and associated casualties would be minimum which is primarily due to the low speed. With technological progress, the mobility gets enhanced by sophisticated vehicles and rate of road casualties increases uninhibited.

2.2.2 Prominent postulates

The existing different strands of literature trying to understand the history of road accidents and economic development may be classified under four major explanations. Coase's theorem constitutes the origin of externalities argument in which any externalities problem could be effectively solved if we are able to accurately assign the property right to create problems (road accidents) and then cheaply traded and he sincerely believed that a matured market economy is a fine way to do that (Coase 1960).

It is thus argued that regulation of externalities and its fruitful assignment of liabilities are possible generally only at advanced stages of economic development when the institutional arrangements attain maturity. The contributors of externalities include the manufacturers of vehicles, insurance companies, enforcement agencies etc and the absence of an effective institutional framework means that the contributors of accidents are not accounted for. Here, Vickrey (1968) stresses emphatically the specific role of motor-insurance policies in risk-taking on roads.

The second theoretical stream emphasizes the role of low investment in road safety in low-income countries. The low priority attached to prevention of road safety mechanisms is primarily based on the notion of cost-effectiveness of public health interventions and the belief that road accident victims are not generally poor. The cost-effectiveness argument bases its arguments reasoning that resources be allocated in such a way that the marginal returns from spending on prevention or cure of disease should be maximum for a given unit of resource spent. With increased income for countries, they can earmark a greater proportion of resources towards road safety and passenger security. The political economy behind the increased allocation may be attributed to the increased wield that the upper and middle income groups they possess.

The so-called vehicle mix hypothesis points out that the effect of economic growth on the changing mix of vehicles on the road (Tay 2003) need not be always positive from the road accident's point of view. Individuals, with income growth, prefer convenience to mass transport means the former are more vulnerable to road accidents. The vulnerability is more if the personal vehicles are two wheelers whose probability of meeting with an accident as well as fatalities is many times higher than other major category of vehicles.

The fourth hypothesis on the relationship between road accidents and economic development elicits the role played by an effective pre-hospital emergency services and trauma care systems. Improved investments in trauma care and pre-hospital care are positively correlated with higher survival in a large number of places (Adam et al 1994; Arreola-Risa et al 2000). Thus, it is observed that despite fast increasing volume of traffic, road traffic accidents decline at the pragmatically advanced phases of economic development probably due to a combination of factors including a higher preference

towards quality on roads including better roads, the safety of travelers and vehicles, creation of a suitable legal framework and an effective enforcement of road rules, etc. Bishal et al hypothesize that investment in harm reduction, improvements in emergency transport and timely and adequate medical treatment of victims reduced fatalities despite increased crashes and injuries (Bishai et al 2006).

2.2.3 Epidemiology

Gordon, viewing injuries from an epidemiological perspective, thinks that injuries are the product of not one cause, but of forces from at least three sources that are the host, the agent (or vector) and the environment (physical and socio-economic) in which host and agent find themselves (Gordon, 1949). Haddon (1980) emphasized that unlike diseases, the onset of injury is sudden and the consequences are devastating, besides the loss of energy. He has introduced time dimension into injury theories and divided the process of injury occurrence and outcome into distinct phases called "pre-event", "event" and "post-event" so that prevention becomes easier.

Uncertainty in incidence of Road Traffic Injuries (RTIs) leaves little opportunity for the households to plan the financing of medical care to the injured. The uncertainty forces households to incur higher amount of inefficient spending because when compared to what is necessary to spend in a normal consumption of goods and services is not available to the injured and his/her household. Inefficient spending means the financier of the cost of treatment makes an expenditure which is higher than what needs to be spend in a normal situation. Here uncertainty introduces additional costs through two constraints. Firstly, choice constraints and secondly monetary constraints. The first one means, even if the victim has the required financial resources, choice of facilities is not often exercised due to inability to exercise choices due to lack of access and or due to lack of availability. Second, lack of resources forces the injured or household to undertake the needed medical interventions in the required time which then forces the household to make a higher expenditure later on. Financial uncertainty in treatment arises when there exists an individual based financing mechanism like OOP where utilization of health services for treatment is based on purchasing power and such a system may exclude the injured belonging to lower income groups. Here two issues become immensely important in determining the output and outcomes. One is the

physical availability of health services and second is the financial accessibility to the patient to access the available service. For the policy makers, this means that there is a clear need for establishing trauma care centres having at least necessary equipments at places where there is a higher probability of accidents. Secondly, mechanisms for financing medical care for injured needs reemphasis because financing by households incurs inefficiency which can be reduced by protection mechanisms. This points to the specific characteristic of a health system called 'unprotected financing' in the form of OOP that makes the difference.

2.2.4 Gender dimension

Globally 2.7 times as many males as compared to females die from RTIs, accounting for the largest sex differentials in mortality rates from unintentional injuries (WHO 2002). It is also said that greater risks for male boys compared to females girls due to their involvement in activities like crossing roads unaccompanied by adults, bicycling, fast driving etc. Further, for pedestrians, it is seen that risk of being involved in a collision, mortality and long-term specialized care increases with age. Gender roles in terms of greater exposure to driving with high-risk behaviour like over speeding, alcohol use, drug use, disregard for pain etc. In places where women's mobility is restricted, men move around in vehicles more than women and thus at an increased risk of suffering injuries. Females are more likely to wear helmets than men and in Karachi, Pakistan males were observed to be more likely than females to jump off a moving bus (43 per cent Vs 1.6 per cent), get on a moving bus (49 per cent Vs 12 per cent) etc all risky amidst heavy urban traffic. If other things remain constant, women are at a greater risk of lower body injury because of their smaller stature (WHO 2002). Studies of frequency and severity of lower body injuries found an excess of ankle/tarsal injuries among females, and follow-up research found that this was due to sex differences in height.

Transport limitations, long distance to health facilities, and weak communication system, and lack of timely resources prevent the injured from seeking adequate care. Gender disparities in RTIs may possibly be an extension of prevailing gender disparities for other acute injuries and ailments. It has been suggested that acute accident care is similar to emergency obstetric care, and communities that cannot respond to one, cannot do to the other as well (WHO 2002). *Ceteris paribus*, women are more likely to be insecure

due to absence of paid work, and it worsens in female-headed households. Besides, since men are often the sole breadwinners, economic and social costs of injuries of their husbands put women at risk of substituting husbands' role.

2.3 Indian scenario

In India, around 500,000 people are killed in a year due to RTIs and more than 50 per cent occurring in the 10-24 age group (GoI, NCRB 2000). India has one per cent of the total number of vehicles in the world but accounts for six per cent of RTAs. Road traffic injury is the sixth most common cause of death in India and is also more frequent among the younger groups (Peters et al 2002) and prevalence of RTI related disability is estimated to be nearly 2 million in India (Gururaj 2006). The economic cost of RTIs in India is estimated at around Rs. 550 billion annually (Mohan 2002) or around one per cent of GDP. As per NSSO 1986-87 data, the incidence (per 1,000) of all injuries amounted to 38 in rural areas while it was 24 in urban areas in major five states in India (Gumber 1994). The proportion of hospitalized injuries was 3.7 for rural areas, while 4.1 per cent of the injured got hospitalized in urban areas. There is a possible inequity in the distribution of hospitalization of injured in terms of urban and rural areas. This may be possibly because of at least three reasons. First, the severity of the injury (both perceived and objective) might be higher in urban areas and so a higher hospitalization. Second, since there is a higher concentration of health facilities in urban areas, physical accessibility is lesser an issue here, and financial accessibility is also higher in urban areas as they have a higher purchasing power compared to the rural segments. Injuries are one category of disabilities that requires long hospitalization indicating severity of the category itself and so the cost of treatment may take a huge variation compared to many other illnesses.

Table-2.3, Table-2.4, and Table-2.5 explain the trends and pattern of road traffic accidents and associated casualties vis-à-vis number of registered vehicles and road availability as well as the rate of accidents at different point of time in different regions of the country. There has occurred phenomenal increase in the number of road accidents in the country since Independence and the number killed or disabled permanently and temporarily is also increasing at a faster pace. The rate of growth of accident and fatality rate (measured by the number of accidents and deaths per 10, 000 has been falling

constantly) probably reflecting advances in vehicle engineering aspects such as improved braking system, and better quality of roads etc. As is obvious, the rate of decline had been faster in the initial stages and compared to recent years (Table-2.3). The rate of fatalities and injuries associated with road traffic accidents continue to increase in all States during 1970s till 2002. However, the rate of growth of casualties are not uniform and varies with some States like Maharashtra recording fall in number of deaths and some States like Assam having slow growth in RTA deaths. However, States like Andhra Pradesh, Karnataka and Kerala's fatality rate has gone up significantly during the period. When we analyse the State-level RTA information based on rate of accidents in relative terms, we find that Kerala's accident rate per 100 km of surfaced road length is almost three times higher than the national average, followed though distantly by Tamil Nadu, Gujarat etc (Table 2.5).

The reasons are multidimensional and multisectoral. The Road Traffic Injury Report 2006 sums the major factors in Indian road accidents (Gururaj 2006):

> *'Growth of motor vehicle industry, liberalized economic policies of successive governments, aggressive media promotion, increasing purchasing power of people, easy accessibility of loans through public and private sector banks, unreliable and unsafe public transport systems, changing values of youth have all contributed for increasing motorization and changing transportation scenario in the country. Unplanned and unsafe traffic environments with high density of vehicles and human beings is not only a place for road traffic deaths and injuries, but also a cause for psychosocial stress, air and sound pollution leading to poor quality of life and accompanying health hazards'.*

In the 1995-96 data of NSSO (for all the major states), the incidence (per 100,000 population) of all injuries reveals that for injuries excluding hospitalization, it is 30 for India where 25 in rural and 44 in urban areas. The incidence in Kerala was 15, which is much lower than the national average, with urban areas reported zero injuries, while rural areas recorded an incidence of 19 per lakh population.

Table-2.3[13]

Road Accident in India, 1970-2003

Year	No. of RTAs	Persons killed (no.)	Registered motor vehicles (in '000)	Accidents per 10,000 vehicles	Persons killed per 10,000 vehicles
1970	1,14,100	14,500	1,401	814.42	103.50
1980	1,53,200	24,000	4,521	338.86	53.09
1990	2,82,600	54,100	19,152	147.56	28.25
1991	2,95,131	56,278	21,374	138.08	26.33
1992	2,75,541	60,113	23,507	117.22	25.57
1993	2,84,646	60,380	25,505	111.60	23.67
1994	3,25,864	64,463	27,660	117.81	23.31
1995	3,51,999	70,781	30,295	116.19	23.36
1996	3,71,204	74,665	33,786	109.87	22.10
1997	3,73,671	76,977	37,332	100.09	20.62
1998	3,85,018	79,919	41,368	93.07	19.32
1999	3,86,456	81,966	44,875	86.12	18.27
2000	3,91,449	78,911	48,857	80.12	16.15
2001	4,05,637	80,888	54,991	73.76	14.71
2002	4,07,497	84,674	58,924	69.16	14.37
2003	4,06,726	85,998	67,033	60.68	12.83

2.3.1 NSSO estimates

Accidents/injuries account for 2 per cent of the entire outpatient cases in the country costing Rs. 500/- or USD 12.5 per episode[14] and 4 per cent of ambulatory care spending. In case of hospitalization, accidents/injuries take 16 per cent of all inpatient cases costing Rs. 9,700/- or USD 242.50 per case and 19 per cent of all inpatient spending.[15] Trauma accounts for 12 per cent of hospital bed occupancy and almost 7 per cent of total national health expenditures. In a hospital based study in Kerala, India, it was seen that about 60

[13] **Source:** National Crime Records Bureau, 2005
[14] the highest among all diseases
[15] After acute infections, injury/accidents represent second highest burden on household financing.

per cent of poly-trauma (more than one organ system injury) cases were due to RTIs. Injuries by type, laceration accounted for 46.7 per cent, blunt injuries (18.6 per cent) and penetrating wounds constituted 7.9 per cent. More than 34.4 per cent had head injuries while 31 per cent had long bone fractures (Devi 2005).

Table-2.4[16]

Persons killed and injured by motor vehicles in India (major States), 2001-04

State/UT	Persons killed				Persons injured			
	2001	2002	2003	2004(P)	2001	2002	2003	2004(P)
Andhra Pradesh	8,428	7,517	9,679	10,552	37,471	22,112	47,477	50,895
Assam	1,021	1,023	1,122	1,288	3,744	3,843	4,361	4,313
Bihar	1,043	1,957	2,368	1,791	1,465	3,882	4,227	2,664
Gujarat	4,502	5,094	5,161	5,423	32,508	34,415	33,680	34,436
Haryana	2,911	2,987	3,028	3,417	8,289	8,321	8,287	8,643
Karnataka	5,805	6,366	6,195	6,496	42,196	45,769	45,781	50,395
Kerala	2,674	2,792	2,905	3,059	49,675	49,460	48,640	51,228
Madhya Pradesh	3,865	4,141	4,523	4,703	27,401	29,780	33,375	37,250
Maharashtra	9,769	9,523	9,483	9,875	49,340	48,377	46,692	47,394
Orissa	1,933	2,220	2,293	2,454	8,314	9,678	8,838	9,498
Punjab	2,690	2,638	2,655	2,580	3,390	3,932	4,077	4,218
Rajasthan	5,187	5,535	6,025	6,477	25,994	27,119	29,079	31,345
Tamil Nadu	9,571	9,939	9,275	9,507	52,922	55,130	55,242	57,283
Uttar Pradesh	9,654	9,726	7,845	9,946	13,256	13,152	9,348	13,188
West Bengal	3,712	4,510	4,361	4,994	10,625	13,800	12,769	14,877
TOTAL	**80,888**	**84,674**	**85,998**	**92,543**	**4,05,216**	**4,08,711**	**4,35,122**	**4,64,583**

[16] **Source:** National Crime Records Bureau, 2005 (P) : Provisional

Table-2.5

Accident Rate in Different States, 1999

State/UT	Total surfaced road length (km)	Accidents (no.)	Accidents/100 km of surfaced road length
Andhra Pradesh	1,10,110	28,529	25.9
Assam	12,701	2,269	17.9
Bihar	34,082	4,545	13.3
Gujarat	83,071	37,428	45.1
Haryana	26,245	8,248	31.4
Karnataka	1,03,045	30,,559	29.7
Kerala	**46,884**	**33,977**	**72.5**
Madhya Pradesh	92,178	30,559	33.2
Maharashtra	2,89,027	72,231	25
Orissa	88,416	6,577	7.4
Punjab	52,602	3,620	6.9
Rajasthan	89,378	21,132	23.6
Tamil Nadu	1,17,468	48,086	40.9
Uttar Pradesh	1,63,908	18,116	11.1
West Bengal	44,970	17,889	39.8
TOTAL UTs	**14,48,629**	**3,86,456**	**26.7**

In an Ahmedabad study (Mavlankar and Nair 2003), distribution of injuries among RTA victim's shows that lower extremity accounted for 35.4 per cent while 20.7 per cent suffered head injury and injury to upper extremity accounted for 17.7 per cent. As per the AIS scale, 40.3 per cent of the victims had minor injuries (AIS score of less than 1 to 3 score), and 16.5 per cent had severe injuries with a score above nine. There is a possibility that injuries once classified as minor may become fatal or severe due to complications occurring due to treatment or non-treatment or even late treatment (Mavlankar and Nair 2003). The ratio of fatal to non-fatal accidents was 1:4.7 using a prospective study design while it was 1:12.4 when used a retrospective method. Empirically tested epidemiological studies from India and other countries with better road traffic accident information management system confirm that the ratios between

deaths, injuries requiring medical attention in health facilities and minor injuries are 1:15:70 in most countries (Mavlankar and Nair 2003). Mavlankar (2003) estimates that under-reporting of severe injuries to the extent of 20-30 per cent.

Table-2.6[17]

Incidence of RTIs (per 100,000 population) excluding hospitalization (1995-96)

State	Rural	Urban	Total
Andhra Pradesh	18	31	21
Assam	35	48	36
Bihar	26	83	33
Gujarat	11	21	14
Haryana	105	321	153
Karnataka	28	20	26
Kerala	**19**	**0**	**15**
Madhya Pradesh	11	29	15
Maharashtra	15	42	26
Orissa	17	50	21
Punjab	53	37	48
Rajasthan	2	11	4
Tamil Nadu	18	16	17
Uttar Pradesh	34	79	42
West Bengal	33	28	32
India	25	44	30

Concerns exist on the possibility of gross underreporting of road traffic injuries especially in developing countries which has been attested by studies and they show that there is widespread under-reporting of road fatalities and several of the documented cases came from the Asia and the Pacific Region. For instance, the actual number of China's road deaths has been estimated by the official Beijing Traffic Engineering Research Institute to be over 40 per cent greater than that reported in official statistics.

[17] **Source:** NSS 52nd round (1995-96)

Independent reports suggest that the official numbers are underestimates for death and disabilities by 5 per cent and 50 per cent (Aeron-Thomas 2000). Thus, it can be estimated for every death, nearly 15-20 individuals get hospitalized and about 50-100 people receive care for minor injuries (Gururaj 2000). Such discrepancies in data need to be re-emphasized here, as it is quite likely that the actual current situation is much worse than that being reported and acknowledged. With regard to the underreporting of road traffic injury victims, a Bangalore based study finds that the data on road traffic crash deaths are reasonably reliable with an estimated underreporting of 5 per cent, while the data on injured and hospital treatment are heavily underreported or underestimated (Gururaj et al 2003). A detailed community based survey in rural Haryana, India showed that the ratio of critical, serious, and minor injuries was 1:29:69. These ratios are generally lower than census based or community based studies implying widespread underreporting due to conceptual problems, technical issues and management failures (Mavlankar 2003). Using epidemiological evidence, conservative estimates utilizing national data points out that a ratio of 1:15:70 between road traffic fatalities, serious injuries (injuries requiring hospitalized treatment) and minor injuries in majority of the countries (Gururaj et al 2000; Varghese & Mohan 2003; Mock et al 1999). Most studies available on the injuries are public hospital based ones in the country, though there is evidence that large number of injury victims seek medical attention from private sector (both for-profit and not-for-profit. For example, based on the NSSO data on morbidity and ailments, in regard to injuries (but not specifically on road traffic injuries), in 1986, 25 per cent and 27 per cent of injured in rural and urban areas respectively sought in-hospital treatment from private health sector, while around 79 per cent and 68 per cent respectively in rural and urban areas sought non-hospital based treatment in the private sector (Gumber 1994). With the passage of around two decades, this share may have gone up if the later health surveys are any guide. This points towards the increased need of coordination between the public sector and private health services.

2.4 Where does Kerala stand?

Road traffic injuries are being ranked as the third major cause of deaths in the state of Kerala. Though state's population forms three per cent of the country's total, it contributes a disproportionate share in the gross injury burden with more than ten percent

coming from Kerala alone every year. As per some estimates, the economic cost of road accidents that occurred in the year 2004 came about Rs. 4.54 billion, or USD 113.5 million, which is roughly 1.5 per cent of the State's GDP (NATPAC 2004). The accident rate in Kerala is around three times the national average (SCRB 2005) and third in the number of accidents. Road traffic injuries are being ranked as the third major cause of deaths in the state of Kerala. Based on the existing rate of growth of vehicle population, the State will have another one million vehicles in the coming year, which effectively means another 15,000 accidents.[18]

Kerala bears a disproportionate burden of road traffic accidents, and associated deaths and disabilities. In terms of the number of registered motor vehicles the State ranks 10th among the 25 States in the country during 2002, while in case of number of accidents its position is third. Similarly, Kerala ranks second in the absolute number of injuries sustained due to road traffic injuries, though ranks tenth in the total motor vehicle population. In terms of non-fatal injuries as well, the State bears the second highest incidence while fatalities are comparatively less. A detailed analysis of road traffic accident scenario is enunciated well in an upcoming chapter.

2.5 To sum up

The term "accident" implies an event that is unavoidable, unpredictable and inevitable (Peden et al 2004) and in reality majority of our road accidents are avoidable, predictable and escapable, if the developed country experiences are any guide. Road related casualties as "disease of development" views are not to be encouraged anymore. Developing country road accidents are a complex issue having not only multi-sectoral dimensions, but also intricate are the wide differentials in the entitlements of the population using roads. The former can be changed with lesser effort by technological and behavioural interventions; however, the latter are intrinsic problems associated with the risks held by the population. Since the latter's behaviour and occupational risks are unambiguously related to the occupational features and living conditions and so on.

[18] Assuming the present accident rate of per 1,000 vehicles at 15/1,000 remains the same

CHAPTER-3

3 CONCEPTUAL FRAMEWORK: FINANCIAL BURDEN OF TREATMENT

Intrinsic and instrumental values associated with health are one of the principal reasons why individuals prefer good health. Recognizing this, in as early as 1970s, Grossman (1972) put forth a conceptual model for demand for health care, though he interchangeably used the concepts of health and health care, stating that demand for health has investment and consumption attributes. Investment, in the sense that good health is an important input for other economic and non-economic activities like work or leisure and also a consumption good, as it is enjoyed for itself due to the utility implications. However, existing models of demand for health care consider health care expenditure as a homogenous entity and ignores the intrinsic nature of the most important part of health care - curative care.

3.1 Curative Vs preventive/promotive care

Conceptually, we need to make a distinction between health care and other expenditures on the one hand and between curative and preventive/promotive health care expenditures on the other. Obviously, health care has similarities and dissimilarities with other commodities making economists state health care as an 'abnormal commodity'. Curative care exhibits more commodity characteristics than preventive/promotive care. However, expenditure on curative care usually is of compensatory in nature and so, need not take the individual back to the pre-illness or injury level of health status. To what extent the health status is restored depends on the seriousness of the illness/injury. The argument that since consumption of health care gives utility, so it has to be considered equivalent to any other commodity may not hold much water in such a context. The point that needs to be emphasized is that such an expenditure possesses a negative connotation. Uncertainty in its incidence, disappearance and outcome sets apart curative care expenditure from other consumption items in an individual's basket. Different dimensions of uncertainty are important in that as they violate, often, one of the

fundamental assumptions of microeconomics like consumer sovereignty and thus choice, transitivity, gross expenditure on illness and its treatment etc.

Unlike curative care, preventive/promotive health care demand is a prime candidate to be called an investment, because it brings forth returns with it in most cases in terms of future disease and its associated costs prevented. Preventive/promotive health care expenditure enhances an individual's health status as well as that of a society's and performs a maintenance role so as to avert a fall in health status. Like most of the general household consumption, consumption of preventive care is not uncertain and effective choice can be exercised by the prospective user. While curative and palliative care are considered as consumption in the mainstream health care demand models on the assumption that consumption of health/medical care brings utility. However, utility theorization may not go far in explaining the need for reducing amount of disease burden in an economy. Drawing from the theory of public health literature, disease is described as a burden, for society in general and individual in specific wants to enjoy better health for the above stated objectives of health.

The characterization that consumption of medical care is to be treated as any other standard economic commodity fails to explain the burden. Incidence of illness/injury is a disutility implying that there has occurred a reduction from a threshold level health status of an individual. It is assumed that normal health is the norm and illness/injury is an aberration. Individuals report illness when the perceived health status falls below a threshold level. What curative health care expenditure tries to do is a "compensating utility function" rather than a promotive utility function. Since disease reduces general well-being of the society at large, the associated expenditure also needs to be reduced.

It is agreed that unlike most other standard commodities, incidence of illness/injury is compounded by high degree of uncertainty in terms of its occurrence, disappearance, the cost of treatment, to a great extend, it has the potential to entail heavy opportunity costs in terms of the general well being of households. The uncertainty due to non-storability of health care make certainty a far-away option in planning health care expenses, though financial protection mechanisms try to shield the uncertainty element.

3.2 Demand for injury care

From a public health point of view, injuries are considered as burden and the paramount mission of all health systems is to reduce their magnitude and associated expenditure.

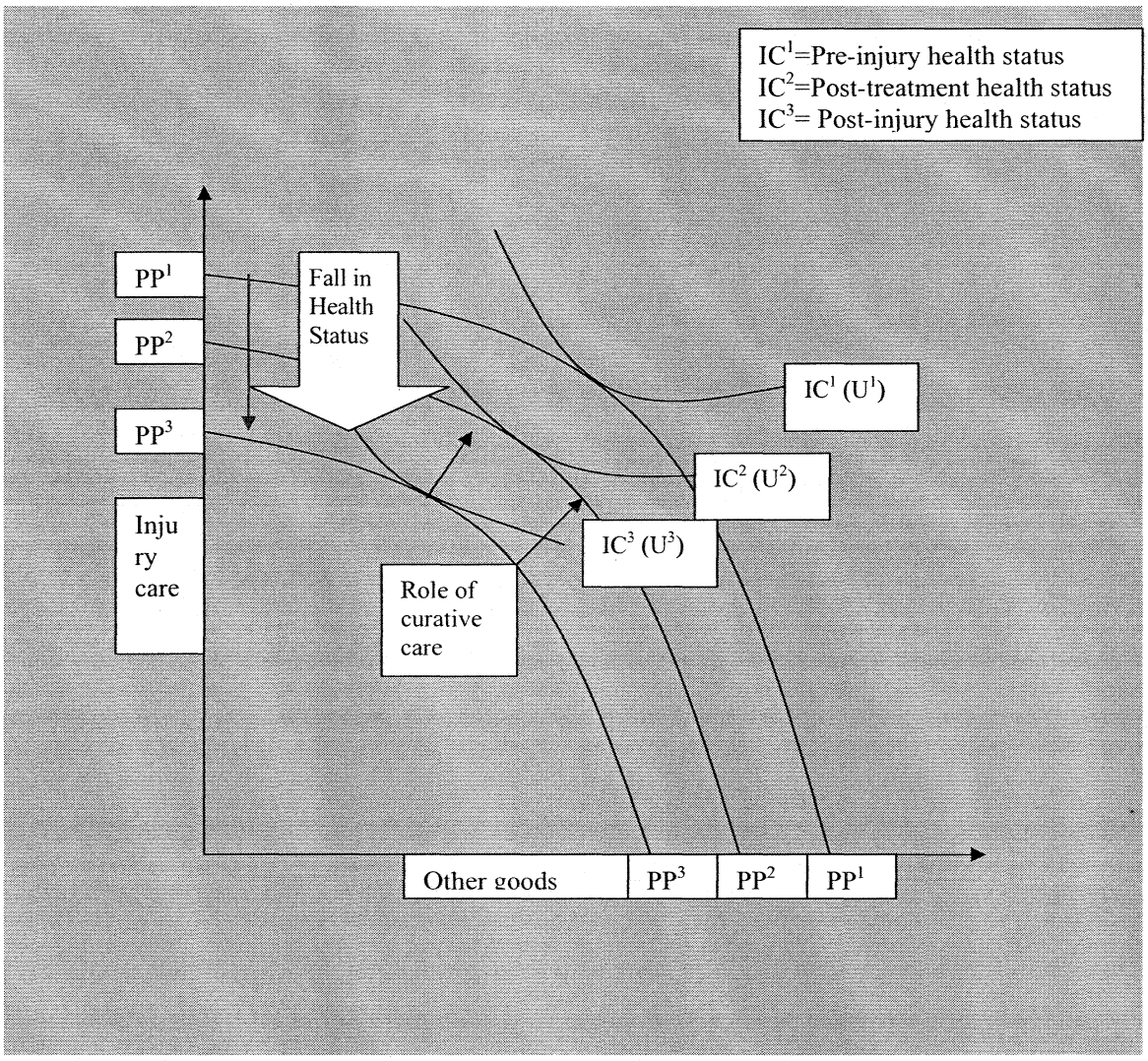
The most visible nature of an individual demand for injury care is the randomness of its need. Unlike food, clothing or similar goods, the demand for injury care is highly irregular and unpredictable. Medical care concerning injuries affords satisfaction only in the event of occurrence, a departure from the normal state of affairs (Arrow 1965). Besides, demand for injury care comes at a stage of high vulnerability and with much assault on personnel dignity. A greater risk of death or impairment of full functioning frowns upon the injured case. Arrow (1963) summarizes these issues in the following words:

> *"The risks are not by themselves unique; food is also a necessity, but avoidance of deprivation of food can be guaranteed with sufficient income, where the same cannot be said of avoidance of illness. Illness is, thus, not only risky but a costly risk in itself, apart from the cost of medical care"*

In Figure-3.1, health status before injury can be depicted by the Health Status Possibility (HSP) curve HSP^1. Satisfaction/utility derived from the health stock, as reflected by the HSP curve, increases with the level of health stock. This is indicated by the corresponding indifference curve (IC). An injury due to road traffic accidents pushes the HSP curve downwards and the level of downward shift in the health stock depends on the seriousness of the injury. This is indicated by the curve HSP^3. For non-fatal injuries, the treatment (curative care) is assumed to partially bring back the health stock to HSP^2. It is pertinent to note that the role of curative care expenditure is that of a compensating function because it is not enhancement of health stock above the pre-injury level. Rather, it strives to attain higher level than the post-injury level (HSP^3). Along with a decline in health stock due to injury, there also occurs a relative shift in the consumption in favour of more medical goods which, in the long-run, affects the overall household welfare.

Figure-3.1

Impact of injury on health status and the role of curative care



3.2.1 Conceptualising the demand

There exists fairly good amount of literature explaining the demand for health and health care beginning with Becker (1965). Grossman (1972), using a utility maximizing household health production function approach, states that health is a durable capital good depreciating over time. According to him, investment in health is an activity where medical care, in combination with other inputs, produces new health so as to reduce the biological or 'natural' deterioration in health due to demographic reasons. The health

stock of time depends on inputs like genetic health endowments, nutrition, behavioural factors such as tobacco use, alcohol consumption, and physical exercise/work, and environmental variables like pollution. Given this, health stock at any point of time can be specified as

$$H_t = H\ (h_{t-1}, g_t, x_t, e_t, mp_t, mc_t)$$

Where

H_t is health stock at time 't'

h_{t-1} is health status at time 't-1'

g_t is the vector of genetic endowments accumulated till time 't'

x_t is the vector of non-health care individual inputs such as diet, level of physical activity, and other lifestyle factors

e_t is the vector of environmental factors outside the individual control such as weather, and household/community characteristics

mp_t is the consumption of preventive/promotive care at 't'

mc_t is the consumption of curative care at time t

The focus here is on the injury care sub-component of mc_t. In other words, injury care is just one input in the entire production process of health status. However, the level of injury care sought and its effect on overall health status are influenced by other input factors such as h_{t-1}, x_t, e_t, mc_t *and* mp_t. In addition, the level and effect of injury care also depend on the health system factors such as availability of and accessibility to facilities and finance.

The financial burden of injury depends on the nature and severity of the injury, the type of care sought, type and level of health care facility from where care is sought, closeness of the facility, price of services/commodities consumed as part of care, co-morbidity and the like. Given the inelastic demand for injury care, price tends to be an insignificant

factor during initial stages of care seeking. Literature on medical care, however, throws conflicting results concerning the nature of demand (Heller 1982; Akin 1985; Gertler 1989; Meyer 1988; Gertler and van der Gaag 1990; Waddington and Enyimayew 1990; Griffin 1992; Bennet and Ngalande-Banda 1994; Mwabu et al 1995; Sauerborn et al 1995). However, under-consumption of care when required found among the low-income groups of population (Gertler 1989; Sauerborn et al 1995) suggests that demand could be elastic at least in low-income settings. At the same time, people, in emergencies, tend to act as if prices are no object and they may over-commit financially.

However, the literature inadequately captures the impact of treatment cost on household budget, consumption and investment decisions, livelihoods and on the household production of health (Berman et al. 1994, Gilson 1996). It is also silent on the differential burden of treatment faced by different income and social groups. Though the demand for injury care is price inelastic (Greenfield 1963, Feldstein 1999), hospitals face an elastic demand owing to the presence of more than one hospital. The relatively inelastic nature of injury care demand is more often shaped by institutional (socio, economic, or political) arrangements (Klarman 1965) and individual, community and health system factors such as price, travel time, opportunity cost, patient's income, perceived quality of care, provider behaviour, resources, structures, institutions, procedures, and regulations (WHO 1977; Patton 1978; Abbs & Walker 1986; Andersen et al, 1987; Gertler 1988; Wennberg, Barnes & Zubkoff 1992; Rosenstock 1992; Haddad & Fournier 1995; Sawano 2001, Shengella et al 2001). Since injury care market displays large number of imperfections due to huge information asymmetries, selection of facilities is severely constrained in the utility maximizing model. Decision making with respect to injuries is a complex and multi-dimensional task shaped by a plethora of variables including the nature and severity of injury, the type of care sought, type and level of health care facility from where care is sought, distance to the facility, price of services/commodities consumed as part of care, household/patient income, socioeconomic/cultural/Geographic accessibility, religious beliefs/affiliations, gender, and community support (Mwabu 1989). The health care provider, acting as an agent for the principal (patient), also influences the care seeking of household (will be discussed in detail elsewhere). The demand for injury care can, thus, be stated as

$$MI_{pt} = M\ (s_{pt}, y_{pt}, p_{mit}, hf_{pt}, hs_t, u_{pt})$$

Where

MI_{pt} is quantum of injury care sought by patient 'p' at time 't'

s_{pt} is the level of severity of the injury of the patient 'p' at time 't'

y_{pt} is the household income of the patient 'p' at time 't'

p_{mit} is the price of injury care at time 't'

hf_{pt} is health facility type from where the patient 'p' seeks care at time 't'

hs_t is health system factors influencing the injury care decision at time 't'

u_{pt} is other exogenous factors not controlled by the patient 'p' at time 't'

Among these factors, severity (s_{pt}) would have a positive impact on the demand and so, quantity demanded (measured in terms of patient days) is likely to go up along with the severity. Overall, as the household income (y_{pt}) increases, quantity demanded of any health care, and therefore of injury care, is likely to go up; many studies have shown that there is a positive relationship between income and medical care expenditure. Price (p_{mit}), *ceteris paribus*, is expected to have a negative impact on the demand for any health care. The literature on this is mixed and so, one can expect any sign or zero with respect to injury care. The type of health facility (hf_{pt}) too plays a positive role on the demand for injury care. But, this goes hand-in-hand with the severity (s_{pt}) and income (y_{pt}); patients with mild injury and poor patients are likely to seek care from lower level facilities. Health system factors (hs_t) include all the factors such as distance, availability and accessibility of facilities, and functional characteristics including the (in)efficiency and induced demand. The exogenous variable (u_{pt}) would include all the exogenous factors such as community support, cultural factors, social aspects, etc.

3.3 Financial burden

Once injury strikes and the affected person seeks care, the financial burden sets in. Burden is a broader term which takes into account all costs (time and monetary) incurred by all the participants in an economic and social system. It can be divided into objective burden and subjective burden. Objective burden refers to measurable or quantifiable values especially through monetary and time scales due to RTIs to society. Subjective burden represents non-quantifiable costs basically psychological costs to the society due to RTIs. Financial burden on households is a major component in the gross objective burden and represents the difficulties experienced by the injured or his/her household as a consequence of road traffic injuries related health care seeking and household care giving.

3.3.1 Welfare loss

The amount the household needs to spend above and beyond the optimum level of spending is described as welfare loss, and the magnitude of welfare loss depends on the magnitude of the combined effect of the demand and supply side imperfections. Welfare loss is conceptualised as the loss of resources incurred towards the treating injuries which might have contributed to increase in the consumption of resources other than medical care.

The opportunity costs assumption in road traffic injury is being spread out through the analysis, because this concept assumes added relevance due to at least two reasons. Firstly, medical consumption is considered as a burden because the resource use has alternative uses. Second implication is that road traffic injury and the associated resource uses is a classic case of avoidable death, disability and associated costs. Injury referral means advice by medical professional/ health care facility to another (change) and not self- referral for treating a single episode of road traffic injury. Injury care shopping means changing of physicians/health care facilities without professional referral for treating a single episode of road traffic injury.

Figure-2 explains what injury care does to the household budget and to the household spending on other commodities normally consumed by the household. BB curves

indicate the total resources at the disposal of the injured household (disposable income). BB^1 is the line indicating pre-injury household consumption with a small amount spent on health care and more for other household items (IC^1). However, as it can be seen, injury forces the household to cut back its total spending (overall budget) (BB^2) because of wage or income loss and besides reallocating resources meant for other commodities/services for health care (IC^2). BB^3 is the line indicating the post injury household budget of the household and IC^3 pointing out that the there has happened a reduction in the consumption of medical goods comparatively depending on the level of disability and co-morbidity.

All the input factors listed earlier in the demand function are likely to have a positive influence on the financial burden of injury care. In addition, there are certain other household factors such as the source of financing, gender, age and similar other factors that specifically influence the financial burden. Input factors having a bearing on the household financial burden while attempting to treat injuries can be broadly grouped under market, health system, context-specific exogenous factors and the household factors. The market related factors can be captured through *mediflation* while the efficiency of health care facilities reflects the overall functioning of the health system.

While the injury care context varies a lot depending on where and when the care is being sought, induced demand may represent a portion of the context-specific influences. Household factors can be explained by the structure and organization of the household out-of-pocket spending on injuries. This conceptualization explains the crux of the approach applied in this study.

3.3.2 Uncertainty-financial burden linkage

As mentioned earlier, injury care seeking is generally associated with major uncertainties concerning its incidence, care, and cure/disappearance, and the price of care. Table-3.1 presents the linkage between the probability of illness, risk and financial burden imposed by treatment. This is from a demand side. On the supply side, uncertainty in the occurrence of illness, as in the case of injuries, shrinks the choice of care and imposes higher financial burden on the affected (Table-3.2).

Figure-3.2

Impact of injury on household budget and resource allocation

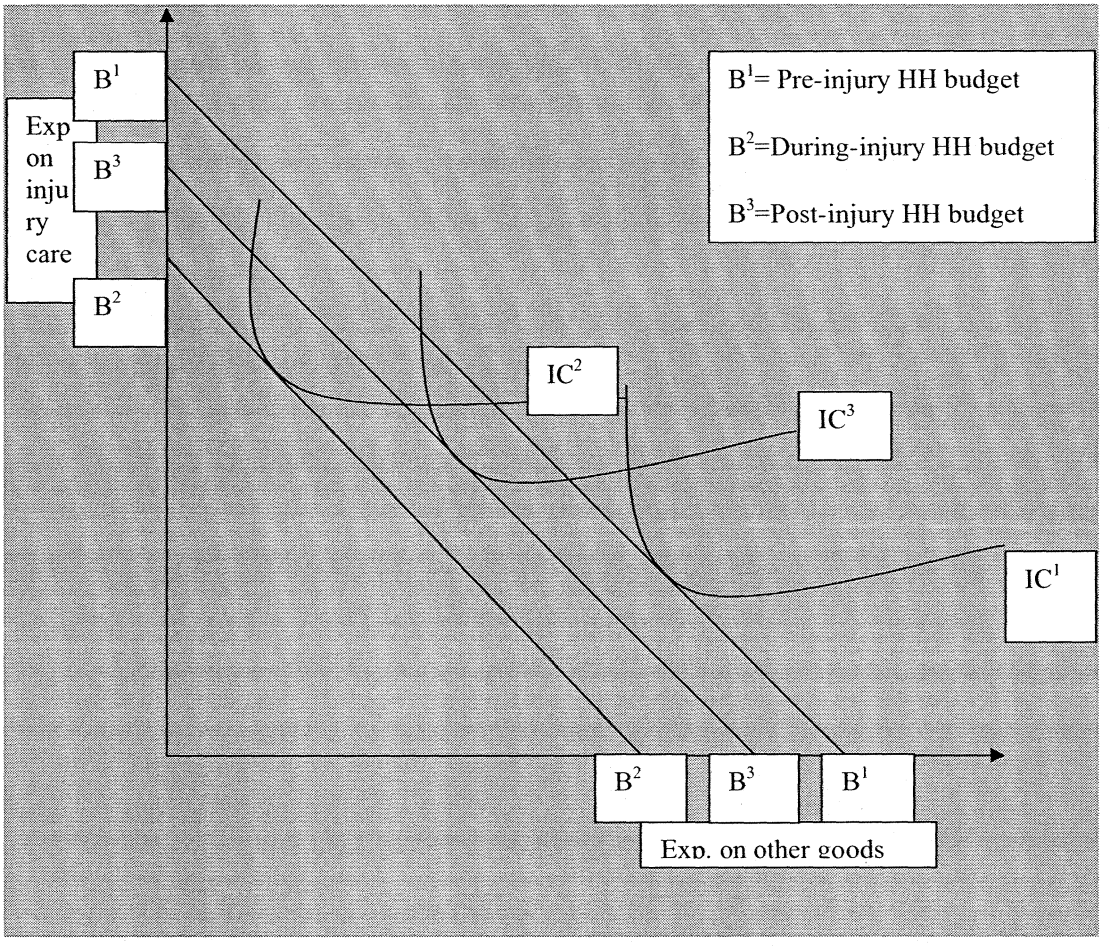


Table-3.1

Probability, risk and financial burden of illnesses/injuries

Probability of illness/injury	Risk	Financial burden of treatment
High	Less	Small
Medium	Moderate to high	Medium
Less	High to very high	High to very high

Table-3.2

Uncertainty, choice, and financial burden of illnesses/injuries

Uncertainty	Choice	Financial burden
Less	More	Less
Moderate	More	Low to medium
High	Less	High

3.4 Assumptions

The existing literature on utilization, as mentioned earlier, is hushed about the possible impact of household medical care expenditure on the household production of health. One crucial assumption made in this study is that the health financing context of injury care is based predominantly on out-of-pocket health care expenditure. This is fairly realistic given the fact that about 70 per cent of health care financing in India is met from household out-of-pocket resources (NCMH, 2005). The proportion could be more for injuries given their emergency nature and lack of other quick organized means of financing injury care. Due to the specific nature of curative care expenses, to which injury care spending belongs, higher proportion of households are being forced into poverty and other long-run economic consequences. The impoverishing effect of the financial burden of treatment is perceived to be maximum for injuries since studies have revealed that mostly the breadwinners and economically active population, especially from the lower income groups, become injury or accident victims.

Though the utilization pattern of the population is shaped by social, economic, cultural and political factors, it varies widely for the rich and the poor. The poor's consumption pattern might be fraught with a range of sub-optimal conditions like under-dosage of medicines and foregoing of certain critical medical interventions altogether due to their inability to pay, and absence of adequate support mechanisms. When there exist price barriers to access, possible effects on equity, as obvious, is a definite negative. With regard to utilization of health services, due to both time and monetary price, the weaker sections suffer.

Payment for health services is also made at considerable social cost to the family and can scarcely be said to represent a 'willingness' to pay in the normal sense of the word (Waddington & Enyimayew 1989). This questions the widely held assumption that willingness to pay (WTP) and ability to pay (ATP) are synonymous. The economist's concept of demand argues that consumers spend only when they are willing and able to pay for a commodity. The underlying assumption is that there exists adequate consumer sovereignty and (s)he knows how best to allocate resources. Though WTP goes along with ATP in general, in case of urgent medical need, such as the injuries, when there is severely constrained opportunities to obtain treatment elsewhere, individuals/households may over commit resources despite their inability. To what extent, this kind of payment involves 'voluntary willingness' is a major question. In health care market, where imperfections dominate with regard to information asymmetries, health care users are helpless (Berman 1996) and they find themselves in heavy disadvantage.

Since demand for injury care is more or less inelastic, the injured cannot escape consumption of health care even if it imposes large amount of resource demands on the households. Due to the presence of many regressive features of the health care system, they may potentially lead to more inequity in the system. Among them, at least two features are very critical. First, the more regressive the distribution of financial burden of injury treatment, the greater is the possibility that medical care expenditures may leave the lower income households with little resources for meeting other necessities. Second, to the extent that the perceived or actual financial burden prevents low-income patients/individuals from receiving the optimal level of health care they require, society becomes worse off (Rasell et al 1994).

3.5 Utilization pattern of Injured

Even though the prescription pattern of the provider is influenced by the economic status of the injured or his/her insurance status or presence of third party financing mechanisms, there are a number of cases where due to economic constraints where the injured under-consume or even forego the consumption of required medical interventions. The process of under-utilisation or unutilisation of essential and needed interventions affects the patients to incur a higher expenditure (meaning increased

financial burden due to delay in treatment) later or worsen the health outcomes immediately or in the long run.

3.5.1 Time costs

Time costs form a major component in the quantity demanded of injury care. In injury care especially, presence of time cost is one of the most important determinants in the selection of health care facilities and monetary costs get even subdued under the influence of the former. Time costs include the monetary cost of travel, the waiting time and the opportunity cost of time. Delay in getting appropriate treatment may make a huge difference in health outcomes. In the interview from the patients, time use would be used an indicator to understand the qualitative efficiency of the health services. For example, the time lost between the point of accident or occurrence till the facility level. Secondly, the time lost between point of entry in the health facility and treatment received could also be taken as another dimension of inefficiency. Lengthy average distance could be considered an indicator of quality but not efficiency, and an indicator for locational inefficiency. Time lost due to injuries can be split into work time lost and leisure time lost.

As already mentioned, the magnitude of difference between the incidence an accident and consumption of appropriate medical care (time loss) has important implication in RTI care seeking, as it primarily determines the outcome especially in injuries of serious nature. The health seeking behaviour of the injured usually tries to minimise the time loss, subject to financial loss. Here, the choice of health facilities in not singly dependent on price but greatly influenced by time as well and so, a greater role for time is also incorporated in the model. A time cost and monetary cost trade-off is inevitable compared to many other illnesses. Choice would be extremely constrained in the initial stage of injury care especially for getting some basic care which is enough to keep the patient out of sheer danger of fatality. However, in the later stages of care, choice of facilities expands at least in theory because the severity of the injury has come down. The issue of selecting other facilities arises only when either they are not satisfied with the existing facility or they may perceive another facility better than the facility where they currently undergo treatment.

When deciding the choice of health care interventions, it is possible that the delay in getting appropriate services may influence the choice, but the intensity of the choice falls down heavily with the later days of treatment. However, generally once a facility is selected the patients try to get all care from the present facility because the patients are not generally knowledge enough to find out alternative facility. And seeking care from a second party is generally undertaken when the facility is absent or non-performing or poor quality including delay etc. Private health facilities generally discourage seeking at least some services from other facilities, as turn away probability always affects the reputation of the health facility in question.

3.6 Supplier induced demand

The debate on the existence and form of supplier-induced demand (SID) has been there for the past three decades with no clear signs of a consensus. Different studies apply a variety of approaches to understand its existence, nature and magnitude. The validity of the results of various models is being debated. The paper argues that for the individual, under conditions of uncertainty cost of treating injuries and illnesses is not investment, rather it is a restorative or compensatory expenditure incurred as a consequence of a socially produced event called "road traffic injury".

In the conceptual framework proposed, the financial burden of treatment of households is assumed to be the function of health system and non-health system characteristics. Health system characteristics are defined as properties of actors and actions working towards the improvement of population health that get reflected through the four core functions of a health system called financing, provision, regulation and stewardship. How these four control knobs are being operationalised in a system is decisive in determining the financial burden faced by the individuals consequent upon an injury or illness.

We argue that health system characteristics are more important in protecting the households from facing catastrophic health care expenditure and the consequent financial burden of treatment. For example, assume a situation in which an individual has a monthly income of Rupees ten thousand (Rs. 10000) and he also has an expenditure of equivalent amount. Assume that the individual or her or his household member is taken

for treatment consequent upon a RTI and costs the household Rs. 5000 in a purely out-of-pocket context. Here the net expenditure on treatment is Rs.5000 and there are other indirect costs incurred here. However, if the financing of health services is undertaken by any third-party, it is obvious that the financial burden faced by the individual or households is zero or tending to be zero. However, in the context of invidividualised financing mechanisms like OOP, this particular household may have to incur amount higher than Rs. 5000. For a household which is meeting its expenditure from its current income may have to borrow or dissave resources effectively means a higher expenditure by the household. This extra-amount takes the form of additional interest rate (opportunity cost) added on to the household due to uncertainty as well as lack of ability to pay.

One of the assumptions that we are making is that there is no major distinction between the output of the health care system (treatment) and outcome on the injured (health status). This assumption has become essential as there is a possibility that outcome of the treatment may differ between an injured having a history of better nourishment and otherwise as well as among different age groups. It is well-known that the outcomes of treatment may differ with age groups and the younger the age groups, the better the health outcome is and vice versa contributed by intrinsic biological reasons.

3.7 Provider Efficiency

There is a possibility that some public hospitals tend to be under-utilised as well as the quality of services might also be sub-optimal. This might be due to the poor quality-inefficiency nexus. Poor quality forces injured not to use facilities leading to under-utilisation of facilities (inefficiency) and the reverse is also possible with inefficient use of facilities may result in poor quality care leading to further abandoning of facilities by the patients. Separating both the state is very difficult at the conceptual level and more so at the practical level.

The quality gap is the difference between what is expected from a health facility and what is actually utilised. Though achieving health status of the pre-injury level might be the desired health outcome, as the output in the study is health care inputs like medical intervention and surgical interventions and the technology needed for it.

The assumption behind inclusion of social capital in the methodological frame is that utility is not only derived from or influenced by the consumption of goods and services by the individual concerned but by others as well. This phenomenon is more prevalent in health care sector compared to other sectors where networks and help groups (both formal and informal) are a norm rather than an exception.

3.8 *Mediflation*

The question asked is: "what is happening to the prices of goods and services used for the management and rehabilitation of road traffic injury victims"? How close or far is the movement of medical prices vis-à-vis the change in prices of general commodities? Though the study might not be able to exactly calculate the level of pure price change due to changing mark-ups, rather it might be able to give a broad pointer towards the price trends of health care goods in treating RTIs.

The prices of different items required for treating injuries would be collected using the price list during the past two years or at least one year. Transaction prices would be used wherever possible and in the absence of it, list prices would be used for computing price change. The prices of drugs, medicines and diagnostics would be collected from retail sellers of these products. Beyond these calculations, the difference in prices between the time of data collection and the price of the last year available would be attributed to the component of mediflation in the decomposition analysis. Another alternative method could be used to understand the difference in the rate of change in medical prices compared to consumer price index (ML). Quality of prices could be partly controlled by this means of selecting prices of standardised commodities. The practical reason includes non-availability of reliable estimates of price changes of medical commodities.

3.9 Decomposition of the financial burden

Financial burden of injury treatment is usually expressed as a proportion of total household or individual income that is present in any health economy and the magnitude of financial burden is logically higher in health systems run under an individual financing mechanism like OOP. In other words, even in a perfectly managed health care

system, the financial burden of treatment may be present, while welfare loss need not be present. In reality, what is seen is an imperfect system with wide variations.

However, there are lot of questions on the issue of what is a perfectly managed health care system, because compared to the market for general economic goods health care market itself is an imperfect one. In such a system the incentive structure faced by all the actors in the health system is such that there is no possibility of conflict of interest among them resulting in better health outcomes. For example, physician market is assumed to be perfect when physician (agent) takes a decision on behalf of the patient (principal) to achieve what is best to the patient. From economic point of view, this implies at least two things. First, physician is interested in facilitating the patient to achieve the best possible health outcome. Second, and more importantly, the best is achieved under conditions of minimum resource demands. As usual, in all these cases, the best implies what is available and possible in the context of medical decision-making. Though practically not achieved, its idealistic overtones could be set as a benchmark with which different systems could be compared as to know how close or how far is one care delivery system from the other.

As seen already, financial burden is imposed by a varied set of factors which were grouped under four major categories viz., market, health system, context-specific and household. Since road traffic injuries occur during highly unexpected time, the victim and his/her household do not often get enough time to mobilise resources. As a result, they mobilize resources for health care through high-cost loans and distress selling of assets. The source of welfare loss on the part of households in seeking injury care is predominant in a health system characterised by an absence of a well functioning financing mechanism which protects the risks of individuals at the time of injury. So, risk arising out of uncertainty forms an important mechanism forcing the households to resort to abnormal financing behaviour at the time of injury and financing injury care. Moreover, distress situation also results in excess consumption (induced or otherwise) of medical care. Provider inefficiency and any price rise (mediflation) may also be passed on to the patients. Hence, a decomposition of various sub-components of the household financial burden viz., market, health system, context-specific, and household will lead to a better understanding of this uncertain and unclear mode of financing. Many national

governments are not in a position to demystify the household OOP in order to come out with a policy to arrest its growing trend, if not to eliminate it. Failure to do so on the part of the government results in huge welfare losses to the patient community or society at large.

The central idea behind the decomposition exercise is prompted by the enquiry that 'how much would have been the total financial burden, had these welfare losses been minimised to zero or to the least levels'? *Mediflation* is an indication of market power in the health care market, while inefficiency at the provider level represents an absence of an effective utilisation of health care resources, supplier induced demand is a component which highlights the amount of medication provided to the injured which is over and above the medically justified levels and costs of uncertainty by households implies the level of difficulties the households face in financing medical care for the injury victim and household due to the economic shock called road traffic injury.

CHAPTER-4

4 METHODOLOGY

4.1 Conceptual approach

As stated already, this study approached the financial burden from clients' perspective on the provider side features influencing the financial burden of treatment owing to road traffic injuries. The financial burden of treatment of a household) is defined as the ratio of the total cost of treatment to the income of the household) net of economic support. In other words, the burden of health financing on a particular household is the share of health expenditure to gross income. The denominator is a measure of the household's capacity to pay which can (in broader terms) include all sources of income, assets and other endowments which the household has at its disposal. Effective income is taken to be the total consumption expenditure of the household plus savings, which in many countries is a more accurate reflection of purchasing power than income reported in household surveys (Xu et al 2003). Since we know that the full cost of any activity is equal to the sum of market prices (direct costs) and the foregone value of time used up (indirect costs) and therefore the latter should also be included in the total costs of illness treatment (Becker 1965). So, the study included both time cost and monetary cost of treatment in the analysis.

Given the perspective, the study took into account all those variables influencing the households' financial burden of injury care, a part of which might have been contributed by macro or micro level inefficiencies. The study was specifically concerned about the monetary costs of the treatment and not concerned with the medical and other benefits of the admission. The reason is that the basic assumption running throughout the study was that normal health is the norm, while decline in the health status is a deviation which has to be prevented all through.

4.2 Assessing inefficiency

Capturing inefficiency at the provider level from the clients' perspective is indeed a daunting task. The study approached inefficiency purely from households' perspective and addressed only the technical component of the overall inefficiency. It was

hypothesized that first phase of the hospital stay tend to have a higher level of financial burden and later days tend to have lower costs of treatment. In the context of uncertainty, this pattern of resource demands on the households implies that they have to raise huge amount of resources within short notice and households are forced to over commit than their fiscal capacity. Information was sought on the pattern of resource requirements during the hospitalization days broken down for each day.

The approach to the measurement of inefficiency was different for public and private hospitals since higher level public hospitals in Kerala are found to be over-utilized while private hospitals report sub-optimal utilization, which might get added to the treatment costs of the RTA victims. Efficiency was assessed in terms of the use of time and resources, especially for public hospitals. Other indicators such as bed occupancy, length of stay and bed turnover rate were also used.

Delay in physical access to health facility concerns the structure of the entire health care delivery system while delay in the utilization of medical care reflects the quality and inefficiency of its functioning. The delay in utilization can be decomposed into clinically justifiable and clinically unjustifiable. For example, elective surgeries are undertaken within some justifiable time gap while emergency surgeries need to be done immediately. However, as mentioned earlier, in all possible cases, expert opinion were sought.

Inability to utilize the existing facilities at optimum levels (un/under utilization) was approached from a cost of treatment, not from a productivity point of view. Such an approach incorporated health care quality into the efficiency analysis. In public hospitals, bed occupancy, bed turn over, and length of stay were used as additional efficiency indicators. Majority of public hospitals in Kerala have high levels of bed occupancy rates and so, measures like bed-occupancy rate, bed turnover rate, or average length of stay may not truly reflect the level of (in)efficiency (Varatharajan et al, 2002). However, they can be used as indicators of partial productivity and are useful in explaining some efficiency aspects concerning household treatment cost.

In private sector, length of stay was used as an indicator of inefficiency along with bed-occupancy rate. Case-mix was controlled primarily at two levels at the facility level by

selecting homogenous facilities catering to similar problems and at the individual level by analysing anatomically and by categorizing the severity. Number of beds, number of personnel, injury care specialties, and whether the facility was a teaching or non-teaching hospital were used as criteria.

The approach used for capturing inefficiency in private health facilities is different from that of public health facilities because the objectives of both of these institutions are different. For assessing private provider inefficiency, a productivity connotation is used while for public facilities, a combination of productivity and quality measurement tools are utilised. Specifically, how do public health facilities are utilising the available inputs (technical [in] efficiency) is the central question addressed in the study.

The welfare loss in public sector due to inefficiency is estimated as follows. Time use criteria captured through delay and non-use or seeking alternative care. One dimension of time delay is that when an injured is taken to a public hospital, how much time delay he/she experiences at each point of care that is throughput time. For e.g., at the emergency care dept, time taken to getting the attention of the physician, emergency surgical interventions, diagnostic procedures done etc are the major indicators. Another dimension of the same problem is that the non-use of care from the same facility where the injured is currently undergoing treatment or alternatively called "exit". This happens through directly asking patients or forcing the patients to undertake diagnostic and other procedures from alternative options when it is available internally. The forced exit also happens when the injured seeks services from outside to avoid delay in getting services internally. The difference between what it would have cost the injured if he had taken the services from inside the facility, and what it actually costs the individual to get the same service from outside the health facility is the amount of welfare loss due to functional inefficiency at the public provider level, though this can be applied at the private sector as well.

The following are few examples of inefficiency-induced burden directly on patients in an out-of-pocket expenditure context prevailing in both public and private health care services and most of them were used as indicators of (in) efficiency in the study.

1. Excessive length of stay, with patients remaining in hospital after they have ceased to benefit from hospitalisation
2. Poor scheduling of diagnostics and procedures adding to the hospital stay
3. Prescribing an intervention or diagnostic test which is known to be of no therapeutic value or relevance
4. Over-prescription of drugs (too high a dosage, too long a course etc)
5. Excessive use of diagnostic tests
6. Use of branded drugs instead of available generics or use of high cost brand drugs when cheaper substitutes are available
7. Absence of critical staff and physical inputs forcing the patient to seek health care goods from alternative sources.

4.3 Models and variables

Overall, the study used many different variables. The key dependent variable, of course, was financial burden of treatment (FBT) while the independent or explanatory variables were severity of the injury, organ affected, age, gender, co-morbidities, sex, employment (regular/casual), and insurance status of the injured, household characteristics such as income, place of residence (rural/urban), and coping strategies, health system factors such as type of facility, type of provider (public, private for-profit, and private not-for-profit), length of stay, delay in seeking care, waiting time, prescription, price, and use of diagnostics, and community characteristics such as social support/capital.

Injury care expenditure or the financial burden of the household of an injured can be captured using the following model:

$$FBT = f(pb, bp, a, g, y, cm, ls, p\text{-}a, ts, hp, ib, ins)$$

where

FBT Financial Burden or the total Cost of the Treatment

pb Severity of the injury (physical burden)

Bp Body part affected

a Age

s Gender

y Household income

cm Co-morbidity

ls Length of stay

p-a proposed minus actual treatment

ts Time space between proposed & actual treatment

hp Health care provider

ib Institutional behaviour

ins Insurance

Various components of the total cost of injury care to the injured can be explained using the following expression

$$C = MC + OC(I) + OC(H) + ML + T + INT + M$$

Where

C Cost of treatment

MC Medical Cost

OC(I) Opportunity cost of the injured

OC(H) Opportunity cost of the household

ML Medico-legal expenses

T Cost of transport of the patient and bystanders

F Cost of food of the patient and bystanders

INT Interest and other costs of financing

M Miscellaneous (Vehicle damage, compensation, production and productivity loss to the society)

Medical cost can be further decomposed using the following equation:

$$MC = f(c, sg, ph, dg, eq, sp)$$

Where

MC Medical cost of treating injury

c Consultation fees

sg Surgery

ph Medicines

dg Diagnostics

eq Equipment

sp Supplies

4.4 Methods

The study used a prospective study design with injured cases undergoing treatment in a health facility (both IP and OP) were requested for their consent. A 'decomposition analysis' was undertaken in which RTI patients were traced back to their households for understanding the household chemistry of injury care financing, utilization pattern, and coping methods and their overall impact on household economic security. Information on socio-demographic characteristics, external causes of injury, situation and context of injury, help-seeking pattern and outcome was also gathered. Economic capacity was

measured using a comprehensive economic index taking into account the quality of housing, nature and quality of occupation; land ownership, and financial assets.

4.4.1 Classification of injuries

Classification of injuries was undertaken based on anatomical systems and following are the major categories of injuries used in the study:

- Head injuries
- Spine injuries
- Chest injuries
- Abdominal injuries
- Upper-Limb injuries and
- Lower-Limb injuries
- Other injuries

The classification was, to a great extent, based on similarity in the treatment in terms of diagnoses, drugs, medicine, and surgical interventions.[19] This is not, in any way, to say that there was no variation in the amount of medical services prescribed or consumed within a particular treatment method and also across different systems of medicine.

The severity of injuries was assessed based on the status of their admissions into a particular health facility. Three levels of severity were considered:

- Simple injuries (generally out-patients)
- Moderate injuries (in-patients) and
- Complex injuries (undergoing ICU management).

In the absence of definite treatment protocols for treating RTIs, a treatment package was defined with the help of many currently practicing physicians and it served as a benchmark for evaluating the utilization of care, induced demand and quality of care.

[19] Differences across the nature of health care provision were taken into account too. This was specifically crucial for a state like Kerala known for plurality of treatment practices such as allopathic, ayurvedic, homeopathy, sidha and unani to mention s few.

4.4.2 Co-morbidities

Treatment pattern would depend on the presence or absence of co-morbidities and other risk factors; the same was also explored in the study. Age was identified as an important variable to influence the outcome, health seeking behaviour, treatment pattern, and health care expenditure.

4.4.3 Tools for data collection

Apart from the literature search and collection of secondary data, the following four instruments were used to collect the primary data on injury care:

- Semi-structured questionnaire for households of the injured person
- Health care facility check-list to understand treatment components provided by health care facilities and to identify relationship, if any, between different efficiency characteristics and the households' financial burden. The checklist was also used to assess the quality of care and the level of services offered.
- A separate checklist was used to collect data from diagnostic firms.
- 'Participant Observation Form', a major tool for use in 'vignettes', was used to gather information regarding the process and various components of the treatment.

The first stage of questionnaire development (the conceptual stage) involved consultation with existing literature, experts in injury care epidemiology and health economists, as most of the issues addressed in the study had no predecessors. The second stage of the questionnaire development was undertaken after consultation with field-level experts in all areas of study. The questionnaire was translated back-to-back from English to the vernacular Malayalam languages by a professional linguist. The third stage was the modification of tools taking into account the field experiences and practical issues encountered in the piloting phase of the study.

Household questionnaire included household characteristics such as HH head, HH size, assets held (land holdings), major source of income, monthly household and per capita

expenditure, caste/tribe status and individual characteristics such as age, sex, marital status, educational attainment, and profession. Questionnaire also included factors responsible for the accident, duration of hospitalization, treatment, and absence from work/leisure/household activities, type of injury, health service provider, services availed, prices of different treatment items, details of expenses incurred under each provider/system, stages when the injured did not seek care, prescribed interventions not undertaken due to paucity of resources, and sources of financing. Detailed information on the level and sources of injury care expenditure - current/past income, sale of core/optional assets, reimbursement by third party like employer, insurer and others too formed part of the questionnaire.

Health facility checklist contained two parts - broad aspects of RTI management and specific details of injury care management. The third tool, somewhat similar to the health facility checklist, was developed exclusively to address the issue of financial burden of RTIs caused by the diagnostic firms. Participant observation form was an adapted version of the ISERDD-the World Bank Participant Observation Form.

A comparison of cost, quality and price was undertaken after controlling for patient and provider characteristics, and layers of health facilities. Distinct dimensions of perceived quality of care captured by the study included:

- Hospital infrastructure
- Restoration of health status
- Medical information
- Medicine availability
- Behaviour of the doctor and other staff

Besides the major instruments, key informant interviews with health facility managers and administrators were also undertaken to cull out some important information on the nature and type of the facility, its structure, and other related issues which were not included in the checklist(s). Expert judgment was also used as a complementary method to assess the validity of study findings especially on appropriate treatment, and designing treatment package.

4.5 Study phases

The study had two phases. First phase exclusively dealt with the identification and analysis of issues (like utilization, expenditure pattern, the characteristics of victims, the geographical concentration of injuries etc) associated with injury care using secondary data at the district and state level. The second phase (had many sub-phases) included the operational level where primary data were collected through a range of instruments including health facility survey using a standard questionnaire and checklist, the patient interviews, and key informant interviews with selected facility managers. Information on mediflation, hospital services' efficiency, supplier induced demand and household financing mechanisms were collected during the second phase.

4.6 Study site

Study sites (districts) were chosen using the indicators such as the prevalence of RTAs and RTIs, RTA fatalities, and the availability of RTI infrastructure (measured by private and public bed capacity). Using these criteria, all 14 districts in the State were ranked and three broad clusters were formed. One district each from the well performing, medium performing and worst performing group of districts was included in the study. The criteria used to choose the districts are given in Table-4.1. Additional sub-criteria such as Geographic factors (low, mid or high land), presence of 4-wheeler and 2-wheeler vehicles, and road density were also used as guidelines in choosing the study districts. Finally, chosen districts were Thiruvananthapuram, Trissur and Idukky (shaded in the table). The significance of using Geographic factors lies in the association of RTAs and their associated damages with the structure of the landscape. The chosen districts are indicated by the shading of cells in Table-1.

The chosen districts fell under the categories of best, medium and worst performing districts and all their *taluks* (sub-districts) were ranked in similar fashion. Within the best performing district, the best performing *taluk* was chosen while medium performing *taluk* was chosen from the median performing district; lowest performing *taluk* was selected from the worst performing district. Choice of specific facility was based on rural-urban considerations and on the level of utilization by the injured and the ownership (only for private hospitals). For this purpose, all the hospitals in chosen *taluks*

were classified as small, medium and large depending on their number of functioning beds and the availability of associated facilities such as CT scan, major surgical theatre, etc.

Table-4.1

Choice of study districts - district-wise health care infrastructure (public/private) in Kerala (allopathic care, 2004-05)

District	No. of beds			Rank in		
	Private	Public	Total	RTAs	Injuries	Fatalities
Ernakulam	11,418	4,804	16,222	1	1	1
Thiruvananthapuram	4,807	2,790	7,597	2	2	2
Trissur	8,345	4,550	12,895	3	3	3
Kozhikode	3,714	2,491	6,205	4	4	4
Kollam	7,194	3,291	10,485	5	5	6
Kottayam	7,642	3,527	11,169	6	6	7
Alappuzha	3,633	2,189	5,822	7	7	8
Malapuram	3,313	1,369	4,682	8	8	5
Palakkd	2,105	1,028	3,133	9	9	9
Kannur	3,952	2,674	6,626	10	10	10
Pathanamthitta	4,391	2,768	7,159	11	11	11
Idukky	3,944	2,520	6,464	12	12	13
Kasaragode	1,290	855	2,145	13	13	12
Wayanad	1,769	913	2,682	14	14	14
State	**67,517**	**35,769**	**103,286**			

4.7 Sample

While the collection of secondary data, the literature review and some portion of analysis pertained to the entire state of Kerala, three districts formed the core for the detailed collection of primary data. Seventeen hospitals were included in the study for detailed efficiency and induced demand analyses. Private hospitals included were owned by

individuals/partners or were corporate ones. Some of them were not-for-profit private and public hospitals. Detailed of hospital selection is given in Table-4.2. Three hundred RTA victims (ratio of outpatients and inpatients was 1:3 favouring inpatients) were included for the client-based analysis.

Table-4.2

Summary of health care institutions included

Choice details	No. of facilities
Total number of health facilities approached	35
Number refused at first visit	4
Number refused after few visits	6
Number of institutions excluded	8
Number found closed	0
Number completed	**17**

4.7.1 Inclusion criteria

The chosen health care institutions had

- Minimum medical care facilities to treat injuries (24 hours provision of care or presence of casualty services or in-patient beds)
- RTI caseload of at least 20 per month
- Agreed to give necessary data/information on patients and facility

The chosen RTA victims were

- Non-fatal cases already accessed the health care institutions
- The ones discharged from the chosen hospitals on the day of data collection
- Outpatient or inpatient cares
- Connected to Orthopaedics, Surgical or Neurosurgery departments
- From the chosen districts and *taluks*

4.7.2 Exclusion criteria

Health care facilities which did not have medical facilities to treat injuries in general and RTIs in particular and which generally managed specific non-injury cases like the chest hospital, and reproductive health specialist health care facilities were excluded from the study. In case of RTA cases, the following exclusion criteria were applied:

- Those who did not attend any health care facility for treating injuries
- Those who suffered fatal injuries
- Those who came for review
- Those who continued to receive treatment from a health care facility (not discharged)
- Those whose injury was too rare to manage in an institution
- Those were related to the vehicles but did not come under the purview of road traffic accidents
- Those who were not stable at the time discharge

Exclusion of patients, though underestimates the financial burden, reduced the heterogeneity in the cases and therefore, comparison was easy. Only discharged recent cases were included because the issue of recall bias would have been higher in others as the study required accurate data from patient files. Review cases were excluded because they did not necessarily follow the principles of care seeking by a typical road accident case in terms of time and money costs. Required information on expenditure and medical care was collected from the victim, his/her immediate family members or bystanders.

4.8 Comparing provider quality

Quality of care, especially its technical (clinical) component, was assessed using a treatment package designed by a panel of practising physicians[20] dealing with injuries. The technique adopted in the study was more or less similar to what is called 'vignettes' in medical literature in which a provider is presented with cases of similar injuries and the process of clinical interventions which (s)he suggests. Also, the investigator sat with providers to observe whether there was uniformity and consistency in the said protocol

[20] General surgeons, orthopeadecians, and neurosurgeons serving both public and private sectors

process across providers and contexts for the same injury. In the final stage, a panel of medical professionals evaluated the appropriateness of the treatment across patients and settings so that a meaningful comparison could be derived.

4.9 Pilot study

All the four instruments used in the primary data collection part of the study were pilot-tested in a number of contexts so as to fine-tune them in terms of missing vital information and to understand the amount of time and other resources required to complete a tool in a setting. The questionnaire was standardized and validated by means of a small-scaled pilot test on some RTA victims undergoing treatment. The checklist for diagnostic firms was piloted in both public and private settings. The revised instrument after piloting incorporated important information regarding quality of care. Major changes in the revised tool were with respect to the quality of diagnostic outputs and price/quality benchmarks for diagnostic services. The method followed for the study was predominantly quantitative, while it relied on qualitative survey methods like key-informant interviews to supplement and substitute where the former was found to be inadequate to capture the required variable.

4.10 Concepts

4.10.1 Catastrophic medical expenditure

Two alternative approaches exist which deal with the issues of understanding catastrophic nature of medical care expenditure is in place which can be adapted into the injury care framework. The concern is to ensure that households do not spend more than some pre-specified fraction of their income on health care. Spending beyond that particular limit is described as catastrophic spending. Another similar approach argues for a minimum in terms of the absolute total level of income. Both of these approaches exist on the assumption that households need more to spend on other areas of individual well-being than medical care alone and to avoid the impoverishing effect of medical care expenditure (Wagstaff and Doorslaer 2001, World Bank 2000, WHO 2000). Different levels of cut-off are set to assess the catastrophic levels of medical care expenditure on injury care, for example, at 5%, 10%, 20%, 30%, etc.

4.10.2 Road traffic injury (RTI)

In the study, we define road traffic injury to include all types of damages to different organs of the body resulting from a road traffic accident including cuts, wounds, burns, fractures, haemorrhage etc which is almost similar to the definition adopted by agencies like National Sample Survey Organisation. NSSO methodology defines injury as all types of damages to different organs of the body including cuts, wounds, burns, fractures, haemorrhage etc. However, the only difference is that NSSO methodology does not differentiate between the causes of injuries, rather clubs of all sources of injuries together and they include (apart from injuries due to motor accidents) fall, drowning, fire, self-infliction and violence.

For the purpose of the study, a Road Traffic Accident (RTA) was defined as an event or series of events, which took place on the road between two or more objects, one of which must be any kind of a moving vehicle. Any injury on the road without involvement of a vehicle (e.g. a person slipping and falling on the road and sustaining injury) or injury involving a stationary vehicle (e.g. persons getting injured while washing or loading a vehicle) or deaths due to RTA were excluded from the study. The classification of road accidents is based primarily on the motive of the victims involved, that is, their primary purpose. If an auto driver gets a back pain due to driving of rickshaws, this would not qualify as a road traffic injury rather an occupational injury. Here the primary purpose has to be movement on the roads and at least there needs one moving vehicle. The victims of the accidents were interviewed to obtain the information about the circumstances leading to accident.

4.10.3 Work hours

Work hours are defined as the number of hours worked during the preceding week on the primary job plus the usual number of weekly hours worked on a second job, if any. From the household, information was brought together on both monetary and time costs of injury including duration of injury recovery, the number of days the injured was unable to perform his/her normal vocation/usual activities, financing of care etc.

4.10.4 Income

The income in the study means permanent income which the victim/household receives over a period of time. However, despite best of efforts to get monetised value of the unearned income of the household like gifts, own production etc, earned income has been given emphasis in the study (wage income, income from investments etc)

4.10.5 Households

Gathering of information from households on socio-demographic characteristics, external causes of injury, situation and context of injury, help-seeking pattern and outcome. Economic capacity is measured using a comprehensive economic index taking into account the quality of housing, nature and quality of occupation; land ownership, financial assets etc.

4.10.6 Health care facility

Those institutions where patients are examined for diagnosis of diseases and medical treatment prescribed and provided. Places/institutions where only consultation facility is available such as consulting rooms or institutions engaged only in selling medicines were not be treated as medical institutions.

4.10.7 Private Medical Institution

A medical institution run by individual(s) or an organisation (e.g. Trust, Co-operative society, Company etc) other than Government Institutions (including institutions receiving government grants) were treated as private medical institutions. Medical institutions having facilities such as disease diagnosis by a doctor, inpatient facilities, X-ray, scan, blood testing, medicine selling etc are considered as medical institutions. But institutions such as laboratories, which are testing, blood, urine etc and optical shops, which are running without the services of a doctor are not included as medical institutions. Like wise medical institutions owned and operated by private individuals, organisations, trusts, companies, co-operative societies, etc are considered as private medical institutions.

4.10.8 System of medicine

This refers to the system of medical treatment followed in the institution viz Allopathy, Ayurveda, Homoeopathy, etc.

4.10.9 Private Sector

- Sole proprietorship: A facility in this category is owned by an individual (physician or non-physician). They have unlimited liability.
- Partnership: These facilities have two or more but fewer than 20 partners. They have unlimited liabilities and profits are shared among the partners.
- Corporate private limited companies: Hospitals in this section have more than 20, but less than 50 partners. They have limited liability and profits are shared among them.
- Corporate public limited companies: These are corporate companies with limited liabilities and they are allowed to raise resources from the public through issue of shares. They profits are shared with shareholders and need not be listed in stock markets (Muraleedharan 1999).

4.10.9.1 Private, for-profit

It implies that primary existence of the health care institution is generation of profit, and there is a declared built-in mark-up in all services delivered.

4.10.9.2 Private, not for profit (trust, missionary etc)

The primary motivation of health care institutions in this category is not earning maximum profits, but other objectives like charity etc. However, this does not imply that they do not earn profit, rather they generate surpluses for sustaining its activities. They are ordained, by law, that the surpluses generated from the functioning of the institution cannot be distributed among partners; rather need to be invested within the institution for the development of it.

4.10.10Utilization of health services

Utilization, defined as the quantity of health care commodities (medical goods and services) used.

4.10.11Out-of-pocket expenditure

OOP refers to the payments made by households at the point of delivery/receipt of health services. OOP payments include insurance fees for private sector care and user charges for public care, co-payments, purchases of medicines, appliances, diagnostic tests, etc from different systems of treatment.

4.10.11.1 Household consumption expenditure

Comprises both monetary and non-monetary (in-kind) payment on all goods and services, and the money value of the consumption of home-made goods. In other words, household budget is defined as the value of consumption, including that from home production .

4.10.11.2 Food expenditure

The amount spent on all food materials by households plus the value of family's own food production consumed within the household. However, it excludes expenditure on alcoholic beverages, tobacco. We also include the food expenditure incurred outside home (e.g. hotel and restaurants), which many definitions exclude.

4.10.11.3 Poverty line (PL) and household subsistence spending (HSS)

Household subsistence spending is the minimum amount of resources required to maintain a basic life in a given society. Poverty line is the defacto application of the regional level poverty line data. Household subsistence spending is calculated as follows:

- Generate the food expenditure share (foodexp h) for each household by dividing the household's food expenditure by its total expenditure.
- Convert the reported household food expenditure in terms of the poverty line in the region/state.

4.10.11.4 Catastrophic health care expenditure (cata)

A household is said to have made catastrophic expenditure, when it incurs more than a certain percentage of its total ability to pay. In this study, we fix the catastrophic medical expenses as 20 percent of household income. Catastrophic payments have been defined as those in excess of a substantial fraction of the household budget (Pradhan and Prescott 2002; Wagstaff and Van Doorslaer 2003; Russell 2004). Spending a large fraction of household resources on health care is disruptive to living standards, either in the short term as consumption of other goods and services must be sacrificed, or in the long term as assets are divested and/or savings depleted. Impoverishment is examined by estimating the number of individuals that are pushed below the poverty line once OOP expenditures on health care are subtracted from household resources.

4.10.11.5 Household ability to pay

It is also referred to as the non-subsistence effective income of the household.

4.10.11.6 Out-of-pocket health spending (OOPs) as share of ability to pay

This is meant to indicate the burden of health payments with out-of-pocket expenditure as a percentage of a household's ability to pay.

$$OOPs = OOP_h/CTP_h$$

4.10.11.7 Informal payments

All payments (in-kind or cash) that patients reported to be paid to health care provider over and above the legally fixed fees and most often these transactions do not have written records. Or Informal payments are defined as payments to institutions or individuals in cash or in kind made outside official payment channels that are meant to be covered by the public and private health services.

4.10.12Access cost

A combination of distance to health facilities, waiting time at the health facility, out-of-pocket payments at the facility i.e. monetary as well as time costs.

4.10.13Co-morbidity

The simultaneous occurrence of two or more diseases or health problems that affect the care of a patient.

4.10.14Case-mix

The clinical composition of patients.

4.10.15Price discrimination

The pricing practice in which a homogenous commodity (here called a specific medical good or service) is sold at different prices to different consumers. It could be considered as an indicator of cross-subsidisation.

4.10.16Average length of stay

Mean number of days from admission to discharge for each inpatient.

ALOS = I/A, where

I = Annual number of inpatient days

A = Annual number of inpatients (admissions or discharges).

4.10.17Bed occupancy rate

Percentage of total available beds that are occupied by patients.

OCC = I/ (365.B), where

I = Annual number of inpatient days

B = Average number of available hospital beds during a year.

4.10.18Annual bed turnover rate

Average number of inpatient admissions per bed or discharges per bed during one year.

T = A/B, where

A = Annual number of inpatients (admissions or discharges)

B = Average number of available hospital beds during a year.

4.10.19Perspective

The viewpoint from which an efficiency analysis is undertaken, which determines what consequences and costs of health services are considered and what decision rules are applied in comparing efficiency.

4.10.20Quality of care

Aspects of health services that affect the process of care and its consequences on patient health condition.

4.10.21Treatment

A set of health services provided for the diagnosis of an injury or suspected injury together with an attempt to cure that injury and co-morbidities.

4.10.22Length of stay

Number of days from admission to discharge inclusive of the admission day. Expenditure for injury care services include physician fees, operating room charges, rent, laboratory charges, nursing fees, pharmacy charges etc.

4.10.23Absolute waiting time

Duration between the date on which the appointment for a medical intervention was advised and the actual date of medical intervention.

4.10.24Asset classification

a. Optional assets: E.g. Ornaments etc
b. Core assets: E.g. Cultivable land

The classification of assets is based on the probable impact it might have on the livelihood of the patients/ households. In other words, the opportunity costs of each asset sold is important and the classification might undergo changes with regard to time and space.

4.11 Understanding the primary data

The study in included three different modes of data collection viz., literature, secondary data from published documents, and the primary data. This chapter describes the key characteristics of the primary data so that the results can be adequately interpreted. The primary data were derived from three primary sources viz., households, health care institutions, and diagnosti facilities relevant to injury care using three types of instruments viz., semi-structured questionnaire (households), checklist (health care institutions and diagnostic firms), participant observation form (health care institutions).

4.11.1 Socioeconomic and demographic profile of the injured

Of the 302 cases, a vast majority (74.7 per cent) of the injured (Table-4.3) were men of 15-44 years age group; 57.9 per cent were currently married. Average exposure to schooling was 8.33 years (40 per cent of them had more than 10 years) while 75.5 per cent hailed from rural areas; 59.5 per cent of the injured belonged to socially backward communities (Table-4.4).

Over 70 per cent of the patients (Table-4.4) reported that they had normal sound health before the accident while 23 per cent reported that their health was satisfactory; 6 per cent suffered from some form of ill-health. Over 90 per cent had physical access to health care services (public/private) within 3 km distance. About two-third of the injured were casual labourers while 10.9 per cent were salaried and 7.6 per cent were students.

Table-4.3

Socio-demographic profile

ATTRIBUTE	NO. OF PERSONS*		
	Male	Female	Total
	264 (87.4)	38 (12.6)	302 (100.0)
Age (years)			
< 14	9 (3.4)	1 (2.6)	10 (3.3)
15-29	101 (38.3)	16 (42.1)	117 (38.7)
30-44	96 (36.4)	11 (28.9)	107 (35.4)
45-59	45 (17.0)	8 (21.1)	53 (17.5)
> 60	13 (4.9)	2 (5.3)	15 (5.0)
Mean	34.5	35.7	35.3
Standard deviation	15.1	11.3	14.3
Marital status			
Never married	108 (40.9)	16 (41.1)	124 (41.1)
Currently married	154 (58.3)	21 (55.3)	175 (57.9)
Widowed	2 (0.8)	1 (2.6)	3 (1.0)
Schooling (years)			
Nil	10 (3.9)	3 (7.9)	13 (4.4)
1-5	48 (18.7)	5 (13.2)	53 (18.0)
6-10	156 (60.7)	24 (61.0)	180 (61.0)
11-15	40 (15.6)	6 (15.6)	46 (15.6)
> 16	3 (1.2)	0 (0.0)	3 (1.0)
Mean	8.8	9.0	8.9
Standard deviation	3.3	3.7	3.7

** Percentages within parentheses*

Table-4.4

Health, health care and social profile

Attribute	No. of persons (%)		
	Male	Female	Total
Health Status			
Good	184 (69.7)	30 (78.9)	214 (70.9)
Average	65 (24.6)	5 (13.2)	70 (23.1)
Bad	15 (5.7)	3 (7.9)	18 (6.0)
Residence			
Urban	10 (3.8)	2 (5.3)	12 (4.0)
Semi-urban	48 (18.2)	14 (36.8)	62 (20.5)
Rural	206 (78.0)	22 (57.9)	228 (75.5)
Community			
General	58 (22.1)	8 (21.6)	66 (22.1)
OBC	160 (61.1)	18 (48.6)	178 (59.5)
SC/ST	34 (13.0)	8 (21.6)	42 (14.0)
Others	10 (3.8)	3 (8.1)	13 (4.3)
Availability of health care services (within 3 km radius)			
None	22 (8.5)	4 (11.8)	26 (8.9)
Public	72 (27.8)	7 (20.6)	79 (27.0)
Private	48 (18.5)	8 (23.5)	56 (19.1)
Both	117 (45.1)	15 (44.1)	132 (45.0)
Profession			
Salaried	27 (10.2)	6 (15.8)	33 (10.9)
Casual	176 (66.7)	23 (60.5)	199 (65.9)
Professional	3 (1.1)	-	3 (1.0)
Student	21 (8.0)	2 (5.3)	23 (7.6)
Housewife	18 (6.8)	4 (10.5)	22 (7.3)
Unemployed	11 (4.2)	2 (5.3)	13 (4.3)
Business	8 (3.0)	1 (2.6)	9 (3.0)
Total	264 (87.4)	38 (12.6)	302 (100.0)

As given in Table-4.5, reported average monthly income of the study households was Rs. 4,679 (USD 117) and average monthly household expenditure was Rs. 3,885 (USD 97). Average monthly household food expenditure Rs. 2,687 (USD 67).

Table-4.5

Economic profile of the households

VARIABLE	NO. OF HOUSEHOLDS (%)		
	Male	Female	Total
Monthly income (Rs.)			
< 1,250	11 (4.2)	2 (5.3)	13 (4.3)
1,251-2,500	70 (26.5)	8 (21.1)	78 (25.8)
2,501-5,000	111 (42.0)	16 (42.1)	127 (42.1)
5,001-10,000	59 (22.3)	10 (26.3)	69 (22.8)
> 10,000	13 (4.9)	2 (5.3)	15 (5.0)
Mean	4,683	4,652	4,679
Standard deviation	3,603	2,785	3,509
Monthly food expense (Rs.)			
< 1,250	14 (5.4)	6 (15.8	20 (6.8)
1,251-2,500	126 (49.0)	14 (36.8)	140 (47.5)
2,501-5,000	111 (43.2)	18 (47.4)	129 (43.7)
5,001-10,000	6 (2.3)	-	6 (2.0)
Mean	2,701	2,592	2,687
Standard deviation	1,107	1,029	1,089
Monthly total expenditure (Rs.)			
<1250	2 (0.8)	1 (2.6)	3 (1.0)
1251-2500	56 (21.8)	10 (26.3)	66 (22.4)
2501-5000	142 (55.3)	19 (50.0)	161 (54.6)
5001-10000	49 (19.1)	8 (21.1)	57 (19.3)
>10001	8 (3.1)	-	-
Mean	3,921	3,643	3,885
Standard deviation	2,008	1,551	1,955

CHAPTER-5

5 RESULTS

5.1 Section-1: Accident and injury features

Kerala is one of the high accident zones in the country. An attempt was made to understand the pattern, magnitude and distribution of road traffic casualties across districts in the State. The analysis relies on the statistics provided by State Crime Records Bureau, the official agency authorized to gather information on road traffic accidents and other crimes. This secondary source of information is used to supplement the information collected from RTA cases treated at different health care facilities. The major variables analyses include time pattern of accidents, intensity of incidence of RTAs along different roads, type of injuries and fatalities etc.

Secondary data for the study included a total of 41,678 accidents reported throughout Kerala during the year 2005. The data included the number, date, and time of all accidents occurred in the state besides the deaths reported. Monthly distribution of RTAs in Kerala (shown in Figure-5.1) indicates that accidents occurred almost uniformly during all months with November accounting for 9.6 per cent of all accidents. Time of travel during the day seems to have contributed little to the road traffic accidents with the uniform distribution of the proportion of RTAs and RTA deaths although there were peak and lean periods (Figure-5.2)[21]; around 66 per cent of all accidents occurred during the day time (6 am till 6 pm).

Accident-fatality rate[22] was fairly uniform across various time zones during a day (Figure-5.3). There were, however, uncertain periods between 1 am and 7 am after which the rate stabilized. In other words, fatality was not related to the number of accidents per se. It is also relevant to understand the distribution of fatal accidents across time scale (Table-5.1) that indicates there exists a higher probability of fatality if an RTA occurs

[21] Available minute-wise accident record was converted into hourly data by merging figures between 26th minute of the previous hour till 25th minute of the next hour. For example, accidents occurred from 8.26 am to 9.25 am were added to show the accidents at 9 am. So, the figure against each hour indicates the accidents around that hour.

[22] Number of RTA deaths divided by the number of RTAs and converted into percentages.

during 0.00 – 6.00 (8.8%) followed by 18.00 – 24.00 (8%). A bulk of accidents occurred during the daytime when the vehicular traffic would have been higher too.

Figure-5.1

Monthly incidence of Road Traffic Accidents in Kerala (2005)

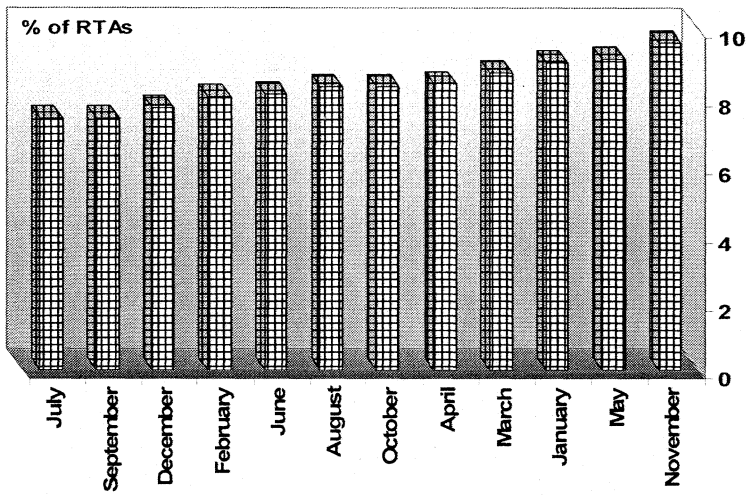


Figure-5.2

Time differential of accident occurrence

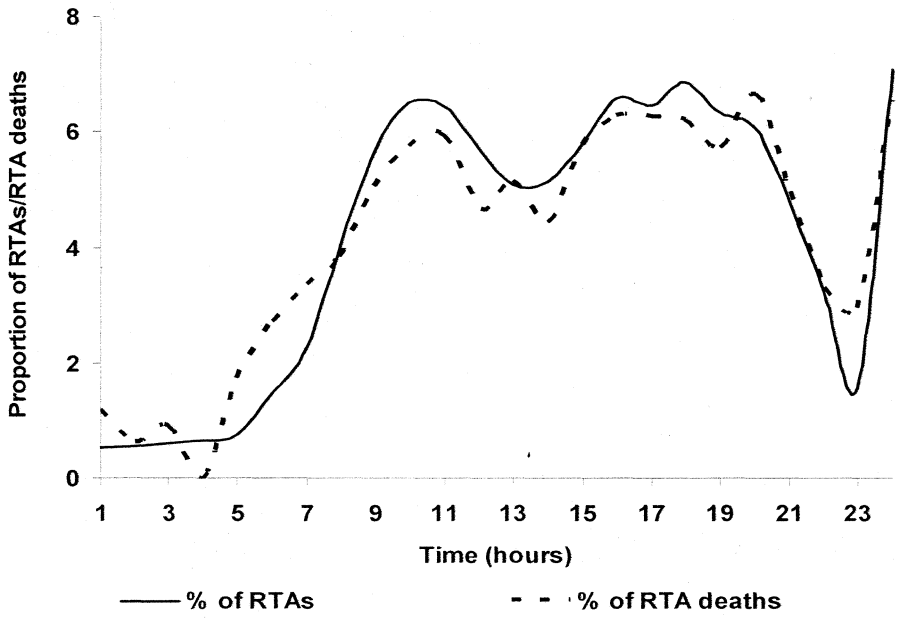


Figure-5.3

Accident-fatality rate during the progress of the day

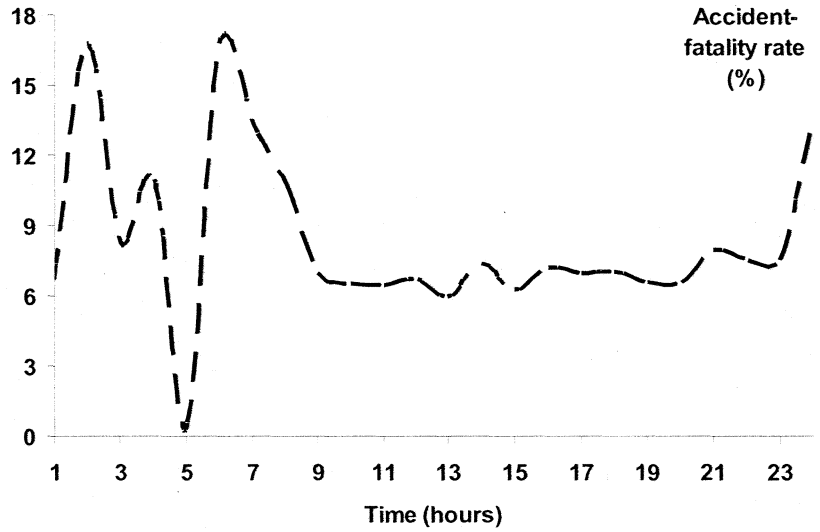


Table-5.1

Distribution of fatal accidents at different time periods in Kerala, 2005

Time	Fatalities	Accidents	Accident-fatality rate (%)
00.00-06.00	394	4,470	8.8*
06.00-12.00	859	12,553	6.8*
12.00-18.00	1,011	14,994	6.7*
18.00-24.00	787	9,857	8.0*
Total	**3,051**	**41,874**	**7.3**

** significant at 0.000 level*

Table-5.2 shows clearly that National Highways, representing 7 per cent of the total road length in the state, bears 26.3 per cent of the RTAs in the state. In other words, the intensity of RTAs was four times higher along the national high ways compared to other roads in the state. Number of accidents per km of road in 2005 was 7.19 in national highways compared to 1.40 in state highways and the state average of 1.81.

Table-5.2

Type of roads and share of road traffic accidents in 2005

Type of road	Road length (km)	No. of RTAs (%)	RTAs per km
National highways	1,524 (7.0)	10,951 (26.3)	7.19
State highways	3,785 (16.0)	5,301 (12.7)	1.40
Other roads	17,683 (77.0)	25,426 (61.0)	1.44
Total (N)	22,991	41,678	1.81

The distribution of the number of accidents and fatalities (Table-5.3) points out that no individual was killed in 38,823 (93.1%) accidents. At least two persons were killed in 3.9 per cent of accidents involving fatality. Incidence of grievous injuries highlights that 30.8 per cent (12,842 persons) of the accident victims sustained serious injuries. Among those grievously injured, 77.5 per cent (12,842 victims) of accidents involved one

Table-5.3

Number of accidents and fatalities

	Number of	
RTA victims	**Fatalities**	**Grievous injuries**
1	2,710 (95.2)	12,842 (77.5)
2	111 (3.9)	2,504 (15.1)
3	21 (0.7)	687 (4.1)
4	13 (0.5)	215 (1.3)
5	1 (0.0)	95 (0.6)
6	--	41 (0.2)
7	1 (0.0)	34 (0.2)
8	--	25 (0.2)
> 8	--	122 (0.7)
Total	**2,847 (100.0)**	**16,565 (100.)**

individual seriously injured. Information relating to the cause of accident found that 41,572 accidents (99.7 per cent of all accidents) occurred due to drivers' mistake. Bad road was the reason in 95 RTAs (0.2%) while the role of bad weather, mechanical mistake, etc was highly insignificant.

About 38 per cent of the accidents occurred during 12.00 noon - 6.00 pm while 28 per cent occurred during 6.00 am - 12.00 noon; 25.5 per cent were reported during 6.00 pm – 12.00 midnight (Table-5.4). National highways accounted for 29 per cent and other roads contributed to 47 per cent. Straight roads were involved in 46 per cent of accidents while 39 per cent occurred in curves; the remaining accidents were in narrow and steep roads. More than 55 per cent of accidents were the result of head-on collisions, and about 22 percent of the accidents occurred during crossing the roads by either a vehicle/s or individual/s. Fifty two percent of the first vehicles and 43 per cent of the second vehicles involved in the accident were motorised two wheelers followed by light motor vehicles 32 per cent and 27 per cent respectively. The ownership pattern of the vehicles involved in accidents indicates that about 58 per cent were for private own use and around 40 per cent were meant for private commercial use, while the public (government-owned) vehicles constituted the rest. Ninety one per cent of the currently injured were not involved in an accident before. Among the two-wheeler riders, about 98.5 per cent reported that they did not use of helmets, and no car driver victim wore seatbelts. None of them used mobile phones during the accidents. Alcohol use on the day of accident was present in 22.5 per cent of the RTAs as culled from the reported data and information from the patient case sheet.

5.1.1 Body parts affected

Head injury was present in 36.4 per cent; upper limb was involved in 35 per cent, and lower limb in 72.5 per cent of cases. About 81 percent of the cases reported that they had a severe injury to any of their body parts, while 70 per cent had injuries of moderate nature while 42 per cent of the injured reported they had mild injuries to one or more of the body parts (Table-5.5).

Table-5.4

Characteristics of the road traffic accidents[23]

ATTRIBUTE	NO. OF ACCIDENTS (%)
Time (hours)	
00.00 – 06.00	26 (8.6)
06.00 – 12.00	84 (27.8)
12.00 – 18.00	115 (38.1)
18.00 – 24.00	77 (25.5)
Accident spot	
National highways	87 (29.2)
State highways	70 (23.2)
Other roads	141 (47.3)
Nature of the road	
Curved	109 (38.5)
Straight	129 (45.6)
Narrow	9 (3.2)
Others	36 (12.7)
Direction of the vehicles involved in the accident	
Opposite	125 (55.3)
Same	40 (17.7)
Crossing	49 (21.7)
Stationary	12 (5.3)
Type of the first vehicle involved	
Cycle	9 (3.2)
Motor cycle	147 (52.1)
Light weight	89 (31.6)
Heavy	31 (11.0)
Others/Unknown	6 (2.1)

[23] N = 302. However, data pertaining to some attributes were not available for some persons as they failed to report the same. .

Type of the second vehicle	
Cycle	17 (10.2)
Motor cycle	72 (43.1)
Light weight	45 (26.9)
Heavy	33 (19.8)
Ownership	
Pvt Own Use	158 (57.7)
Pvt Commercial	109 (39.8)
Public Own Use	4 (1.5)
Public Commercial	3 (1.1)
Accident history	
Never	262 (91.1)
Once	20 (6.9)
Twice and above	6 (2.0)
Consumption of Alcohol	55 (22.5)
Usage of Helmet	2 (1.5)

Table-5.5

Organs affected

BODY PART	NO. INJURED (%)				
	Nil	Mild	Moderate	Severe	Total
Head	192 (63.6)	18 (6.0)	67 (22.2)	25 (8.3)	302 (100.0)
Face	235 (77.8)	22 (7.3)	28 (9.3)	17 (5.6)	302 (100.0)
Neck	293 (97.0)	3 (1.0)	3 (1.0)	3 (1.0)	302 (100.0)
Spine	296 (98.0)	0 (0.0)	3 (1.0)	3 (1.0)	302 (100.0)
Chest	256 (84.8)	11 (3.6)	16 (5.3)	19 (6.3)	302 (100.0)
Abdomen	283 (93.7)	0 (0.0)	13 (4.3)	6 (2.0)	302 (100.0)
Upper limb	196 (64.9)	44 (14.5)	33 (10.9)	29 (9.6)	302 (100.0)
Lower limb	83 (27.5)	30 (9.9)	48 (15.9)	141 (46.7)	302 (100.0)

5.1.2 Associated consequences of injury

Severe pain was reported by around 69 per cent of the injured, while another 25 per cent had moderate pain due to accidents which is significant in the choice of providers. Severe and moderate degree of loss of consciousness after the RTA was reported by 19.5 per cent and 20.5 per cent of the injured respectively, which is assumed to indicate the degree of severity of the injury sustained (Table-5.6). Blood loss of severe and moderate levels was reported by 31 per cent and 39 per cent respectively indicating the need for having the necessity of adequate blood transfusion facilities in the state. Around 54 per cent had severe temporary disability while another 35 per cent were suffering from moderate level temporary disability. Possibilities of permanent disabilities of different levels (severe/moderate/mild) were reported by 73 per cent for the injured.

5.1.3 Co-morbidities

Over 80 per cent of the injured had no other health problems than the injury they suffered while others had raised blood pressure, diabetes mellitus, heart ailments and/or asthma.

Table-5.6

Associated consequences of injury (N = 302)

CONSEQUENCE	NO. OF PERSONS (%)			
	Nil	Mild	Moderate	Severe
Pain	14 (4.6)	6 (2.0)	74 (24.5)	208 (68.9)
Loc	27 (8.9)	141 (46.7)	62 (20.5)	59 (19.5)
Blood loss	45 (14.9)	46 (15.2)	118 (39.1)	93 (30.8)
Disability (Temporary)	16 (5.3)	18 (8.0)	106 (35.1)	162 (53.6)
Disability (Permanent)	72 (23.8)	118 (39.1)	99 (32.8)	13 (4.3)

5.2Section-2: Health care seeking

5.2.1 Utilization of health care facility

The injured had 488 overall interactions with medical care institutions/personnel yielding an average number of 1.6 interactions per injured person; 60.2 per cent of the interactions were accounted by public health care institutions with 54 per cent of the injured choosing them as their first point of contact (Table-5.7). The role of the public sector increased with the increase in the number of contacts. Only 2 per cent reportedly received some form of first aid at the site of accident. Public sector was the first contact point for 52 per cent of the injured males and 71 per cent of the injured females.[24]

For the first episode of injury management (reduction of the acute state of the injury cycle), 48 per cent of the injured needed to seek care from only one provider, while around 42 per cent sought care from two providers and about 10 per cent utilized three health care facilities to treat the first episode of injury management.

Table-5.7

Care seeking by the injured

PROVIDER	POINT OF CONTACT (NO. OF PERSONS)					
	First		Second		Third	
	Male	Female	Male	Female	Male	Female
Public	137 (51.9)	27 (71.1)	84 (62.2)	19 (90.5)	23 (88.5)	4 (100.0)
Private	127 (48.1)	11 (28.9)	51 (37.8)	2 (9.5)	3 (11.5)	-
Total (N)	302		156		30	

5.2.2 Distance to reach the health care facility

Regarding the physical accessibility of health care services, 42 per cent had a first pint of contact within 5 km while 31 per cent reached the provider within 10 km (Table-5.8). Regarding the second contact point, 24 per cent sought care within 10 km and 54 per

[24] The difference was statistically insignificant.

cent travelled up to 60 km. Distance travelled increased for the third contact point 60 per cent had to travel up to 20 km and the rest had to travel more than 60 km.

Table-5.8

Distance traveled to health care facilities

DISTANCE (KM)	NO. OF PERSONS (%)		
	First contact point	Second contact point	Third contact point
< 5	125 (42.4)	18 (12.0)	3 (10.0)
5.0 - 10	91 (30.8)	18 (12.0)	3 (10.0)
10.1 - 20	58 (19.7)	14 (9.3)	12 (40.0)
20.1 - 30	10 (3.4)	30 (20.0^)	0 (0.0)
30.1 - 60	11 (3.7)	40 (26.7)	0 (0.0)
> 60	0 (0.0)	30 (20.0)	12 (40.0)
N	295	150	30

5.2.3 Time taken to reach the facility

About 75 per cent of the injured reached the first point of health care contact within half-an-hour from the time of the accident (Table-5.9); 20 per cent reached within an hour. On the other hand, 78 per cent reached the second contact point within one hour and 60 per cent reached the third contact point within one hour.

Table-5.9

Time taken to reach the contact points

TIME (HOURS)	NO. OF PERSONS (%)		
	First contact point	Second contact point	Third contact point
< 0.5	221 (74.7)	49 (31.8)	4 (13.3)
0.6 - 1.00	59 (19.9)	71 (46.1)	14 (46.7)
1.1 - 2.00	16 (5.4)	30 (19.5)	9 (30.0)
> 2.00	0 (0.0)	4 (2.6)	3 (10.0)
N	296	154	30

5.2.4 Duration of treatment

The length of treatment at different health facilities by the injured indicate that more than 70 per cent were treated as out patient (including observation cases) and the rest were prescribed hospitalized treatment at the first pint of contact. In the second point of contact, 43 per cent were administered ambulatory treatment and 57 per cent were given in-patient treatment. In the third point of contact, 90 per cent of the injured received hospitalized treatment. More than 42 per cent of the cases had duration of treatment at the first contact point in less than one hour, while a 21 per cent were put under observation for less than 24 hours and an additional 14 per cent had a length of stay of less than 5 days. Overall, 37 per cent had a length of stay of less than 24 hours, while 26 per cent had a length of stay between 2 and 7 days, while the rest 37 per cent had a length of stay of 8 or more days of hospitalised treatment (Table-5.10).

Table-5.10

Length of treatment

TIME (HOURS)	NO. OF PERSONS (%) IN		
	1st Contact Point	2nd Contact Point	3rd Contact Point
Outpatient (hours)			
< 1.00	123 (42.3)	6 (3.9)	--
1.01-2.00	20 (6.9)	8 (5.2)	--
2.01-24	62 (21.3)	52 (34.0)	3 (10.0)
Total	205 (70.4)	66 (43.1)	3 (10.0)
Inpatient (days)			
2-5	41 (14.1)	20 (13.1)	--
6-10	23 (7.9)	16 (10.5)	8 (26.7)
11-20	19 (6.5)	21 (13.7)	6 (20.0)
> 20	3 (1.0)	30 (19.6)	13 (43.3)
Total	86 (29.6)	87 (57.0)	27 (90.0)
Grand total	**291**	**153**	**30**

Decomposition of the above table further into length of treatment across providers gives interesting results. In the first point of contact, of all patients having less than 24 hours treatment, public sector health care institutions managed about 78 per cent of cases, 46 patients having a length of stay between 2 - 7 days were treated by the public sector and 37 per cent of cases having a length of stay of 8 or above 8 days (Table-5.11). When private sector was the first point of contact, 22 per cent were given ambulatory care, 54 percent were given hospitalized treatment between 2 – 7 days and 63 per cent had a length of stay of more than 8 days. In the second point of contact, 90 per cent of the injured having a length of treatment less than 24 hours were treated in a public health care institution, while 55 per cent of cases having a length of stay of between 2 – 7 days were managed by private health care institutions and of 66 per cent of the patients having a length of stay of more than eight days were treated by private hospitals. In the third point of contact, 90 per cent of the patients were treated by public sector and the length of stay is more than 7 or more than 7 days.

Table-5.11

Outpatient and inpatient utilization of injury care

LENGTH OF TREATMENT (DAYS)	NO. OF PERSONS DURING THE					
	1st Contact Point		2nd Contact Point		3rd Contact Point	
	Public	Private	Public	Private	Public	Private
< 1	87 (77.7)*	25 (22.3)*	46 (92.0)*	4 (8.0)*	3 (100.0)	--
2-7	36 (45.6)*	43 (54.4)*	13 (44.8)*	16 (55.2)*	--	--
> 7	41 (36.9)*	70 (63.1)*	44 (57.1)*	33 (52.9)*	24 (88.9)	3 (11.1)
Total	164 (54.3)	138 (45.7)	103 (66.0)	53 (34.0)	27 (90.0)	3 (10.0)

** significant at .000*

5.2.5 Choice of health care facility for injury care

Proximity was the reason for choosing first point of contact in 65 per cent of cases, availability of specialist for 19 per cent, medico-legal issues in 7 per cent of cases and

cost for 6 per cent (Table-5.12). Specialist was the reason for choosing second point of contact 51 per cent; cost was the reason for choosing the second contact point in 17 percent of cases; proximity was the reason in about 15 per cent of cases. In case of third point of contact, 60 per cent chose it because of cost and in the rest 20 percent as well had cost as one of the factors along with proximity.

Table-5.12

Reason for choosing health care providers

	NUMBER OF INJURED CHOOSING		
Variable	**1st Contact Point**	**2nd Contact Point**	**3rd Contact Point**
Cost	9 (3.1)	25 (16.7)	18 (60.0)
Proximity	192 (65.1)	22 (14.7)	--
Specialist	57 (19.3)	77 (51.3)	6 (20.0)
MLC	19 (6.4)	7 (4.7)	--
Cost & proximity	4 (1.4)	6 (4.0)	6 (20.0)
Cost & specialist	4 (1.4)	6 (4.0)	--
Others	10 (3.4)	7 (4.7)	--
Total	295 (100.0)	150 (100.0)	30 (100.0)

Table-5.13 given under depicting the relationship between monthly household income and type of provider finds that injured whose monthly household income is less than Rs. 2500 chose public provider in 68 percent of cases as the first point of contact, while those with monthly income above Rs.5001 chose more than 60 per cent cases a private provider.

A quartile income analysis[25] and its relationship between choice of providers reiterates the findings of Table-5.13. There exists a statistically significant and consistent pattern in choice of providers by income quartiles. Of the 153 cases who chose only public

[25] The monthly household income has been split into quartiles so as to understand the variation in financial burden borne in relation to their monthly household income.

provider, about 74 per cent belonged to the monthly household income group with less than Rs. 4,000 (USD 100) and the 26 per cent of the income group above Rs. 4,001 (USD 100) utilized the services of public hospitals.

Table-5.13

Relationship between monthly household income and choice of providers

Income group	NUMBER OF INJURED CHOOSING					
	1st Contact Point		2nd Contact Point		3rd Contact Point	
	Public	Private	Public	Private	Public	Private
< 2500	62 (68.1)*	29 (31.9)*	28 (82.4)**	6 (17.6)**	6 (100.0)	--
2501-5000	69 (54.3)*	58 (45.7)*	48 (76.2)**	15 (23.8)**	11 (100.0)	--
> 5001	33 (39.3)*	51 (60.7)*	27 (45.8)**	32 (54.2)**	10 (76.9)	3 (23.1)
Total	164 (54.3)	138 (45.7)	103 (66.0)	53 (34.0)	27 (90.0)	3 (10.0)

* significant at .001 level ** significant at .000 level

5.2.6 Reason for leaving the health facility

It is seen from the that reason for leaving the first point of health care contact was discharge in about 50 per cent of the injured, while another 45 per cent were referred to a higher level health facility (Table-5.14). Self-referral due to poor quality and high cost were the reasons for 3.5 per cent of all cases who attended the first point of contact. From the second point of contact, 79 per cent of the cases were discharged while a 14 per cent of the cases were further referred up to an advanced centre for care. The proportion of the injured who self-referred from the second point of contact due to poor quality and high cost went up to 7 per cent. In the third point of contact, all the patients were discharged.

Table-5.14

Reason for leaving different health care facilities

Reason	NUMBER OF INJURED LEAVING		
	1st Contact Point	2nd Contact Point	3rd Contact Point
Discharged	141 (49.6)	121 (78.6)	30 (100.0)
Referred	129 (45.4)	22 (14.3)	--
Self-referral due to high cost/poor quality	10 (3.5)	11 (7.1)	--
Others	4 (1.4)	--	--
Total	**284 (100.0)**	**154 (100.0)**	**30 (100.0)**

Table-5.15

Share of different providers in treating mild injuries

	MILD INJURY		
	Public	**Private**	**Public & Private**
Head	6 (5.5)	12 (10.9)	--
Face	6 (9.0)	10 (14.9)	6 (9.0)
Neck	3 (33.3)	--	--
Spine	--	--	--
Chest	11 (23.9)	--	--
Abdomen	--	--	--
Upper limb	23 (21.7)	11 (10.4)	10 (9.4)
Lower limb	22 (10.0)	8 (3.7)	--
Total	71 (55.5)	41 (32.0)	16 (12.5)

Injury severity generally describes the impact of an injury in terms of the extent of tissue damage (that is, the pathologic evidence of trauma) and/or the physiologic response of the body to that damage (here) as perceived and reported by the injured. The tables (Table-5.15, 5.16, 5.17, 5.18) illustrate the choice of the injured on providers

based on severity of the injury and the part of the body affected as well as the number of providers selected for the current episode of injury. The share of public sector health care institutions treating mild, moderate and severe injuries is 55.5 per cent, 54.6 per cent and 48.6 per cent respectively, whereas the share of private sector in treating mild, moderate and severe injuries is 32 per cent, 22.5 per cent and 21.4 per cent respectively. The rest of the injuries were managed by public and private hospitals together, in which at least one public and one private hospital is involved. It also gives an idea regarding the segmentation of market across severity and body part affected. another group and lower limb and upper limb into the third group. Secondly, the reported severity by the injured on each part is given a score with severe injury as 3, moderate injury as 2, simple or mild injury as 1 and no injury equals zero. Finally, the severity score of each injury group is summed and classified into two groups based on the maximum score to each group.

Table-5.16

Share of different providers in treating moderate injuries

BODY PART	MODERATE INJURY		
	Public	**Private**	**Public & Private**
Head	31 (28.2)	16 (14.5)	20 (18.2)
Face	7 (10.4)	14 (20.9)	7 (10.4)
Neck	33 (33.3)	--	--
Spine	--	3 (50.0)	--
Chest	9 (19.6)	4 (8.7)	3 (6.5)
Abdomen	13 (68.4)	--	--
Upper limb	13 (12.3)	6 (5.7)	14 (13.2)
Lower limb	25 (11.4)	13 (5.9)	10 (13.7)
Total	131 (54.6)	54 (22.5)	55 (22.8)

The maximum scores in all groups were less than 5 and 6. So, it was comparatively easier to divide each group into two. Any group having a combined value of 2 or less than 2 is assumed as moderate injury and any group having a value of 3 or more than 3 is assumed as severe injury group. This exercise has been undertaken primarily to combine the different group of body parts as well as their respective severity, because road traffic

accidents in the study has typically more than one body part affected with differing severity.

Table-5.17

Share of different providers in treating severe injuries

BODY PART	SEVERE INJURIES		
	Public	Private	Public & Private
Head	18 (16.4)	3 (2.7)	4 (3.6)
Face	3 (4.5)	8 (11.9)	6 (9.0)
Neck	3 (33.3)	--	--
Spine	3 (50.0)	--	--
Chest	13 (28.3)	--	6 (13.0)
Abdomen	--	3 (15.8)	3 (15.8)
Upper limb	12 (11.3)	8 (7.5)	9 (8.5)
Lower limb	66 (30.1)	30 (13.7)	45 (20.5)
Total	118 (48.6)	52 (21.4)	73 (30.0)

Table-5.18

Share of different providers in treating all injuries (severity and body part)

BODY PART	ALL INJURIES		
	Public	Private	Public & Private
Head	55 (50.0)	31 (28.2)	24 (21.8)
Face	16 (23.9)	32 (47.8)	19 (28.4)
Neck	10 (100.0)	--	--
Spine	6 (100.0)	--	--
Chest	33 (71.7)	4 (8.7)	9 (19.6)
Abdomen	13 (68.4)	3 (15.8)	3 (15.8)
Upper limb	48 (45.3)	25 (23.6)	33 (31.1)
Lower limb	113 (51.6)	51 (23.3)	55 (25.1)
Total	294 (50.4)	146 (25.0)	143 (24.6)

CHAPTER-6

6 FINANCIAL BURDEN OF TREATMENT AND ITS COMPONENTS

The financial burden sets in once injury strikes and the affected person seeks paid care. It represents the difficulties experienced by the injured or his/her household as a consequence of road traffic injuries related health care seeking and household care giving. In addition to direct treatment cost, which already includes the effects of *mediflation* and induced demand, the household also bears indirect consequences or future cost such as normal or abnormal interest on borrowings, reduction of future earnings due to the loss of assets, and ill-effects of other coping methods. This chapter brings out the results pertaining to the household financial of treating non-fatal injuries and its associated components and factors.

6.1 Section-1: Household financial burden

The financial burden is imposed by a varied set of factors which were grouped under four major categories viz., market, health system, context-specific and household.

6.1.1 An assessment of total financial burden

An assessment of the total size of the household financial burden has been a major objective of this study. Table-6.1 gives a bird's eye view of the health care facilities, the total expenditure incurred, and the disaggregated total cost of treatment depending on various points of contact. The required information was collected directly from the affected households through a semi-structured questionnaire. The average amount spent by an injured person during the first phase of treatment was Rs. 8,436.20 or USD 211 (Median Rs. 4,615 or USD 115 and SD 10,721). Mean expenditures at the first, second and third points of health care facility contact were respectively Rs. 2,208 or USD 55 (SD 3,802), Rs. 8,102.57 or USD 203 (SD 16,465) and Rs. 11,532.50 or USD 288 (SD 10,757) for treating the most crucial stage of injury care seeking. It was also evident that about 50 per cent of the injured who attended the first contact point spent less than Rs. 500 (USD 13) while 59 per cent who attended the second point of contact had to spend

between Rs. 500 (USD 13) and Rs. 5,000 (USD 125). In third point of contact, more than 56 per cent of the injured spent higher than Rs. 10,000 (USD 250) on treating injuries.

Table-6.1

Total spending on injury treatment at different points of contact

AMOUNT SPENT (RS.)	NO. OF PERSONS SEEKING CARE (%)		
	1st Contact point	2nd Contact point	3rd Contact point
Free care	23 (10.0)	3 (2.7)	--
1 – 100	29 (12.7)	--	--
101 – 500	64 (27.9)	--	--
501 – 1,250	40 (17.5)	21 (18.6)	1 (6.3)
1,251 - 2,500	16 (7.0)	32 (28.3)	6 (37.5)
2,501 - 5,000	24 (10.5)	14 (12.4)	--
5,001 - 10,000	23 (10.0)	31 (27.4)	--
10,001 - 20,000	9 (3.9)	3 (2.7)	6 (37.5)
> 20,000	1 (0.4)	9 (8.0)	3 (18.8)
Total (N)	229	113	16
Mean	2,207.93	8,102.57	11,532.50
Standard deviation	3,802	16,465	10,757

Average total cost of treatment per episode at all contact points Rs. 8,436.20 (Median 4,615, SD 10,721)

6.1.1.1 Medical and non-medical expenses

Table-6.2 gives the details of amount of money spent by the injured on medical expenses like consultation fee, room rent, bed charges, surgical expense, equipment use, supplies, medicines, diagnostics and nursing charges and non-medical expenses on travel, food, medico-legal charges and other miscellaneous items. The proportion between medical and non-medical expenses turned out to be roughly 6.2:3.8. In other words, medical expenses constituted 62 per cent of the total injury care spending. About 21 per cent of the study population spent up to Rs.1,250 (USD 31) for treating the current episode of

injuries while another 34 per cent of them spent up to Rs. 5,000 (USD 125) on treating injuries and others spent over Rs. 5,000 (USD 125) for managing injury care.

Table-6.2

Details of medical and non-medical expenses

AMOUNT (RS.)	NO. OF PERSONS (%) INCURRING		
	Medical expenses	**Non-medical expenses**	**Total expenses**
0	3 (1.0)	3 (1.0)	3 (1.0)
1 – 100	32 (11.1)	3 (1.0)	3 (1.0)
101 – 500	32 (11.1)	51 (17.4)	19 (6.5)
501 - 1,250	44 (15.3)	54 (18.4)	36 (12.3)
1,251 - 2,500	32 (11.1)	54 (18.4)	49 (16.7)
2,501 - 5,000	41 (14.3)	68 (23.2)	51 (17.4)
5,001 – 10,000	66 (23.0)	48 (16.4)	52 (17.7)
10,001 – 20,000	18 (6.3)	8 (2.7)	58 (19.8)
> 20,000	19 (6.6)	4 (1.4)	22 (7.5)
Total (N)	287	293	293

Table-6.3 provides a brief description of the average medical and non-medical expenses incurred by different income quartile groups. The lowest income group spent Rs. 6,573 (USD 164) per episode while the second lowest income group spent Rs. 7,210 (USD 180); the richest quartile spent Rs. 13,772 (USD 344).

Distribution of medical expenses shows the highest degree of *skewness* (implying that the intra-group distribution of differential burden is very high in the lowest income group) followed by the third income quartile while the income group (2,475-4,000) also show wide variation and the richest income quartile has the least *skewness*. Regarding the distribution of gross injury care expenses, maximum *skewness* in the distribution of the total expenses of injury care is also in the lowest income quartile, followed by the second income quartile from below as well as the third income quartile. The richest income quartile shows that total injury care expenditure distribution is the least skewed.

Table-6.3

Average injury care expenses by different household income quartiles

INCOME QUARTILE (RS.)	MEDIAN INCOME (RS.)	NO. OF PERSONS SPENDING		
		Medical expenses	Non- medical expenses	Total expenses
< 2,475	1,800	4, 495 (1000)*	2,436 (1350)	6573 (2,350)
2,475 - 4, 000	3,500	3,958 (2,252)	3, 268 (1750)	7,217 (3,840)
4,001 - 6,000	5,000	5, 724 (1390)	3,180 (1600)	8,310 (3,870)
> 6,000	9,500	11,152 (7,510)	4,917 (3,800)	13,772 (12,735)

** Values in parentheses indicate median values*

Figure-6.1 depicts the relationship between total medical expenses and household income. This curve may be termed as the medical cost of treatment curve based on income. As it can be seen, medical expenditure rises as the income increases and the rate of growth of medical expenses gets higher for higher income households among the injured. However, the shape of the curve is not steep enough to suggest that the rate drastically increases for the high income households meaning even low income households face similar increase in medical expenditure.

The pattern of overall spending on injury care against household income is shown in Figure-6.2. The trend here is much more steeper than the earlier curve indicating that the total injury care spending rises faster for high income households than that of low income households. The steep increase can be attributable to a sharp increase in non-medical spending because the relation of income with medical expenditure was not steep.

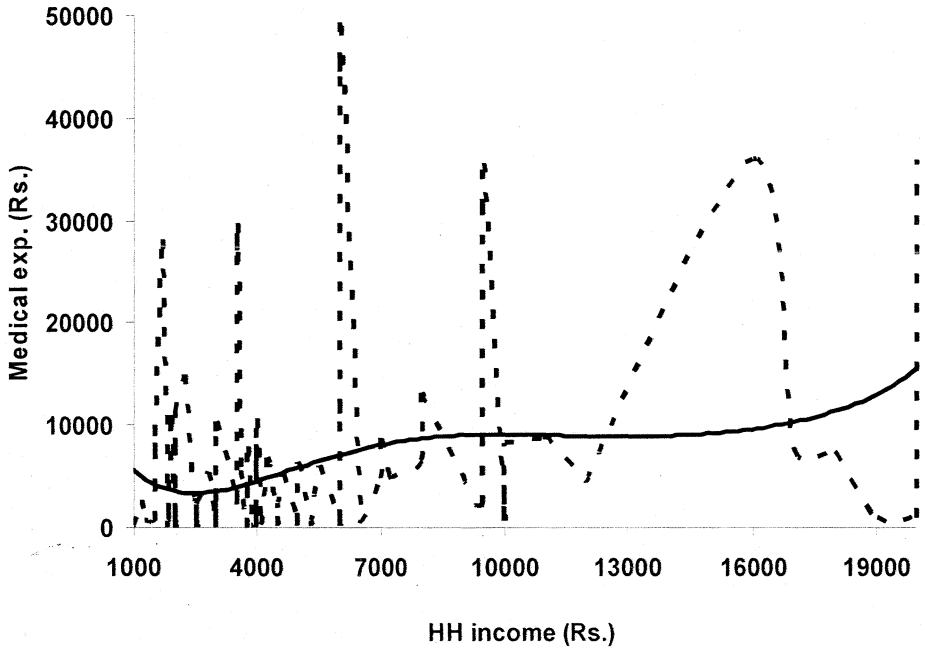
6.1.1.2 Duration of treatment and injury care expense

The relationship between the duration of treatment (sub-divided into ambulatory injury care and hospitalized injury care) is described in Table-6.4. It shows the pattern of medical and non-medical spending across injuries managed as out-patient and in-patient. The relationship between duration of treatment and quantum of spending has got statistically significant values and the pattern is consistent across the spectrum. On

average, about 21 percent of both OP & IP cases spent less than Rs. 1250, while 34.2 per cent of the injured spent between Rs. 1250-Rs.5000 and the finally, about 45 per cent spent more than Rs. 5000 for managing the first episode of injury.

Figure-6.1

Relationship between household income and medical expense on injury care (302 households, 2007)



6.1.2 Pattern of spending

Table-6.5 explains the pattern of spending at different health care facilities by the injured. As it can be seen, 77.8 per cent of cases attended at the first contact point incurred maximum expenses on the day of accident while 12.9 per cent spent their maximum on the day of admission. In the second contact point, 41 per cent spent the highest amount on the day of accident and 34 per cent on the day of admission. For majority patients who had undergone surgery, surgery day turned out to be the most expensive day in this episode of injury care seeking.

Figure-6.2

Relationship between household income and total expense on injury care (302 households, 2007)

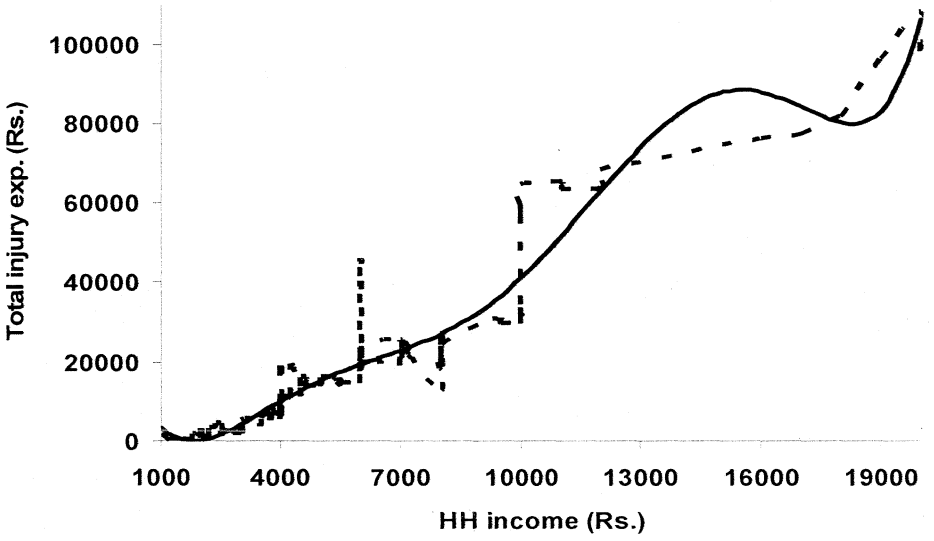


Table-6.4

Duration of treatment and the level of injury care spending

INJURY CARE	NO. OF PERSONS INCURRING								
	Medical expenses			Non-medical expenses			Total expenses		
	< 1,250	1,250 -5,000	> 5,000	< 1,250	1,250 - 5,000	> 5,000	< 1,250	1,250 - 5,000	> 5,000
OP	91*	10*	1*	82	26	--	54*	52*	2*
	(31.7)	(3.5)	(0.3)	(28.0)	(8.9)		(18.5)	(17.8)	(0.7)
IP	20*	63*	102*	29	96	60	7*	48*	129*
	(7.0)	(22.0)	(35.5)	(9.9)	(32.8)	(20.5)	(2.4)	(16.4)	(44.2)
Total	111	73	103	111	122	60	61	100	131
	(38.7)	(25.4)	(35.9)	(37.9)	(41.6)	(20.5)	(20.9)	(34.2)	(44.9)

** significant at 0.001 level*

6.1.2.1 Catastrophic nature of injury care spending

Table-6.6 brings out the distribution of total injury care expenses as a proportion of total monthly household income for different income quartiles. Among the lowest income quartile, 65 per cent spent in excess of 100 per cent of their income on treating injury care; some of them spent more than 20 times their monthly income for treating the first episode of injury care. Over 20 per cent spent up to one-fifth of their income. Over 51 per cent incurred more than 100 per cent of their income on injuries; some spent 10 times their income. Regarding the third quartile, 43 per cent spent more than 100 per cent. For the richest quartile, about 60 per cent spent more than 100 per cent.

On average, injury care expenses formed 130.6 per cent, 109.7 per cent, 77.4 per cent and 134 per cent of the median monthly household income of poorest, second, third, and the richest income quartiles respectively. Of the 302 cases, 70.2 per cent incurred more than 50 per cent of their monthly income on injury care.

Table-6.7 depicts the distribution of expenses of treatment across different income groups when sought care from different sources of care. For the lower income group, when sought care from public facility, about 31 per cent incurred more than their median monthly income for seeking care, while a 21.3 per cent had spent less than 20 per cent of their income on injury care in the public sector. All the injured who sought care from private sector spent an amount more than their monthly income. Regarding the second income quartile, about 17 per cent spent more than their monthly income on injury care when sought care from public sector, while 17.8 per cent spent more than their median income when sought care from private sources of care. For the third quartile, majority of those who spent less than 50 per cent of their income on injury care sought care public sources. The richest quartile utilized more often private sources and as such, majority spent more than 50 per cent of their monthly income on injury care and whoever sought care from public sources were insulated from catastrophic expenses.

Both public and private means at least one public and one private. It is interesting to note the pattern of referral pattern of the poor and rich as there exists wide differences. For the higher income groups, if the point of contact is a public facility, generally they shift to a private hospital as a second or third point of contact. However, for the lower income

groups, if private health facility is the first contact point, they have chosen public facility as second or third point of contact.

Table-6.5

When do the injured need resources?

DAY OF	1ST CONTACT POINT	2ND CONTACT POINT	3RD CONTACT POINT
Accident	217 (77.8)	55 (41.4)	3 (11.5)
Admission	36 (12.9)	45 (33.8)	17 (65.4)
Surgery	14 (5.0)	26 (19.5)	6 (23.1)
All days	6 (2.2)	4 (3.0)	--
Others	6 (2.2)	3 (2.2)	--
Total	279 (100.0)	134 (100.0)	26 (100.0)

Table-6.6

Distribution of financial burden of treatment across income quartiles

INCOME QUARTILE	MEDIAN INCOME	<20 %	20-50 %	51- 100 %	> 100 %
<2,475	1,800	21.3	4.0	9.3	65.3
2,475-4,000	3,500	10.3	16.5	22.1	51.2
4,001-6,000	5,000	22.5	22.4	12.1	43.0
> 6,000	9,500	5.8	28.8	5.8	59.6

Use of more than one facility is always a costly option which implies at least two things. Firstly, it probably tells that the injury is serious enough to require the medical assistance of more advanced care and support. Secondly, it may be due to non-availability of necessary facilities (both real and perceived) in the first or second point of contact leading to increased transportation and other costs.

Table-6.7

Distribution of injury treatment expenses among different providers for income quartiles

INCOME QUARTILE (MEDIAN INCOME)	PROVIDER	<20	20-50	51-100	> 100	TOTAL
< 2,475 (1,800)	Public	21.3	0.0	9.3	30.7	61.4 (43)
	Private	0.0	0.0	0.0	17.3	17.3 (13)
	Public & private	0.0	4.0	0.0	17.3	21.3 (16)
	Total	21.3	4.0	9.3	65.3	100.0 (75)
2,475 - 4000 (3,500)	Public	10.4	15.8	16.7	16.9	59.8 (64)
	Private	0.0	0.9	5.6	17.8	23.4 (25)
	Public & private	0.0	0.0	0.0	16.8	16.8 (18)
	Total	10.4	16.7	22.3	51.5	100.0 (107)
4,001 – 6,000 (5,000)	Public	17.3	17.2	0.0	15.5	50.0 (29)
	Private	5.2	0.0	0.0	13.8	19.0 (11)
	Public & private	0.0	5.2	12.1	13.7	31.0 (18)
	Total	22.5	22.4	12.1	43.0	100.0 (58)
> 6,000 (9,500)	Public	5.8	9.6	0.0	5.8	21.2 (11)
	Private	0.0	0.0	5.8	34.6	40.4 (21)
	Public & private	0.0	19.2	0.0	19.3	38.5 (20)
	Total	5.8	28.8	5.8	59.6	100.0 (52)

6.1.3 Sources of finance

Table-6.8 describes the means of raising resources to pay for the current injury treatment costs. The sources of financing care are broadly divided into internal or own sources of financing and external sources of financing. In the table, the columns (1) (2) and (5) are called own sources of financing and the rest could be identified as external sources of financing. Table-6.8 depicts the average amount of resource drawn by various income groups from different sources for defraying cost of treating injuries. For the lowest

income quartile, loan with interest formed the highest amount (Rs. 3640) for financing followed by loan without interest (Rs. 1700), while the income group (Rs. 2476-4000) had selling of assets (Rs. 3995) followed by loan with interest (Rs. 2037) as the major means for meeting injury care expenses.

Table-6.8

Average share of sources of financing by income quartiles

INCOME	CURRENT INCOME	SAVINGS	LOAN		SELLING OF ASSETS	INSURANCE	EMPLOYER	OTHERS	INTEREST RATE (MONTHLY)
			Without Interest	With interest					
< 2,475	8.2	3.7	23.1	49.5	0.0	0.0	0.0	14.7	3.55
2,475 - 4,000	4.6	4.5	25.1	49.2	0.8	0.0	2.6	13.6	4.42
4,001 - 6,000	3.1	3.3	16.4	66.7	5.9	0.0	1.2	11.3	3.09
> 6,000	3.8	15.3	38.1	18.1	6.3	3.7	2.7	13.2	2.64

Regarding the third income quartile (Rs. 4001-6000), loan with interest contributed the highest (Rs. 5776) followed by loan without interest (Rs. 1422) while for the richest quartile, loan without interest (Rs. 5237) was followed by loan with interest (Rs. 2492) and closely by savings (Rs. 2102) were available for meeting injury care expenses. The impact of road traffic injury on household economic security can be partly understood from the changes in the household income and expenditure information.

Table-6.9 demonstrates that there has occurred a decline in the income after the incidence of injury in all income quartile groups. For example, the monthly income of the household of the lowest income quartile declined by 67.5 percentage points, on average, whereas the income group (Rs. 2476-4000) saw a decline in its income by 78.4 per cent. The reduction in the income of the income group (Rs. 4001-6000) was to the

tune of 72.8 per cent while the richest income quartile had a fall in the income by around 63 per cent.

Table-6.10 highlights the changes in the monthly food expenditure and household expenses before the incidence of the current episode of injury and after the event. For the

Table-6.9

Household monthly income of the injured in the pre and post injury period

INCOME QUARTILE (RS.)	NORMAL INCOME (RS.)		POST-INJURY INCOME (RS.)		NORMAL INCOME AS % OF POST INJURY INCOME
	Average	SD	Average	SD	
< 2,475	1,712	361.8	557	759.5	32.5
2,475-4,000	3,386	543	731	1,036	21.6
4,001-6,000	5,179	657	1,463	2,293	28.2
> 6,000	10,368	3,876	3,827	3,683	37.0

Table-6.10

Household monthly expenses of the injured in the pre and post injury period

INCOME QUARTILE	FOOD EXPENDITURE			HH EXPENDITURE		
	Normal	During Injury		Normal	During Injury	
		Rs.	% of normal food exp.		Rs.	% of normal HH exp.
< 2,475	2,167 (862)	1,360 (535)	62.8	3,113 (1692)	1,970 (887)	63.3
2,475-4,000	2,505 (715)	1,833 (907)	73.2	3,718 (1687)	2,471 (1194)	66.5
4,001-6,000	2,523	1,827	72.4	3,501	2,552	72.9

	(875)	(854)		(1234)	(1136)	
> 6,000	3,923	2,769	70.6	5,669	3,926	69.3
	(1193)	(1215)		(2013)	(2134)	

** Values in parentheses indicate standard deviation*

lowest income quartile, the reduction in household food and general expenditure were to the tune of about 37 per cent in both cases. For the income quartile (Rs. 2476-4000), the reduction in both expenditures were about 27 per cent and 35.5 per cent respectively. The third income quartile's household food and general expenses declined by about 28 and 27 per cent respectively, while the same for the highest income quartile were 29 and 31 per cent respectively.

Table-6.11 points out that the mean days lost for the injured and the immediate (one) bystander is about 10.24 days for both of them respectively for the lowest income group, while the expected loss of days were 43.86 for the injured and 32.63 for the immediate bystander. For the second income quartile, average number of days lost for the injured and bystander is 8.21 days respectively. The highest number of actual and expected day loss is reported for the richest income group with actual day loss of 15.96 days and expected day loss of 46.96 for the injured and 33.15 for one bystander.

Table -6.11

Actual and Expected time loss due to injury across income quartiles

INCOME QUARTILE	MEAN DAYS LOST FOR		MEAN EXPECTED DAY LOSS FOR	
	Injured	Immediate bystander	Injured	Immediate bystander
< 2,475	10.24 (11.8)	10.24 (11.8)	43.86 (54.4)	32.63 (41.3)
2,475-4,000	8.21 (8.7)	8.21 (8.6)	34.59 (35.9)	25.58 (29.5)
4,001-6,000	7.19 (9.1)	7.19 (9.1)	35.89 (47.8)	23.71 (29.0)
> 6,000	15.96 (12.1)	15.96 (12.1)	46.96 (48.3)	33.15 (30.7)

** Values in parentheses indicate standard deviation*

Income loss (both actual and expected) of the household is described in Table-6.12 (Income loss for each group is the average per day income of the injured and bystander of the respective income quartile multiplied by the number of days lost or expected day loss). Income lost as a percentage of the household income due to injury constitutes 68.2 per cent, 54.9 per cent, 48 per cent and 106.5 per cent of the average monthly household income of the different income quartiles respectively.

Table-6.12

Actual & Expected income loss of the household

INCOME QUARTILE	INCOME LOST (RS)		EXPECTED INCOME LOSS (RS)		TOTAL INCOME LOST BY THE INJURED & BYSTANDERS (RS.)	INCOME LOST AS A % OF AVERAGE MONTHLY HH INCOME
	Injured	Immediate bystander	Injured	Immediate bystander		
< 2,475	614	614	2,632	1,958	1,228	**68.2**
2,475-4,000	961	961	4,047	3,861	1,922	**54.9**
4,001-6,000	1,201	1,201	5,994	3,960	2,402	**48.0**
> 6,000	5,059	5,059	14,886	10,509	10,118	**106.5**

Table-6.13 is a brief discussion of the different coping methods adopted by the injured and the household in the face of road traffic injury. The lowest income quartiles had suffered comparatively more by means of forgoing children's education, health care for other family members, permanent and partial leaving of employment of the family members, migrating to other parts for higher income jobs to compensate the loss of income of the injured and overworking of other family members.

Table-6.13

Non-income consequences of injury

INCOME QUARTILE	COPING METHODS BY THE INJURED HOUSEHOLD					
	Foregone			Migration	Overwork	Total
	Education	Healthcare	Work			
< 2,475	17 (22.7)	19 (25.3)	71 (94.7)	8 (8.0)	24 (32.0)	75
2,475 – 4,000	11 (10.0)	23 (20.9)	103 (93.6)	3 (2.7)	42 (38.2)	110
4,001 – 6,000	--	8 (13.8)	48 (82.8)	5 (5.2)	32 (55.2)	58
> 6,000	6 (10.2)	4 (6.8)	52 (88.1)	--	24 (40.7)	59

6.2Section-2: Cost components

Table-6.14 shows that medical expenses constitute about 63 per cent of the gross expenditure on injury care while non-medical expenses including travel and food of the patient constitute about 37 per cent of the entire injury care expenses. Surgery represents the single largest category of expenditure (20.4 %) in the medical expenses of injury treatment, followed by medicine (19.7 %), scan & x-rays (18.8 %), doctors' fee (13.9 %) etc. Food expenses (38.4 %) followed by travel expenses (25.6) of the injured represent major category of non-medical expenses.

Table-6.14

Components of cost of treatment

EXPENDITURE ITEM	MEAN (RS.)	MEDIAN (RS.)	SD	% OF MEDICAL EXP.	% OF TOTAL INJURY EXP.	TOTAL (RS.)
Doctor fee	1,838	1,000	2,829	**13.9**	**8.7**	2,29,775
Patient rent	1,223	500	2,073	**6.8**	**4.3**	1,12,475

Surgery	5,187	3,500	5,892	**20.4**	**12.8**	3,37,150
Medicine	1,473	750	1,878	**19.7**	**12.4**	3,26,950
Supplies	530	300	521	**5.0**	**3.1**	82,155
Equipment	1,981	400	2,865	**12.3**	**7.7**	2,04,025
Labfee	381	300	330	**3.1**	**1.9**	49,875
Scan-xray	1,168	600	1,457	**18.8**	**11.8**	3,10,806
Total medical exp.	5,773	2,630	10,450	**100.0**	**62.9**	16,56,711
% of non-medical expenses						
Travel (patient)	894	600	1,107	**25.6**	**9.5**	2,50,380
Travel (others)	754	500	838	**19.1**	**7.1**	1,86,250
Food (patient)	1,641	1,050	2,293	**38.4**	**14.2**	3,75,800
Food (others)	808	600	754	**6.2**	**2.3**	60,600
Miscellaneous	437	250	858	**10.7**	**4.0**	1,04,450
Non-medical exp.	3,336	2,100	4,197	**100.0**	**37.1**	9,77,480
Total injury exp.	8,436	4,615	10,721		**100.0**	26,34,191

Table-6.15 is an account of the general pattern of spending on different components of the cost of treatment by different income groups. For all income groups, surgery turned out to be the largest income quartile, followed by medicine or equipment. For the lowest income group, surgery, on average, has taken Rs. 5438 followed by medicine (Rs. 1622). The second lowest income group has spent Rs. 3700 on surgery followed by equipment, and the income group (Rs. 4001-6000) spent Rs. 9714 on surgery followed by equipment (Rs. 2632) and for the richest income group, the average spending on surgery was Rs. 4916 followed by rent (Rs. 4341) and doctor fees (Rs. 3460).

Table-6.15

Components of cost of treatment across different income quartiles

INCOME (RS.)	**< 2,475**	**2,475-4000**	**4,001-6,000**	**> 6,000**
Expenditure Item		**Medical expenses (Rs.)**		
Doctor fee	1,109 (800)	873 (400)	2,041(1,000)	3,460 (1,800)
Patient rent	660 (550)	623 (90)	680 (500)	4341 (2900)

Surgery	5,438 (4,000)	3,700 (4,000)	9,714 (15,000)	4,916 (3,000)
Medicine	1622 (837)	1,313 (700)	1,042 (200)	2,116 (1,800)
Supplies	506 (300)	494 (350)	292 (200)	815 (1000)
Equipment	749 (240)	1733 (625)	2632 (900)	2914 (1000)
Lab Fee	350 (300)	301 (300)	298 (213)	570 (500)
Scan & x-ray	912 (360)	1,077 (650)	1,046 (210)	1,849 (750)
Total medical exp.	4,494 (1000)	3,958 (2252)	5,724 (1,390)	11,152 (7,510)
Non-medical expenses (Rs.)				
Travel (patient)	644 (600)	835 (600)	1,184 (575)	1,025 (1,000)
Travel (others)	635 (500)	624 (500)	846 (500)	1,058 (800)
Food (patient)	1,342 (1,000)	1,960 (1,000)	997 (450)	2136 (1,600)
Food (others)	747 (600)	453 (300)	1,083 (1,200)	1,224 (1,000)
Miscellaneous	318 (250)	532 (250)	235 (200)	606 (400)
Non-medical exp.	2,436 (1,350)	3,268 (1,750)	3,180 (1,600)	4,917 (3,800)
Total injury exp.	6,573 (2,350)	7,217 (3,840)	8,310 (3,870)	13,772 (12,735)

** Values in parentheses indicate median values*

6.3Section-3: Determinants of financial burden

6.3.1 Socioeconomic and demographic

6.3.1.1 Age of the injured

About 41 per cent was the share of less than 29 age group in the total injury care expenditure and 39 per cent was added by the age group 30 – 45 and rest of the injury care expenses was borne by injured above 46 years (Table-6.16). However, age group of the patient fails to show statistically significant variation among different age groups.

Table-6.16

Relationship between age of the injured and gross injury care expenses

AGE	PER CENT OF THE INJURED SPENDING (RS.)				
	<1,500	1,500-4,500	4,501-10,000	>10,000	Total

< 29	29 (9.9)	27 (9.2)	29 (9.9)	34 (11.6)	119 (40.8)
30-45	22 (7.5)	32 (11.0)	29 (9.9)	30 (10.3)	113 (38.7)
> 46	21 (7.2)	15 (5.1)	9 (3.1)	15 (5.1)	60 (20.5)
Total	72 (24.7)	74 (25.3)	67 (22.9)	79 (27.1)	292 (100.0)

6.3.1.2 Gender

An attempt was made to understand whether the sex of the injured does make any difference in the gross expenditure on injury treatment. Though more than 85 per cent of the entire injury care expenditure was accounted for by males, sex is found out to be a statistically insignificant factor in explaining changes in total injury care spending (Table-6.17). However, when disaggregated the total injury care expenditure into medical and non-medical expenditure, there exists a statistically significant relationship between sex of the injured and curative care expenditure.

6.3.1.3 Income

Income of the injured is analysed using monthly household income and monthly per capita income. Income of the injured shows a clear and consistent relationship between income of the injured and expenditure incurred which is found to be statistically significant and trend is consistent (Table-6.18 and Table-6.19). The analysis used not only total expenditure on injury treatment, but also disaggregated into medical expenses and in this cases as well, a highly statistically significant and consistent relationship across income groups have been found.

Table-6.17

Relationship between sex and gross injury care expenses

SEX	NUMBER OF THE INJURED SPENDING (RS.)		
	< 1,250	**1,250-5,000**	**> 5,000**
Male	52 (85.2)	84 (84.0)	118 (90.0)
Female	9 (14.8)	16 (16.0)	13 (10.0)
Total	61 (100.0)	100 (100.0)	131 (100.0)

Sex of the injured and total medical (Curative) expenses			
Male	90* (81.0)	68* (93.2)	92* (89.3)
Female	21* (18.9)	5* (6.8)	11* (10.7)
Total	111 (100.0)	73 (100.0)	103 (100.0)

** significant at 0.04 level*

6.3.2 Health status/care factors

6.3.2.1 Co-morbidity

The relationship between existence of other illness along with medical care expenses and injury care expenses is depicted (Table-6.20). The relationship between existing illnesses coupled with injury is found to have a significant effect on the total injury care expenses incurred, but not with medical expenses. This probably is due to the fact that some co-morbidities requires higher amount of expenses which in other cases may not be serious. The study had not controlled for the seriousness and nature of co-morbidity.

6.3.2.2 Average length of treatment (duration of treatment)

About 37 per cent (112) of all providers have a length of treatment within a medical institution of less than 24 hours (called outpatients) [Table-6.21]. Another 190 patients

Table-6.18

Monthly and per-capita income of the injured household and medical care expenses

HOUSEHOLD MONTHLY INCOME (RS.)	NUMBER OF INJURED SPENDING (RS.)			
	< 1,250	**1,250-5,000**	**> 5,001**	**Total**
< 2,500	42* (14.6)	21* (7.3)	19* (6.6)	82 (28.6)
2,500-5000	39* (13.6)	43 (15.0)	45* (15.7)	127 (44.3)
> 5,000	30* (10.5)	9* (3.1)	39* (13.6)	78 (27.2)
Total	111 (38.7)	73 (25.4)	103 (35.9)	287 (100.0)
Per capita income (Rs.)				
< 600	37* (12.9)	19* (6.6)	28* (9.8)	84 (29.3)
601-1250	53* (18.5)	40* (13.9)	25* (8.7)	118 (41.1)

> 1251	21* (7.3)	14* (4.9)	50* (17.4)	85 (29.6)
Total	111 (38.7)	73 (25.4)	103 (35.9)	287 (100.0)

** significant at .000 level*

Table-6.19

Monthly and per-capita income of the injured household and total injury care expenses

HH MONTHLY INCOME (RS.)	NUMBER OF INJURED SPENDING (RS.)			
	<1,250	**1,250-5,000**	**>5,000**	**Total**
< 2,500	28* (9.6)	34* (11.6)	26* (8.9)	88 (30.1)
2500-5000	26* (8.9)	40* (13.7)	61* (20.9)	127 (43.5)
> 5000	7* (2.4)	26* (8.9)	44* (15.1)	77 (26.4)
Total	61 (20.9)	100 (34.2)	131 (44.9)	292 (100.0)
Per capita income (Rs)	**Total injury care expenses (Rs.)**			
<600	26** (8.9)	29** (9.9)	32** (11.0)	87 (29.8)
601-1,250	31** (10.6)	43** (14.7)	47** (16.1)	121 (41.4)
>1,251	4** (1.4)	28** (9.6)	52** (17.8)	84 (28.8)
Total	61 (20.9)	100 (34.2)	131 (44.9)	292 (100.0)

** significant at .001 level* *** significant at .000 level*

were having a length of stay in a hospital for more than two days. About 51 per cent (153) of the 302 cases were treated by public sector singly, while 24.5 per cent (74) were treated by the private sector and the percentage of those who sought care from more than one point of contact in which at least one has to be a private sector medical institution

Table-6.20

Co-morbidity and injury care expenses

CO-MORBIDITY	NUMBER OF INJURED SPENDING (RS.)				
	<700	700-2,500	2,501-5,000	>5,000	Total
No	71 (24.7)	54 (18.8)	35 (12.2)	74 (25.8)	234 (81.5)

Yes	18 (6.3)	--	6 (2.1)	29 (10.1)	53 (18.5)
Total	89 (31.0)	54 (18.8)	41 (14.3)	103 (35.9)	287 (100.0)
Co-morbidity	**Number of injured spending (Rs.)**				
No	66** (22.6)	59** (20.2)	58** (19.9)	53** (18.2)	236 (80.8)
Yes	6** (2.1)	15** (5.1)	9** (3.1)	26** (8.9)	56 (19.2)
Total	72 (24.7)	74 (25.3)	67 (22.9)	79 (27.1)	292 (100.0)

*** significant at .001 level*

and minimum one public health care institution constitute 24.8 per cent (75). Among those who sought care from a public hospital, about 57 per cent were treated in an ambulatory setting and 17 per cent had a length of stay of between 2 to 7 days and 26 per cent had a length of stay above 7 days, while the majority (71 per cent) were treated as in-patients in a private setting. About 84 per cent of those sought care from both public and private sectors combined had hospitalisation above 2 days.

Average length of treatment is another variable influencing the total injury care expenses and length of stay has got significant relationship between duration of treatment and total injury care expenses (Table-6.22). Injured with a higher length of stay has a higher concentration of higher amount of injury care expenditure.

Table-6.21

Duration of injury treatment among different providers

PROVIDER	**NUMBER OF INJURED HAVING TREATMENT DURATION OF**			
	<24 Hrs	**2-7 Days**	**>7 Days**	**Total**
Public	87 (56.9)*	26 (17.0)*	40* (26.1)	153 (50.7)
Private	13* (17.6)	36* (48.6)	25* (22.5)	74(24.5)
Public & private	12* (16.0)	17*(22.7)	46* (61.3)	75 (24.8)
Total	112 (37.1)	79 (26.2)	111 (36.8)	302 (100.0)

** significant at .000 level*

Table-6.22

Duration of treatment and the amount of expenses incurred

TIME	NUMBER OF INJURED SPENDING (RS.)			
	<1,250	1,250-5,000	>5,000	Total
<24 hrs	54* (18.5)	52* (17.8)	2* (0.7)	108 (37.0)
1-7 days	7* (2.4)	31* (10.6)	38* (13.0)	76 (26.0)
>8 days	--	17* (5.8)	91* (31.2)	108 (37.0)
Total	61 (20.9)	100 (34.2)	131 (44.9)	292 (100.0)

** significant at .000 level*

6.3.2.3 Severity

Table-6.23 is a detailed analysis of part of the body affected, reported severity of the injury as felt by the patient in relation to the total expenses involved. Since most of the injured had multiple organs affected, a clear decomposition between mild, moderate and severe injuries and their respective expenditure commitments could be undertaken. As expected, there is a positive association between injury severity and expenditure incurred for cure. However, there are some categories with mild injuries even taking away a very high proportion of injury care expenses.

Table-6.23

Body part affected, nature of injury & total injury care expenses

BODY PART	SEVERITY OF THE INJURY	NUMBER OF INJURED SPENDING (RS.)				
		<1,500	1,500-4,500	4,501-10,000	>10,000	TOTAL
	Mild	6 (5.5)	3 (2.7)	1 (0.9)	8 (7.3)	18 (16.4)
Head	Moderate	6 (5.5)	20 (18.2)	30 (27.3)	11 (10.0)	67 (60.9)
	Severe	3 (2.7)	9 (8.2)	6 (5.5)	7 (6.4)	25 (22.7)
Face	Mild	3 (4.7)	6 (9.4)	3 (4.7)	7 (10.9)	19 (29.7)
	Moderate	4 (6.3)	8 (12.5)	10 (15.6)	6 (9.4)	28 (43.8)

	Severe	--	--	7 (10.9)	10 (15.6)	17 (26.6)
	Mild	3 (33.3)	--	--	--	3 (33.3)
Neck	Moderate	--	3 (33.3)	--	--	3 (33.3)
	Severe	--	3 (33.3)	--	--	3 (33.3)
	Mild	--	--	--	--	--
Spine	Moderate	3 (50.0)	--	--	--	(50.0)
	Severe	--	--	--	3 (50.0)	(50.0)
	Mild	8 (17.4)	3 (6.5)	--	--	11 (23.9)
Chest	Moderate	6 (13.0)	--	10 (21.7)	--	16 (34.8)
	Severe	--	4 (8.7)	3 (6.5)	12 (26.1)	19 (41.3)
	Mild	--	--	--	--	--
Abdomen	Moderate	6 (31.6)	4 (21.1)	3 (15.8)	--	13 (68.4)
	Severe	3 (15.8)	--	3 (15.8)	--	6 (31.6)
	Mild	16 (15.5)	13 (12.6)	11 (10.7)	4 (3.9)	44 (42.7)
Upper limb	Moderate	6 (5.8)	15 (14.6)	9 (8.7)	3 (2.9)	33 (32.0)
	Severe	6 (5.8)	6 (5.8)	3 (2.9)	11 (10.7)	26 (25.2)
	Mild	15 (6.8)	11 (5.0)	4 (1.8)	--	30 (13.7)
Lower limb	Moderate	19 (8.7)	10 (4.6)	15 (6.8)	4 (1.8)	48 (21.9)
	Severe	13 (5.9)	28 (12.8)	38 (17.4)	62 (28.3)	141 (64.4)

Table-6.24

Head, face, neck & spine injury severity and injury treatment expenses

COMBINED INJURY AND ORGAN SEVERITY MEASURE	NUMBER OF INJURED SPENDING (RS.)				
	<1,500	1,500-4,500	4,501-10,000	>10,000	Total

0[26]	47* (16.1)	31* (10.6)	23* (7.9)	35* (12.0)	136 (46.6)
1-2 (Moderate)	19* (6.5)	28* (9.6)	27* (9.2)	24* (8.2)	98 (33.6)
3-5 (Severe)	6* (2.1)	15* (5.1)	17* (5.8)	20* (6.8)	58 (6.8)
Total	72 (24.7)	74 (25.3)	67 (22.9)	79 (27.1)	292 (100.0)

**significant at 0.007 level*

Among the different parts, combined injury severity measure of head, face, neck and spine shows statistically significant relationship between severity of injury to these parts and injury care expenses (Table-6.24). However, no clear pattern can be drawn from the table. For example, there are some moderate injuries which took away more than severe injuries probably due to the multiple injury effect or provider effect.

Injuries to chest and abdomen do not show any statistically significant relationship between injuries to these parts of differing degrees and total injury care expenditure (Table-6.25). However, proportion of the injured having moderate injuries incurred relatively lower treatment expenses and majority of the severe chest and abdomen injury cases required higher amount of treatment expenses.

Injuries of differing severity to lower limb and upper limb, which is predominant form of injuries among the injured has a highly significant relationship between total injury care expenses incurred (Table-6.26). The pattern, though not uniform, shows a more or less consistent shape in which injured with moderate injuries had spent lower amount of money for treatment while the category with severe limb injuries had an increasing concentration of spending in the higher treatment expenses segment.

[26] indicates that zero (no injury) has a positive value because it point outs that these injured do not have currently an injury to any of the above parts (head, face, neck & spine) of the body but other parts could be involved.

Table-6.25

Chest and abdomen injury severity and injury treatment expenses

COMBINED INJURY & ORGAN SEVERITY MEASURE	NUMBER OF INJURED SPENDING (RS.)				
	<1,500	1,500-4,500	4,501-10,000	>10,000	Total
0[27]	52 (17.8)	67 (22.9)	48 (16.4)	67 (22.9)	234 (80.1)
1-2(Moderate)	14 (4.8)	3 (1.0)	13 (4.5)	--	30 (10.3)
3-5(Severe)	6 (2.1)	4 (1.4)	6 (2.1)	12 (4.1)	28 (9.6)
Total	72 (24.7)	74 (25.3)	67 (22.9)	79 (27.1)	292 (100.0)

Table-6.26

Limb injury severity and injury treatment expenses

COMBINED INJURY & ORGAN SEVERITY MEASURE	NUMBER OF INJURED SPENDING (RS.)				
	<1,500	1,500-4,500	4,501-10,000	>10,000	Total
0[28]	13* (4.5)	13* (4.5)	7* (2.4)	9* (3.1)	42 (14.4)
1-2 (Moderate)	34* (11.6)	23* (7.9)	16* (5.5)	4* (1.4)	77 (26.4)
3-5 (Severe)	25* (8.6)	38* (13.0)	44* (15.1)	66* (22.6)	173 (59.2)
Total	72 (24.7)	74 (25.3)	67 (22.9)	79 (27.1)	292 (100.0)
**significant at 0.000 level*					

6.3.2.4 Type of providers

[27] indicates that zero (no injury) has a positive value because it point outs that these injured do not have currently an injury to any of the above parts (chest & abdomen) of the body but other parts could be involved.

[28] indicates that zero (no injury) has a positive value because it point outs that these injured do not have currently an injury to any of the above parts (upper limb & lower limb) of the body but other parts could be involved.

Table-6.27 explains "how does the cost of treatment vary across providers?" The relationship between provider group and injury care expenses is found to have a high statistical significance. The chart shows that among those who attended a public health facility spent less than Rs. 1,500 constitute 22.6 per cent in public sector and one (1) percent in private sector respectively. Above those who spent more than Rs. 10,000, 8.6 per cent were in public setting and 11 per cent were in private hospitals 7.5 per cent were in the combined group.

Table-6.27

Injury care expenses for injury treatment among different providers

PROVIDER	MEDICAL EXPENSES (RS.)				NON-MEDICAL EXPENSES (RS.)			
	<700	701-2,500	2,501-5,000	>5,000	<700	701-2,500	2,501-5,000	> 5000
Public	73* (25.4)	32* (11.1)	7* (2.4)	32* (11.1)	60* (20.5)	48* (16.4)	22* (7.5)	20* (6.8)
Private	4* (1.4)	6* (2.1)	22* (7.7)	38* (13.2)	11* (3.8)	27* (9.2)	17* (5.8)	15* (5.1)
Public & Private	12* (4.2)	16* (5.6)	12* (4.2)	33* (11.5)	3* (1.0)	16* (5.5)	29* (9.9)	25* (8.5)
Total	89 (31.0)	54 (18.8)	41 (14.3)	103 (35.9)	74 (25.3)	91 (31.1)	68 (23.2)	60 (20.5)

6.3.2.5 Gap between recommended and actual interventions

Table 6-28 describes difference between recommended health care interventions and actual interventions undertaken by the injured which is alternatively called patient compliance. Majority of the recommended interventions were undertaken by the injured. Since the gap between recommended interventions and actual interventions is the least, it is assumed that the total cost of treatment in both situations would be more or less same. In the case of physiotherapy, the gap between prescribed and actual care is maximum in case of physiotherapy.

Insurance status: Formal insurance coverage status to protect against cost of medical care was available to 1 per cent (3) of the population while 99 per cent (299) of the study subjects did not have insurance coverage. Three individuals were supported by insurance between Rupees 5000 - 10000 and such the benefits of insurance were not available to a large majority and so insignificant.

Table-6.28

Proposed treatment and actual treatment received by the injured

VARIABLE	RECOMMENDED INTERVENTION	UNDERTAKEN INTERVENTION
OP days	165 (100.0)	165 (100.0)
IP days	213 (100.0)	210 (98.6)
X-rays	231 (100.0)	231 (100.0)
Scan	117 (100.0)	115 (98.3)
Medicines	260 (100.0)	260 (100.0)
Dressing	221 (100.0)	221 (100.0)
Surgery	61 (100.0)	56 (91.8)
Physiotherapy	75 (100.0)	14 (18.7)

6.3.3 Injury care expenses and their major determinants

The results of the binary logistic regression indicate that injury care expenditure. (Table 6.29). Firstly, the relationship between age group and gross injury care expenses were not having any definite pattern and so, was not incorporated in the final analysis. Secondly, it was also found that the low income groups had incurred lower injury care expenses compared to the higher income groups. Thirdly, when compared to those who had undergone surgery, non-surgery groups spent lesser amount for injury management. Fourthly, injury cases having a less serious injuries spent lesser amount for injury care. Finally, when compared to cases who utilized both public and private sector hospitals for the current episode of injury spent lesser amount in public settings compared to private sector.

Table 6. 29

Relationship between injury care expenses and major determinants

Results of binary logistic regression

Variables	Beta Constant	Standard Error	Level of Significance	Odds Ratio	95.0% C.I. for Odds Ratio	
					Lower	Upper
Gender	-0.632	.758	.405	.532	.120	2.349
Monthly HH income	-1.942	.574	.001	.143	.047	.442
Injury severity of different body parts						
Head, Neck, Spine & Face (Moderate)	-3.561	1.203	.003	.028	.003	.300
Head, Neck, Spine & Face (Severe)	-4.284	1.252	.001	.014	.001	.161
Chest, Abdomen (Moderate)	-1.510	.859	.079	.221	.041	1.188
Chest, Abdomen (Severe)	-.157	1.024	.878	.855	.115	6.358
Limbs (Moderate)	-1.759	.838	.036	.172	.033	.890
Limbs (Severe)	-.853	.620	.169	.426	.126	1.436
Provider						
Public source only	-3.350	1.867	.073	.035	.001	1.362
Private source only	-3.957	1.885	.036	.019	.000	.769
Duration of treatment						
< 24 hours	-7.766	1.354	.000	.000	.000	.006
1 - 7 days	-.886	.590	.133	.412	.130	1.311
Cases who underwent surgery	-.464	.661	.483	.629	.172	2.298

Constant	11.554	2.709	.000	1.042E5		

6.4 Section-4: Decomposition of the financial burden

6.4.1 Provider side factors

Having seen the major determinants of cost of treatment, the attempt now on is to identify and explain the different welfare losses inherent in the financing of injury care by the injured. As mentioned elsewhere, the major welfare losses would addressed under the given headings:

- Inefficiency at the provider level
- Mediflation
- Supplier-induced demand
- Costs of health care financing method.

6.4.1.1 Inefficiency

> *"Inefficiency is akin to a torn rice sack. If the holes are not identified and sealed/mended, it would be impossible to fill the sack. In a similar way, unless inefficiencies are identified and eliminated, resources will keep on leaking out of the health care system. And thus, reducing the extent to which health systems are able to achieve goals of health status improvement, responsiveness to client's rational expectations, and fairness in health care financing".*
>
> - The World Health Report 2000

Table-6.30 is a description of the amount of time patients had to wait to receive treatment once they report at the facility and exploring the difference between various providers and different levels of care. In the first point of contact, on average, about 41 per cent of the injured had a waiting time of less than 5 minutes and 48 per cent had to wait between 6 – 10 minutes and more than 11 per cent had to wait for more than 10 minutes. Among the patients who attended a public facility as first point of contact, 17.8

per cent had to wait for less than 5 minutes and an additional 27.7 per cent had a waiting time between 6 to minutes and 7.2 per cent had to wait for more than 10 minutes in a public facility.

Table-6.30

Waiting time to commence treatment at different health facilities

TIME IN MINUTES	1ST CONTACT POINT			2ND CONTACT POINT			3RD CONTACT POINT		
	Public	Pvt.	Total	Public	Pvt.	Total	Public	Pvt.	Total
<5	47* (17.8)	61* (23.1)	108 (40.9)	24** (19.5)	24** (19.5)	48 (39.0)	13 (56.5)	7 (30.4)	20 (87.0)
6-10	73* (27.7)	53* (20.1)	126 (47.7)	38** (30.9)	15** (12.2)	53 (43.1)	3 (13.0)	--	3 (13.0)
>10	19* (7.2)	11* (4.2)	30 (11.4)	16** (13.0)	6** (4.9)	22 (17.9)	--	--	--
Total	139 (52.7)	125 (47.3)	264 (100.0)	78 (63.4)	45 (36.6)	123 (100.0)	16 (69.6)	7 (30.4)	23 (100.0)

significant at 0.041 level* * significant at 0.047 level*

Among those who had a private facility as first point of contact, 23 per cent of the injured had to wait for less than 5 minutes while an additional 20 per cent had to wait between 6 – 10 minutes and 4.2 per cent had to wait for more than 10 minutes. In the second point of contact, about 19.5 per cent had a waiting time of less than 5 minutes while an additional 31 per cent had a waiting time between 6 – 10 minutes and 13 per cent above 10 minutes in a public facility.

When the above analysis is repeated at disaggregated level (Table-6.31) as well, there exists a slight advantage for private health facilities over their public counterparts.

6.4.1.2 Waiting period of injury cases requiring surgery

The minimum waiting period for elective surgery is one day and maximum 32 days. The average waiting time for elective surgery is 12 days (SD 8.678). Mean pre-surgical length of stay in public hospitals was 15.7 days having a range of 5 to 32 days and the pre-surgical length of stay in private hospitals is 5.4 days with a range of one day to 20

Table-6.31

Waiting time to commence treatment at the study hospitals[29]

	WAITING TIME (IN MINUTES)								
Hospital	**1st contact point**			**2nd contact point**			**3rd contact point**		
Code	**<5**	**6-10**	**>10**	**<5**	**6-10**	**>10**	**<5**	**6-10**	**>10**
1.1	12 (4.5)	41 (15.5)	9 (3.4)	18 (14.6)	24 (19.5)	13 (10.6)	9 (39.1)	3 (13.0)	--
1.2	4 (1.5)	4 (1.5)	4 (1.5)	--	8 (6.5)	--	4 (17.4)	4 (17.4)	--
1.3	--	--	3 (1.1)	--	--	--	--	--	--
1.4	--	--	3 (1.1)	--	--	--	--	--	--
1.5	--	6 (2.3)	--	3 (2.4)	3 (2.4)	--	--	--	--
1.6	3 (1.1)	3 (1.1)	--	--	--	--	--	--	--
1.7	6 (2.3)	6 (2.3)	--	3 (2.4)	--	--	--	--	--
1.9	3 (1.1)	3 (1.1)	--	--	--	--	--	--	--
2.10	4 (1.5)	11 (4.2)	4 (1.5)	8 (6.5)	12 (9.8)	--	--	--	--
2.11	3 (1.1)	--	--	6 (4.9)	3 (2.4)	--	3 (13.0)	--	--
2.12	4 (1.5)	3 (1.1)	--	4 (3.3)		--	--	--	--
2.13	8 (3.0)		--	--	--	--	--	--	--
2.14	9 (3.4)	1 (0.4)	--	--	--	3 (2.4)	--	--	--
2.15	--	--	--	3 (2.4)	--	--	--	--	--
2.16	--	--	--	3 (2.4)	--	--	--	--	--
1. 21	19	10	--	--	3 (2.4)	3 (2.4)	--	--	--

[29] All prefixes starting with one (1) means that it is a public health institution and prefixes starting with two (2) implies a private medical institution.

	(7.2)	(3.8)							
2. 22	33 (12.5)	38 (14.4)	7 (2.7)	--	--	3 (2.4)	--	--	--
Total	108 (40.9)	126 (47.7)	30 (11.4)	48 (39.0)	53 (43.1)	22 (17.9)	16 (69.6)	7 (30.4)	--

days. The minimum waiting time for emergency surgery is 3 hours to a maximum of 5 hours. The average waiting time is 3.95 hours for emergency surgery.

6.4.1.3 Pre-surgical length of stay of the injured

Table-6.32 displays the waiting time for elective surgery among different providers. This is also called pre-surgical length of stay because the injured is not discharged but kept in the hospital itself for surgery at a later date. Among those who have been subject to surgical intervention, 62.4 per cent were done in a public hospital while the rest were undertaken in private facilities. As a whole, about 28.5 per cent of the patients had a waiting time of one day, while an additional 17.6 per cent had a waiting time between 2 – 10 days and 55.4 per cent had a waiting time in excess of 10 days. Disaggregated results show that 12.3 per cent of all cases had a pre-surgical length of stay 2 – 10 days and 50 per cent had a waiting time over 10 days in public sector hospitals.

Table-6.32

Waiting time (pre-surgical length of stay) for elective surgery at different health facilities

PROVIDER	NUMBER OF INJURED WITH WAITING PERIOD			
	1 Day	**2-10 Days**	**> 10 Days**	**Total**
Public	--	7 (12.3)	29 (50.1)	36 (62.4)
Private	16 (28.5)	3 (5.3)	3 (5.3)	22 (37.6)
Total	16 (28.5)	10 (17.6)	32 (55.4)	57 (100.0)

Among all, 28.5% of total cases had to wait for a day in a private hospital, while another 5.3% had to wait between 2 – 10 days and another 5.3% above 10 days in private sector.

Table-6.33 shows that about 67% of the injured who had a surgery had to remain in the hospital for 2 – 10 days after the surgery, while more than 33% of the patients had an average post-surgical length of stay of more than 10 days. When analysed across providers, about 61% and 76% of surgical cases had a length of stay between 2 – 10 days in public and private hospitals respectively and about 39% of surgical cases in public sector and 24% in private sector had a post surgical length of stay of more than 10 days.

Table-6.33

Post-surgical length of stay at different health facilities

PROVIDER	NUMBER OF INJURED WITH WAITING PERIOD		
	2-10 Days	> 10 Days	Total
Public	22 (61.1)	14 (38.9)	36 (62.4)
Private	16 (76.2)	5 (23.8)	21 (37.6)
Total	38 (66.6)	19 (33.4)	57 (100.0)

Table-6.34

Relationship between surgery & length of stay at different health facilities

LENGTH OF STAY	NUMBER OF INJURED UNDERGONE SURGERY				
	No surgery	<7 days	8-15 days	>15 days	Total
2-7 days	79 (41.6)	--	--	--	79 (41.6)
Above 7 days	53 (27.9)	16 (8.4)	23 (12.1)	19 (10.0)	111 (58.4)
Total	132 (69.5)	16 (8.4)	23 (12.1)	19 (10.0)	190 (100.0)

Among all the hospitalized injury cases, about 70% did not have a surgical intervention and the rest had undergone a surgical correction (Table-6.34). Among the total cases, 8.4% of the surgical cases had a hospital stay less than 7 days, while 12% had a length of stay between 8 – 15 days and a 10% had a length of stay of over 15 days due to surgery.

6.4.2 Observations

The relatively small size of the private hospitals in the study did not permit an exhaustive analysis on the relationship between some critical variables.

Many injured under observation in hospitals and inpatients reported that they had a sub-optimal length of treatment at public facilities with a high occupancy rate. However, the over-crowding at the facility prompts them to leave the health facility. The average space available per patient is very limited in the studied tertiary level public hospitals. Many of the reported dissatisfaction in the public facility are due to: a) non-availability of adequate information regarding service availability and b) non-availability of beds and associated amenities like wheel chair and trolley etc. On the contrary, many patients in the private hospital reported that they were being over treated (more than required length of stay); while patients from public hospitals report they are being under-treated.

There existed wide differences in the utilization rates of hospitals. Public hospitals of secondary curative and tertiary care centres had a bed occupancy rate (BOR) more than 135%. However, hospitals below the sub-district level were having an average bed-occupancy rate of 70-80%. Private hospitals have shown wide variation in bed occupancy ranging from 50% to 98% and hospitals with lower prices were found to have a bed occupancy rates close to 100%. However, probed further, we found that objective of the hospital was more important in pricing of services. When decomposed further, private hospitals having lower bed occupancy were found to have higher prices and the reverse situation could not be found. That is, some private hospitals having a BOR of more than 80% were found to have higher prices probably suggesting that the type of market (*read* degree of market imperfection) is more important than utilization.

One of the expected associations between financial burden of treatment and price of treatment of for-profit private health facilities was that, with large scale hospitals would tend to have lower price of treatment compared to the smaller health facilities as bigger ones would be able to utilize economies of scale and scope better. The lower average cost of producing services in turn would reflect as lower prices for the patients. However, this hypothesis has been found to be weak, as price of treatment increases with size of the hospital and in contrary, medium-sized health facilities have lower price of

treatment. The above phenomenon probably asserts the fact that with increasing size the monopolistic behaviour of the hospital in question leading to increased mark-up for the hospital or employees.

Year of establishment was found to be a significant factor influencing cost of treatment. Hospitals with facilities having a recent addition cost more than the normal. In other words, cost of treatment is higher in hospitals and facilities that have been set up recently. This is probably due to the fact that facilities set up earlier would have received majority of the returns from capital invested.

Surgical patients were predisposed to suffer from a higher degree of inefficiency in public hospitals compared to non-surgical cases. Surgical cases were having a longer than required pre-surgery length of stay which inflated the financial burden of treatment on the patients. Non-surgical cases were having a less than optimal length of stay in public hospitals of higher levels.

6.4.3 *Mediflation*

In order to estimate the *mediflation* component associated with treating road traffic injuries, the following methods were adopted. The price levels of majority of the medical goods used for treating injuries were analysed. The study has analysed the mark-up levels of some standardized medical goods only. The medical goods were divided into:

1 Medicines
2 Diagnostics

6.4.3.1 Medicines

Table-6.35 shows the retail market prices of different medicines which are primarily used for injury management at across health facilities. It is found that medicines in different setting have wide differences in the selling prices. For example, there exists an average difference of 43.7 per cent in retail-mark-up ranging from 8.9 per cent to 148 per cent for some medical commodities.

Table-6.35

Retail selling prices of medicines in different settings

DRUG SELLER

NAME OF MEDICINE	PUBLIC	PUBLIC	PRIVATE	PRIVATE	PRIVATE	PRIVATE	DIFFERENCE BETWEEN HIGHEST & LOWEST (%)
Injection					**Prices (Rs.)**		
Voveran	**10**	**10**	**11.6**	11.24	11.5	11.35	11.6
Rantac	**3**	**3**	**3.81**	3.23	3.80	3.55	27.0
TT	7	**5**	7.15	**7.8**	7.25	7.75	56.0
Ampicilin	**8**	9	16.8	13	**17.8**	14	123.0
GM 80	**5**	6	6.3	**6.92**	6.5	6.90	38.4
Tramadol	11	**10**	14	14.5	**15**	14.25	50.0
Tetglob	**400**	410	445	450	**455**	440	13.8
CP 10 L	**6**	**7**		6.5	6.90	6.85	16.7
Ampoxin		**11**		12.50	**13.5**		22.7
Tablet							
Megapen500	1.85	**1.8**	**1.96**		**1.96**		**8.9**
Rantac 50	0.46	**0.25**	0.5	0.52	0.6	**0.62**	**148.0**
Lyser D	**5**	**5**	6.27	6.28	6.25	**6.35**	27.0
Ciplox	7.7	**7**	8.66	8.57	8.61	**8.75**	25.0
	Average difference 43.7						

The retail prices of different diagnostic (scans, x-rays) items at different settings are depicted in the Table-6.36. Average difference in the selling price (after controlling for quality of the diagnostic input and output) of diagnostics is about 297% with a range of 33.3% - 500% inclusive of both public sector and private sector diagnostics market. However, the difference in selling price of diagnostics narrowed down to an average of 56.12% with a range of 25% - 92.3% when the private sector diagnostics alone was included.

Table-6.36

Selling prices of diagnostic services in different settings

NAME OF THE ITEM	PUBLIC	PUBLIC	PRIVATE	PRIVATE	PRIVATE (NOT-FOR-PROFIT)	PRIVATE	DIFFERENCE BETWEEN THE HIGHEST & LOWEST (%)
				PRICES (RS.)			
CT Scan* (Head)	**600**	1,320	2,,000	**2,500**	1,300	2,100	316.7
MRI Scan* (Head)	--	5,500	**6,000**	5,500	--	**4,500**	**33.3**
US Scan*	**150**		**500**	**500**	400	450	233.3
X-ray** (Chest)	**30**	45	100	150	107	**180**	**500.0**
X-ray** (Others)	**30**	35	100	125	107	**150**	400.0
					Average difference		**296.7**

** Without contrast (plain)* *** Normal film size (from permanent machine)*

6.4.4 Supplier induced demand

The appropriateness of treatment prescribed by the provider and utilized by the patient is evaluated in the following way. For a specific case of injury, a panel of physicians from both public and private sector (including GP, Orthopeadician, General Surgeon and Neurosurgeon) were requested to prepare a treatment protocol ranging from minimum appropriate prescriptions to maximum appropriate prescriptions. Appropriate expenditures to take care of the prescription were calculated. In this under-consumption or under-prescription of treatment as well as over treatment were taken care of. While

analyzing the treatment pattern and utilization, the setting (public/for-profit/not-for-profit) in which the care had been delivered as well as the level of health care provider was also taken note of.

6.4.4.1 Service intensity across providers

Service intensity was measured using quantity of different medical services prescribed and used in the treatment process finds that private sector has a higher level of service intensity when compared to the private sector, even when the length of treatment for inpatients is higher in public hospitals. Table-6.37 gives a brief idea regarding the intensity of medicine use (measured as total doses of medicines consumed per person) for the injured who had utilized the services of a private health unit, public health facility and at least one private and public health facility. More than 76% of the patients who received less than 10 doses of medicines are in the public sector, and 17% in private sector. In rest of the rows, public as well as private sector shows more or less similar consumption levels. However, as given elsewhere, since the length of stay is longer in public hospitals and it could be expected to have a higher level of prescription. But the private sector, despite its relatively lower length of stay showed a higher intensity in medicine consumption.

Analysis of service intensity based on the recommendation and use of scan across public and private providers finds that 51.8% of the entire scans were recommended by public sector (Table-6.38). While 29.1% of scans were prescribed by private health services and 19% by public and private sectors together. However, when broken up, the fraction of cases where more than one scan is recommended and used in the private sector. For example, more than 55% of the cases who had more than one scan are in the private sector followed by public and private sector together.

6.4.5 Household coping costs

Even in utilisation of health services is maintained, it is essential to know if this is being achieved by reductions in other aspects of well-being, for example, by asset sale, or reduced expenditure on food items or education, or by individual sacrifices made by

some members of the household, for example by mothers on behalf of their children (Lucas & Nuwagaba 1999). Loan with interest formed the most significant source for financing injury care expenses of all groups, but the richest quartile (Table 6.39). About 73% of the entire resources to pay for injury have come from loans for the poorest income group, while 74% for the second quartile and 83% for the third income quartile and for the richest loan with interest constituted 18% while loan without interest contributed 38% of all resources.

Table-6.37

Proportion of medicine prescription across providers

MEDICINES (QUANTITY)	PUBLIC	PRIVATE	PUBLIC & PRIVATE	TOTAL
< 10	67 (76.1)	15 (17.0)	6 (6.8)	88 (33.8)
10-25	15 (45.5)	15 (45.5)	3 (9.1)	33 (12.7)
26-50	22 (40.0)	15 (27.3)	18 (32.7)	55 (21.2)
51-100	8 (19.5)	10 (24.4)	23 (56.1)	41 (15.8)
> 100	22 (51.2)	12 (27.9)	9 (20.9)	43 (16.5)
Total	134 (51.5)	67 (25.8)	62 (22.7)	260 (100.0)

Table-6.38

Proportion of scan prescription across providers

NUMBER OF THE INJURED				
Scan (Number)	**Public**	**Private**	**Public & Private**	**Total**
1	54 (49.1)	21 (19.1)	15 (13.6)	90 (81.8)
2	3 (5.3)	11 (10.0)	6 (5.5)	20 (18.2)
Total	57 (51.8)	32 (29.1)	21 (19.1)	110 (100.0)

Box-1

Participant observation - following a case

This is the result of the analysis undertaken using a protocol with the help of the tool – "Participant Observation Form". One patient each with head injury (forehead) was taken to a hospital A (a private hospital) and (hospital B) a public hospital respectively. Both the hospitals are referral centres and as such provide advanced care. One hospital with a bed occupancy rate of more than 170 per cent and another with a bed utilization rate close to fifty per cent.

Clinical condition of both the patients

Normal blood pressure and pulse rate and no loss of consciousness and history of vomiting; Physical examination revealed that a wound on the skull and no other external injury; No ENT Blooding and the Glasgow Coma Scale (GCS) was 15/15.

Interventions

In hospital A, the injured was admitted for two days and was advised a CT scan and medicines and wound debridement.

In hospital B, the patient was advised observation for a period of five hours and advised routine medicines. Wound debridement was undertaken and a CT was advised, only if GCS worsens, which has not happened either.

Clinical assessment

Hospital A advised a CT Scan to the patient without any medically justified reason, because objectives conditions like no history of vomiting, no ENT blooding, adequate GCS were found. There is also no apparent reason for admission and the patient could have been treated as out-patient with some extended hours of observation.

Hospital B has gone almost close to the criteria of medically justified interventions. However, there was a delay in getting treatment at fast speed, and the crowded state of the observation room probably led the physician to prescribe five hours of observation which could be extended for about 10 hours.

In order to assess the question of supplier induced demand more closely, we have used a case study of typical cases from different settings and the results are indicated in box 1. We had gathered more cases for the study, but result of only one is analysed here.

Table-6.39

Sources of financing injury care expenses

INCOME QUARTILE	CURRENT INCOME	SAVINGS	LOAN WITHOUT INTEREST	LOAN WITH INTEREST	SELLING OF ASSETS	INSURANCE	EMPLOYER	OTHERS	TOTAL	RATE OF INTEREST (PER MONTH
<2475	8.2	3.7	23.1	49.5	0.0	0.0	0.0	14.7	100.0	3.55
2476-4000	4.6	4.5	25.1	49.2	0.8	0.0	2.6	13.6	100.0	4.42
4001-6000	3.1	3.3	16.4	66.7	5.9	0.0	1.2	11.3	100.0	3.09
> 6000	3.8	15.3	38.1	18.1	6.3	3.7	2.7	13.2	100.0	2.64

Table - 6. 40

Rates of interest on loans for financing injury care

MONTHLY INTEREST RATE	ANNUAL INTEREST RATE	NUMBER OF INJURED BORROWED (%)
0	0	89 (38.7)
2	24	27 (11.7)
5	60	54 (23.5)
10	120	37 (16.1)
15	175	14 (6.1)
20	240	9 (3.9)
	Total	230 (100.0)

Table-6.40 shows the actual monthly and extrapolated annual interest rates paid by the injured when borrowing was undertaken. Of those who borrowed, 39% obtained interest-free loans, while the rest had to borrow at annual rates ranging between 24% and 240%.

This chapter has made a detailed analysis regarding the components and determinants of financial burden of treatment. It also decomposed some of the critical issues in injury care expenses including catastrophe and differential burden across income groups.

CHAPTER-7

7 ANALYSIS OF RESULTS –DEMYSTIFYING THE HOUSEHOLD FINANCIAL BURDEN

The focus of this study has been on the household out-of-pocket spending on road traffic injuries, which, for some people, reaches the level of catastrophe depending on the severity of the injury and on household preparedness to face such uncertain events. This study attempted to demystify this financial phenomenon faced by many households in a state like Kerala, one of the injury-prone State. Given the context of galloping out-of-pocket spending on health in India and more particularly in Kerala, a state that leads with the highest proportion of out-of-pocket payments, such a study throws up findings that would help policy makers to devise new strategies to reduce the reliance on this highly unorganized and impoverishing form of financing health.

This chapter discusses the results of the present study in the context of other existing hypotheses, theories and findings. The results essentially pertain to economics and epidemiology of road traffic accidents and associated injuries. The chapter is organized into two parts - findings in relation to the existing knowledge and issues related to financial burden such as inefficiency, *mediflation*, supplier-induced demand and coping.

7.1 Ruralisation of injuries and urbanization of facilities

In Kerala, there has been an increasing incidence of road traffic accident and associated injuries thus increasing the financial burden of the households in a state where the reliance on household out-of-pocket payments is already high. According to some newspaper reports, total number of fatalities in 2007 has surpassed the last year's total by the month of October indicating an annual increase of about 20 per cent. It is also clear from the data that Kerala has been experiencing a progressive *ruralisation* in road accident pattern with majority of them taking place in district and other roads although the incidence per km. is still highest in national highways. From health system point of view, the study confirms that 75 per cent of the injured hailed from rural areas but the majority of the injury care facilities are located in urban areas. This probably indicates

the rural-urban continuum in Kerala and the resultant traffic congestion due to frequent internal mobility of people.

Since majority of the accidents were the outcomes of head-on collisions and in straight roads, the results call for an increased investment in road safety methods such as provision of dividers specifically in roads where the traffic volume is significantly bulky. Also, safe driving practices like usage of helmets and seat belts were reported to be pretty low or insignificant.

7.1.1 Misleading statistics

Also, more than 99 per cent of the accidents were reportedly due to the mistake of the drivers when evidences from studies found that it cannot exceed 60 per cent. In addition, the state official statistics does not even report age and sex of the RTA victims, the nature of road, etc. Further, alcohol use among accident victims, as reported by the study sample, was found to be much lower compared to the general alcohol use prevalence of 58 per 1,000 male population in the state. The treating physicians also reported that more than 60 per cent of the RTA cases might be under the influence of alcohol. Since recording of alcohol use is practically difficult in a heavily crowded casualty department and since accurate recording may affect the insurance claim of the injured, physicians generally under-report the usage of alcohol. Alcohol consumption has been estimated to increase the possibility of suffering severe injuries or death in an RTA, no matter gender, age or weight (Trevino-Siller et al 2005). Similarly, the reported time of accidents shows a uniform tendency throughout the day as against the popular perception that accidents, especially the fatal ones, occur during late nights or afternoons. Hence, the state's official statistics appears to suffer from a number of inadequacies.

7.1.2 Physical burden

It is often found that severity of road traffic injuries is higher (NSSO 2004) where hospitalization rate is one of the highest. Our study also found that about 80.5 per cent of the injured were having at least one reported severe injury, and a vast majority of them were hospitalized. In terms of severity (measured as the proportion of illnesses requiring hospitalization to all treated illnesses), injury ranked second in rural and third in urban

areas, next to diseases of skin and subcutaneous tissue, and neoplasm (Gumber 1994). It is also important to note that more than 76 per cent of the injuries were categorized as 'grievous' by the official statistics and hospitalization rate is very high (SCRB, 2005). However, this phenomenon also needs to be viewed in the context of existing legal and economic incentive structure as well beyond the medical objectives. Studies attest that the relative risk of transport injuries was three time higher in those with manual labour as a profession, compared with those in the service sector (Ghaffar A et al 1999) and the severity also higher across other countries including Ghana (Afakaar et al 2003).

As majority of the injured constitute two-wheeler riders, it is not surprising to find that limbs especially lower limbs were mostly affected followed by head injured. Interestingly, there exist differences between the body part affected between developing and developed country. For example, studies from India including the present one demonstrates that limbs are the most affected body part (Mavlankar 1999) followed by head while a study from Denmark found head and neck were mostly affected (Dano 2005) probably suggestive of the situation that in the former majority of the injured are two wheeler riders and pedestrians while in the latter most are car occupants. Since the study did not include fatal crashes, and so there is a possibility that life threatening injuries to head, chest, spine etc might have died even before attending a health facility.

Though around 40 per cent of the injured responded that they had loss of consciousness (LOC) of moderate and severe degree, the case records had shown that it was present in less than 10 per cent. In economics, this has two major implications. Firstly, it shows that during injured (consumer) is not able to exercise rational choice regarding selection of provider, spending capability etc. Secondly, this also shows the wedge between technical guidelines for recording LOC and perceived LOC by the injured.

7.1.3 Socioeconomic profile of the injured

Studies reported that the poor have a higher road accident death incidence in both urban and rural areas; vulnerable road users such as auto rickshaw drivers accounted for the vast majority of those killed and seriously injured, especially in urban areas in Bangladesh, India and Pakistan (Aeron-Thomas et al 2004, Ghaffar 2005). This study affirms that the vast majority of those seriously injured were male wage-earning

members of the poor households creating a vicious cycle of poverty and indebtedness in those households. Over 75 per cent of the injured were engaged in unorganized sector with casual labour being the single largest occupational group among the accident victims. About 30 per cent of the injured had a monthly household income of less than USD 2 per day. Studies from India and other developing countries also showed similar patterns. The present study, however, included a relatively small proportion of under-14 population probably because paediatric hospitals were not included in the sample.

7.1.4 Injury care seeking

It is interesting to note that with increase in severity public sector hospital becomes the preferred option of the injured. The pattern emerges here is that the share of public and private together treating a patient increases with severity probably because the increased severity is managed by more than one institution, generally. In public health services, the referring of patients may be done according to the assessment of severity of injury by the physician and referral pattern is almost well-defined in public sector and loosely defined in the private sector. The other instances in which public sector used referral pattern were using the possibilities of backward referral (that is, after managing the acute phase of injury, some of the patients were referred back to appropriate lower level health facilities adjacent to their residences which is justified from cost-effectiveness point of view for both the provider as well as the user (efficiency and equity gains). There were many reported instances by the injured that there exists a case selection pattern by some private health facilities who select cases (Gumber 1994) and generally do not accept and treat road traffic injury cases because of the assumed medico-legal complications. Within public sector itself, there might be a likelihood of selection of cases by the lower level health care facilities and referring it to the higher level facility though no concrete evidence could be found by the researcher on this aspect of the referral. If former is the case, it is not advisable because the injured might get worse off in health status terms as well as in economic terms due to over stretching of care seeking process.

Further, regarding the referral pattern across facilities, at least three significant possibilities emerge. Firstly, public sector is a preferred option of seeking care in majority of injury cases probably due to better presence, medico-legal implications, seriousness of the injury, selection of health facility often not by the injured

himself/herself/themselves. Also, government hospitals are usually equipped with diversified services including the surgery, orthopaedics and blood bank which many private hospitals lack (Gumber 1994). Secondly, public sector health care institutions refer more number of cases than private sector, which is a welcome feature if followed based on the ideal conceptualisation of referral system. But it would be disturbing and inefficient for the patient, if the lower level public health units select cases and dump it into a higher level centre. Thirdly, this may also show that the behaviour of some private hospitals to keep cases beyond requirement at the facility itself, which was reported by many cases.

As far the choice of facilities and consequent economic outcome of the injury care seeking process is concerned, it is interesting to note that both the dynamics of monetary costs and time costs play a crucial role in choosing the different points of contact by the injured. In the initial stages of care seeking, more than 65 per cent sought care due to proximity reasons indicating that minimization of time costs as the dominant reason. Research finds that travel time functions as a price in determining the demand for medical services when free care is available (Acton 1975). Delay in time can cost the patient both in terms of reduction in the health status as well as increase in the curative and associated expenses later on. Better spread of both public as well as private medical institutions help in the injured reaching health care facilities on time. However, it would be too simplistic to conclude that there exists no differential in care seeking from public and private. The higher income groups consistently chose private health care facilities, if not as first point of contact, at other contact points. This fact is interesting to note, because it clearly highlights the fact that even while seeking emergency care, the economic status of the victim does make a difference with higher income groups consistently chose private health care providers compared to the lower income groups whose preferred option is a public health care facility. Once the most acute phase of injury care is over, patients think of "health care provider shopping" where economic cost adequately plays its role.

Since much of the road traffic victims chose institutional care rather than individual medical practitioners, scope of doctor-shopping is limited but provider shopping is seen, at least in some cases. Medical care shopping for road traffic injury is defined as the

changing of medical care institutions without professional referral for treating a single episode of road traffic injury. The reason for shopping may be price (perceived or real) and quality of treatment, among other things. The study could not reach an unambiguous answer for the pattern of shopping for institutions, rather finds that patients from higher socio-economic status chose a higher level private hospital if the quality was perceived to be bad in a public hospital or even private hospital. Poor patients consistently chose public health facilities, assuming availability of health facilities is normal. In some study areas, it was interesting to find that due to the geographical location of a public tertiary care hospital, injury cases had to seek care from a private tertiary care centre which is known for low costs. Poor patients' shopping pattern indicates that (who are already restricted by the poor purchasing power) tend to prefer a higher level public hospital or else adapt to the existing quality of care in the same institution if it is a public hospital.

Some interesting insights about time cost are in order. One of the general concerns is that there exists inequality even in the mode of transportation between rich and poor. For example, rich have better means of transport, and so they are able to reduce the opportunity cost of time of travel. A study from Vietnam (Ensor & San 1996) finds that rich households are able to use faster modes of transport (motorcycle than bicycle or walking). However, this type of inequities in transportation of health care is not visibly noted in the present study, probably due to better spread of public and private health care institutions.

Regarding the average distance travelled by the injured to seek medical care, it is comparatively less especially in the care of an emergency event like road traffic injury which is obviously a welcome feature of the State. However, how far does it differ based on geographical region is a matter of to be probed further. Coupled with this, we observe that injured in *Idukky* district are less favourably placed as majority of the injured from this district reported that they do not have a health care facility within a 3 km radius from their houses, which is borne true by the official data set as well. It is also crucial to note that due to better spread of both public and private health care facilities in most districts studied, majority of the injured have been able to reach within the 'platinum hour' and 'golden hour'. However, a number of injured reported that they had to lie unattended for not too short time. It is essential to look at options on the possibility of avoidance of

acceptable delay in shifting the patient to receive appropriate medical care. It is also disturbing to note that no patient was shifted from any of the voluntary ambulance services in the studied districts, though two districts had wide presence of them. Transfer of the injured from the accident spot to the health facility was mostly done by means of unscientific mode of patient transfer, say, auto-rickshaws and cars and hardly ambulance vehicles rescued any of the injured. It calls for strengthening vehicles with appropriate life support systems. Besides, on the availability of first aid, a 98 per cent were not in receipt of any form of first aid at the site of accident which is quite disturbing. However, this may be due to the fact that health care facilitates are laterally distributed.

As far as the mode of transportation to health care facility is concerned, almost all the injured were transported by car or auto *rikshaws* at least till the first point of contact. From first point, more number of patients was transported by ambulance to higher centres of care. In a number of cases especially in national and state highways and cases that were not attended to by any help, the police shifted them to some health care facility. However, what is expected from the police force in such events and how much actually they achieve is a question to be analysed along with. Before concluding anything regarding the accessibility to appropriate emergency medical services to the injured, it would be important to look at the fatalities associated with road traffic injuries, which the current study did not attempt to, a limitation of the current study from this perspective.

7.1.5 Treatment duration

Duration of treatment has demonstrated an unambiguous positive association between total injury care expenses incurred. Duration of treatment across providers and different points of health care contact illustrate that, as expected, first point of contact had the lowest cost of treatment probably reflecting: the short length of stay of critical as they would be referred upwards, less serious injuries may need the services of basic medical care consumption and mostly health facilities with small size and minimum infrastructure, In the second point of contact, majority of the injured were treated as inpatient and the length of stay was generally longer than the first point of contact implying severity of injury, assuming other things remain constant. Third point of contacts had almost all administered hospitalised treatment with more than 63 per cent having a length of stay of more than 11 days indicating that injured came to a third

facility probably indicating the seriousness of the injury or absence of adequate health care infrastructure at the lower levels or higher cost of treatment of the lower level facilities.

Secondly, with regard to choice of health care facilities cases having shorter duration of treatment as well as higher duration of treatment were in a public institution. This phenomenon is interesting to observe and perhaps suggestive of the reasons:

(i) Public hospitals try to treat as many cases in an ambulatory setting as possible due to the overcrowding in wards and in many cases an under-treatment could not be ruled out;

(ii) Among those admitted, surgery cases had a higher length of stay skewing the length of stay picture;

(iii) Non-surgery cases had lesser length of stay.

Private medical institutions had less variance in length of treatment across cases showing less severe cases being treated in such institutions or probably higher clinical quality. Evidence also bear out that there exist selection of cases in private health care institutions based on the expected clinical outcome of the patient before admitting him/her (Bennet et al 1994: Sonia 2002). The economic condition of the patient was also a prerequisite for admission in some of the private hospitals in the study. For instance, beyond the public health importance, some of the private hospitals admit cases on the condition that a fixed sum of amount to be deposited prior to treatment. Such ethically unacceptable practices were reported from Thailand as well (Bennet et al 1994).

7.1.6 Bypassing health care facilities

The study observes the phenomenon of bypassing – i.e., when patients reject a closer facility in favor of a more distant health care provider. Quality reflected as specialist being the reason for choosing a distant facility is found in the study quite evidently. Existing literature mostly finds that households bypass public facilities in favour of the private sector (Akin and Hutchinson 1999. We, however, find that for treating road traffic injuries many bypass nearby private health care facilities and lower level public facilities in favour of higher level public sector facilities. In general, studies have found

that bypassing is associated with facility quality (e.g., number of doctors, drug availability etc). However, socio-economic gradient of the individual patient concerned exerts significant influence on the choice between public and private hospitals.

7.2 Household financial burden

7.2.1 Pattern of spending

Generally, it is believed that the cost of treatment and associated resource requirements are high in the initial days and it gradually declines over the later part of hospital stay. The implication on financial burden is that the patient households need to raise resources at a very short notice which can entail heavy sacrifice by them. It is also referred as one of the ugliest faces of uncertainty where households had to over-commit resources beyond their normal capability. The lesser the time available, higher the cost of raising resources and the exorbitant interest charged on the injured stands testimony to this situation.

7.2.2 Financing sources

The sources of financing indicate that all income groups had to depend on external sources of financing to pay for injury care expenses. This probably shows that either cost of treatment is so high that even the richer quartiles find it difficult to manage with own resources or uncertainty associated with incidence of injury left little time for the injured to plan resource requirements. Loan with and without interest constitute more than 70 per cent of all income quartiles barring the richest quartile. It is also important to note that the lower income groups would have to pay a higher interest rate than the higher income groups. The study conceptualised to study the pattern of sales of assets based on optional and core asset classification. However, it could not identify the pattern due to absence of adequate number of cases. Still, it was found that in the initial stages of care, sales of optional assets are common followed by some planning to sell core assets. The poor generally reported that they did not have anything 'saleable'. It seems that the pattern would have been better captured had the study analysed the sales pattern during the rehabilitation phase of injury care.

The lower income groups, on average, would have to pay the highest interest rates while the higher income groups obtained interest at lesser rates. This is expected because giving loans to the lower income groups are more risky (having less or no loanable security) than giving loans to the rich and so, lower interest to the higher income groups. Interest rates for loans for health care payments would be high, as people were more willing to finance productive activities, where there was a reasonable prospect of repayment, than to finance illnesses which simultaneously increased a household's requirement for cash and reduced their earning capacity (Lucas & Nuwagaba 1999). Huge interest payments (above 50 per cent per annum) occur to a large section of the injured while the formal sector interest rates hover around 8 – 10 per cent per year. Formal credit are harder for the ill to seek, because of lack of any collateral, effectiveness of medical care subject to high degree of uncertainty, and so medical loans are treated too risky by lending financial institutions. So, this calls for alternative financing mechanisms covering both medical and non-medical expenses for injury treatment including insurance system having cashless treatment etc.

7.2.3 Injury expenses

Decomposition of components of cost of treatment across income quartiles gives attention-grabbing results. Firstly, it is essentially surprising to note that non-medical expenses constitute a sizeable component in the total expenses especially the expenses on food and travel. For example, for many income quartiles, non-medical expenses outnumber medical expenses. In public hospitals a good number of the injured spent a higher amount on non-medical expenses than medical spending indicating that any public policy for injury management needs to take into account this issue as well so that the total financial burden is limited to a minimum. The higher non-medical expenses in public hospitals are undoubtedly a result of the extended length of stay and which is more or less related with provider inefficiency and high travel costs were often due to extended travel necessitated by more number of referring especially in public health facilities. A number of cases were referred to an upper care centre because of the absence of essential equipment in injury management called X-ray machine. Trauma centres at appropriate places are expected to go a long way in addressing this problem.

Secondly, within the medical expenditure for injury management, surgery expenses constitute the single largest category for all quartiles especially the poorest. The fact that low income groups incurred higher amount as consultation fees for physicians is disturbing to note, given the fact that majority of them sought care from public hospitals. It was elicited from the patient survey that almost all surgery cases, except the ultra poor, had paid 'informally' (unofficially) the operating surgeons and anaesthetists sums to arrange for the surgery on time. None of the surgery cases paid any unofficial payments to the physicians. Patient attendants were the other category who were reportedly given 'informal payments' for transferring the injured from the casualty departments and operation theatres to wards.

7.2.4 Catastrophic payments

The question that "what are the health system features which protect or expose the injured from making catastrophic payments and impoverishing injury care expenses?" is indeed too important a question to be ignored. It is seen that public sector acted as an insulator in a number of cases, but a large majority belonging to the lower income groups made catastrophic levels of expenditure in the public sector. It points to the glaring fact that use of public sector is not 'free', but involves a number of hidden and open costs or access costs. Even the lowest income quartile had to spend substantial amounts in public hospitals. Firstly, it points to the user fee policy of the government and the hospital administration which failed to target all the poor equally which might have protected at least some from facing catastrophe. Secondly, informal payments in the hospital for some category of staff are also responsible for increased financial burden on the injured. Thirdly, a substantial part of the catastrophic treatment expenses especially for the lower income quartiles having undergone surgery was unambiguously contributed by the provider level technical inefficiency.

The present discussion shows clearly the regressive nature of injury care expenses on the lower income groups. As expected, seeking care from private health services inevitably leads to making catastrophic payments. Ideally, in estimation of financial burden of treatment, part of financial support extended by insurance and other external support needs to be deducted. However, only an infinitesimal percentage of the injured had access to such form of economic support, at least at the stage of seeking care, has been

excluded from analysis. Also, it needs to be confirmed that road traffic injury care is a very expensive treatment process, which is attested by some earlier studies as well (Gumber 1994). For example, even the richest quartile spent more than 130 per cent of their monthly income on treating injury, as majority of the richest quartile sought care from private sector which is inevitably a costlier option. We find that there exists both vertical (different income groups spending different amount of money for same category of injury) and horizontal inequity (a given income group spending different amount of money for same category of injury) in injury care payments.

The income lost as a proportion of household income is the highest for the richest income quartile may be due to the reason that they have more often sought injury care from private sources. Impact on the poor is quite high as well, probably reflecting the fact that despite them predominantly preferring public sources of care their average monthly income is too low, but the prices of many medical goods they face have more or less equal prices for both the lower income groups and higher income groups indicating the regressive. The better-off can respond to injuries with adequate consumption of medical goods and services, while the ultra-poor cannot afford to divert resources from the already thin budgets.

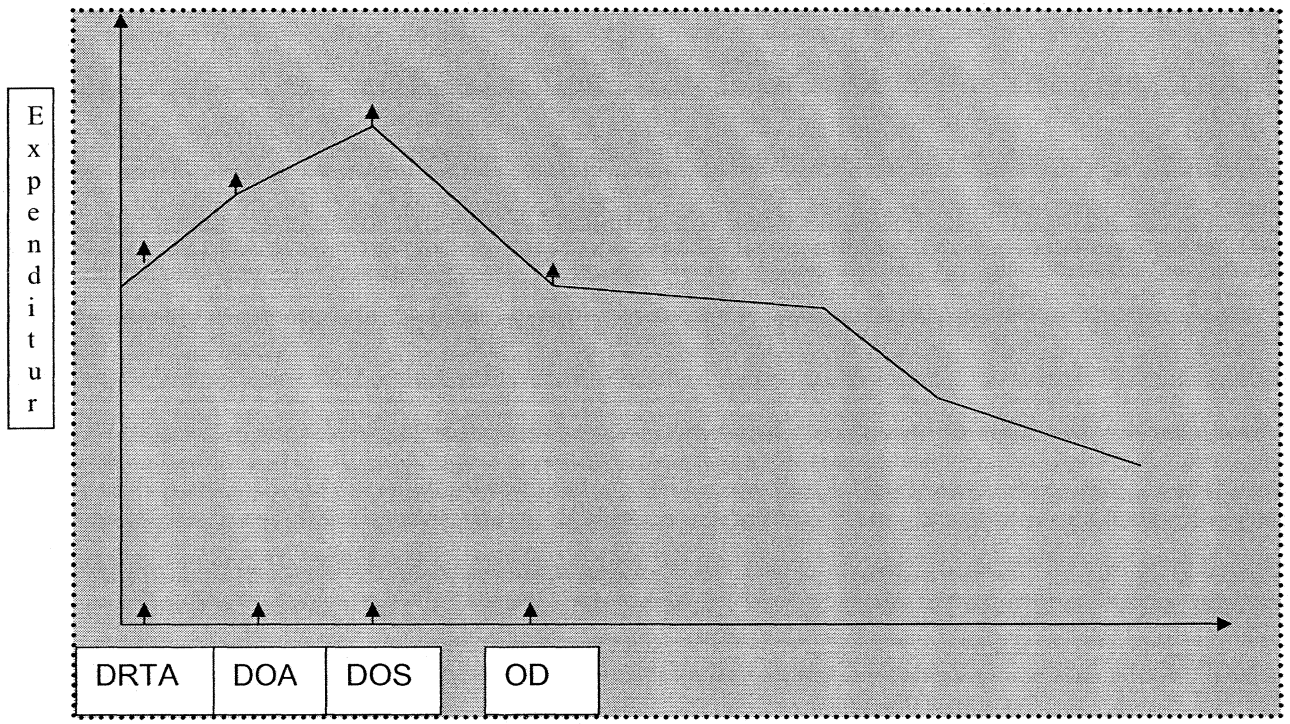
Graded charging in public hospitals is one of the health system characteristics helped reduce the financial burden faced by some RTA cases in possession of BPL cards. However, the informal payments and other unaccounted prices and non-availability of many services in public hospitals had imposed demands on the budget of the lower income quartiles. Private medical institutions were found to have no cross-subsidization in prices except some not-for-profit medical institutions. There is one study indicating a comparatively higher rate of reduction in price of treatment for the lower income groups compared to the higher income groups in Bangladesh but bulk of those who received major discounts were high occupational groups (Amin et al 2004). Also, a Philippines study demonstrated no cross subsidization for the poor (Gertler and Solon 2002). Some private diagnostic firms used price discrimination as a trade strategy to charge lower prices from some of the poor patients who are referred by some specified physicians and medical institutions.

7.2.5 Cost components

Figure-7.1 is the graphical representation of the pattern of resource requirements after the event. Expenditure demands start at an unexpectedly higher plane on the day of accident and increases steeply on the day of admission (for IP cases, the day of RTA and date of admission coincides) and reaches a peak on the day of surgery and later goes down.

Figure-7.1

Injury care expenditure pattern



Time progression of injury management (days)

DRTA	Day of road traffic accident	DOA	Day of admission
DOS	Day of surgery	OD	Other days

7.3 Determinants of financial burden

7.3.1 Income

The relationship between income of the injured and total injury care expenses is not unidirectional; it is multidimensional. The richest income quartile and the lowest income

quartile spent proportionately higher amount compared to the other two quartiles. When the analysis was done using per capita income and injury care expenditure as well, the relationship has not undergone any significant changes. It is graspable for the rich to spend a higher amount as expenses are backed obviously by income and also highest income group predominantly sought care from private medical institutions. However, it is disturbing to note the poorest quartile, despite seeking care predominantly from public health care institutions, has spent more in terms of medical expenses compared to the middle income quartiles, which probably indicates that they are not able to 'influence' the providers to get adequate care at right time. Or is it that poor are afflicted with more serious injuries compared to the better off groups? Or are these costs represent "access costs" to receive free care?

7.3.2 Sex

Firstly, total medical expenses of females are less because of their comparatively less severe injuries. Evidences show that women show generally less incidence of injuries as well as less serious injuries (WHO 2004) probably pointing out their lesser engagement with road related jobs (as drivers) and less risky road behaviour. Secondly, as the study finds, provider of care for majority of the females was a public setting which might have an effect on less medical expenditure being incurred on female injured. Whether gender roles played any role in injury care seeking is obviously a question beyond the scope of the study.

7.3.3 Severity

As expected, a detailed analysis regarding the relationship between body part affected and gross treatment expenses do not show a consistent trend. However, injuries to head and face had required greater expenditure. It is to be remembered that this categorization may be problematic because majority of the injured were polytrauma cases and it was not possible for us to collect segregated expenses for each part affected. A consistent trend was not emerging probably also indicative of the fact that we needed to control for the effect of provider. With regard to severity of cases, public medical institutions had consistently received a higher proportion of serious cases across all body parts.

Further than the body part affected, severity of the part affected along with provider might explain the total injury care spending better. Overall, very severe injuries were more or less having higher cost of treatment. We further, to simplify the analysis, body part affected was merged with reported severity of the injury for body parts whose management as well as cost of treatment is similar. Using such an analysis, we find that severity of injury to some parts were generally costlier to treat than some other parts. Moderate injuries to head, neck, face and spine were generally costlier than moderate injuries to chest and abdomen as well limbs. Severe injuries to head, chest, neck and face along with severe limb injuries were generally costlier than chest and abdomen. This comparison may not be rigorously consistent, because the study has not included some very critical injuries to some parts like head, spine, chest and neck which are generally fatal.

7.3.4 Treatment provider

Majority of those who sought care in a public facility spent comparatively less and those who sought care from a private health facility had to incur higher expenses for injury management. Majority of the cases which were seen both by private and public medical institutions spent relatively higher amounts for injury care. The picture becomes clearer when we analyse total injury care expenses in terms of medical and non-medical categories. It is found that those who utilized public facilities had a huge majority spending less on medical goods and services, while majority of those who utilized private sector had a higher concentration of the injured spending higher medical expenses. Higher medical spending in private sector might have been due to the higher prices of medical goods in the private sector vis-à-vis the public sector. Those who utilized the services of both public and private health services for the current episode of injury had generally spent higher amounts as both medical and non-medical expenses. These price differentials across providers reflect at least three things. Firstly, the injury may be more serious requiring the services of different providers and services of any of these institutions are costly. Secondly, transportation of the injured and associated costs may be higher. Thirdly, in relative terms, those who sought care from a public hospital spent more as non-medical expenses and less on medical expenses. Finally, the

possibility that those with serious injuries utilising public facilities spending less could not be ruled out.

The dichotomy in terms of market share between outpatient and inpatient service provision by the public sector is in line with the intention of the governments to protect patients against catastrophic medical expenses and as such access to and usage of inpatient services for treating road traffic injuries is over whereas less resource-intensive outpatient care has been mostly left to private providers. However, this mission is not targeted by the government rather chosen by the patient in the face of uncertainty and higher cost of treatment.

Price discrimination is a critical component in the practice of medicine since time immemorial as part of charity and professional ethics so that the differences in the elasticity of demand are overcome, and inequity in access prevented to that extent. Such features specific to the health system has implications on the financial burden facing the patient as well. In the study, the process of graded charging based on income, though not widespread, were undertaken in public hospitals for the injured in possession of below poverty line (BPL) identity cards. Progressive price discrimination was virtually absent in the private sector, though a few private providers claimed they did.

7.3.5 Under-consumption - gap between recommended and actual treatments

The issue of provider compliance is of immense importance in the overall utilization pattern of the injured because of the equity and efficacy questions of health care consumption involved. When under-consumption of treatment interventions occurs, it affects the effectiveness of the medical intervention and generally delays recovery from injury, assuming the interventions advised are optimal. Even though the prescription pattern of the provider is influenced by the economic status of the injured or his/her insurance status or presence of third party financing mechanisms, there are a number of cases where due to economic constraints where the injured under-consume or even forego the consumption of required medical interventions. The process of un/under utilization of essential and needed interventions affects the patients to incur a higher expenditure (meaning increased financial burden due to delay in treatment) later or worsen the health outcomes immediately or in the long run. Our study finds that the

patient more or less complies with the advices of the physician at least in the hospital setting. Mostly, patients may fail to comply with prescribed medications once they are out of a formal institution like home which may be due to economic reasons or lack of belief in the physician or the system of medicine etc.

Equity literature points out immensely the experiences of different societies regarding under-consumption of medical care and as expected, socially and economically poor often under-consume or forego medical care (NSSO 1995, 2004). The present study found that the gap between what is recommended by the provider and they were more or less followed by the injured. Since the present study was undertaken within a formal institution called hospital and majority of the medical care required were essential in nature, the injured even by over-commitment of resources might have followed all their provider medical advices. Some analyses already found that the socio-economic status of the patient influences the prescription pattern of the provider in which less costly interventions are advised (Muraleedharan 1999). However, though there exists variation in the prescription pattern of medical interventions in the public and private sector, a clear trend could not be observed. In case of physiotherapy, the wedge between what was recommended by the provider and what was actually undertaken by the patient was maximum. Under-consumption of physiotherapy was the highest in public hospitals where there is hardly any provision for administering physiotherapy and unsurprisingly, none of the injured in public hospitals have undertaken them.

7.4 Decomposition of the burden

7.4.1 Provider inefficiency

Public hospitals, in many circumstances, fail to confirm to the neo-classical notion of efficiency which assumes uniform conditions for both public institutions and for-profit private institutions in terms of incentives faced by the providers, the case-mix addressed, social, Geographic and economic status of the users etc. For example, from qualitative analysis, the study finds that patients away from interior rural areas prefer to stay in hospital, because they may not get any attention at home, and staying at hospital ensures them some form of clinical cure and daily living. These patients do not have adequate resources to pay for transportation to report later for a review. In such cases, public

hospitals act as an asylum for large number patients where they would have an abnormal length of stay.

Some of the instances are worth pointing. From the patient face-to-face, a tendency of many private hospitals to advise patients to stay for a longer duration of time has been noted. Such stays has not helped the patients to regain their lost health status, rather deteriorated their injuries and thus, health status. In one case, a patient was forced to stay for five days by a private hospital informing the specialist would be available soon. Finally, the patient made a self-referral to reach a public sector tertiary centre. In another case, a patient with a head injury was admitted in a private hospital, advised two CT scans and made the patient stay for two days on the information that specialist would be attending the case soon. In this case too, the patient made a self-referral to a tertiary care private hospital increasing the financial burden faced by patients. These represent avoidable costs (in economic and health status terms) on the patient by the provider.

The behaviour of some of the public hospitals is also worth mentioning. Sub-optimal treatment is argued out to be one of the features in public sector hospitals especially at the advanced level whose bed occupancy rate is above normal ranges. Secondly, in some cases, patients were discharged assuming that they had their injury rectified, but some patients had to come back with serious illness. Thus the issue of under treatment is primarily a quality question but is indeed an issue of quantity as well which is clearly observed in public hospitals.

Hospitals with lower bed-occupancy are found to have a longer length of stay for injured in both public and private health facilities, which is an expected relationship. In such contexts, exit of health care institutions may improve the operating efficiency of the remaining hospitals in the local health care market (Lindrooth et al 2003). Lidrooth also found that those hospitals in the brink of closure were having a bed occupancy rate of 48 per cent. Process variables such as occupancy rate were suggested as a mediator between these risk factors and the outcome of hospital closure (Kennedy & Dumas, 1983; Longo & Chase, 1984; Lynch & Ozcan, 1994). The low occupancy rates of hospitals at the district level in some developing countries are generally considered as reflecting economic inefficiency (Barnum & Kutzin 1993). The current study gives a similar impression when we find that some of the district level and sub-district level hospitals

have a lower occupancy rate compared to public sector tertiary centres. It is also important to note that hospitals rated as having a better quality were reportedly having a higher level of utilization. The health care facilities in which length of stay is longer would tend to have a per day lower average cost of treatment for similar category of case mix per day because the intensity of services provided is generally less, assuming other things being constant. There is a possibility that the additional stay in the hospital may not make improvements in the health status of the patient and may indicate inefficiencies as well. The inefficiency imposed by the behaviour of such hospitals inflated the financial burden of household unequivocally.

It is important to note that a number of patients can be taken care of effectively at rehabilitation centres which are less resource intensive. However, it is equally important to note that even in the full-fledged treatment phase; patients in many public hospitals are not able to get optimum treatment because of highly adverse patient-staff (doctor, nurse & assistant) ratio leading to overcrowding. As expected, private hospital patients have some advantage over public sector patients in terms of waiting time to start medical treatment after reporting at a health facility. However, there are some cases in both public as well as private settings where there exists wide variation in waiting time. Waiting time in a hospital is not only a question of macro level policy of having adequate doctors, but more importantly an internal management issue where the physician needs to be made available at the time of arrival of emergency patients at right place.

7.4.2 *Mediflation*

The study has analysed the mark-up levels of some standardized medical goods only. Average difference in the selling price (after controlling for quality of the diagnostic input and output) of diagnostics is about 297 per cent with a range of 33.3 per cent and 500 per cent inclusive of both public sector and private sector diagnostics market. However, the difference in selling price of diagnostics narrowed down to an average of 56.12 with a range of 25 per cent to 92.3 per cent when the private sector diagnostics alone is included. The prices of diagnostics remain constant for the last two years except in the public setting.

7.4.3 Supplier-induced demand

Incentives faced by the provider constitute the gold-mark for distinguishing between inefficiency at provider level and supplier induced demand. In many economic studies dealing with the health care sector the physician has an informational advantage in supplying medical services (Liu and Mills 1999). The existence of incentives is the kingpin in supplier-induced demand and any incentive structure facing the provider where the revenue of the provider has a direct linkage with the quantity of services provided, and then one could unambiguously doubt a clear chance for inducing demand. In a study, Muraleedharan finds *prima facie* to suspect the existence of supplier-induced demand of diagnostic services in Chennai, where the physicians have mostly accepted that there exist networking between private medical institutions and diagnostic firms (Muraleedharan 1999). Another study found that there existed wide variations in the prescription of drugs for the same health condition with 75 percent of the consumption was ruled unnecessary by an expert panel (Meng et al 2000).

Over-prescription is one of the prime reasons for injured downgrading the ranking of private sector, as found in the study. Some studies also reached similar findings elsewhere. For instance, the private sector health facilities were less likely to refer the patients to higher levels of care (Meng Q et al 2000). The private facilities try to retain the patient till some serious complications arise, and such referrals would be towards public sector so that there is an absolvement of responsibility. The evasion is because of two things: Firstly, when dealing with patients with serious complications, there is a higher probability of risk involved which can be safely shifted to the public sector or another higher level hospital. Secondly, death to a patient also means the reputation of the hospital is at stake which will make the facility loose some proportion of the existing or potential market.

The phenomenon that availability leading to utilization is more or less clearly established in the analysis. Firstly, hospitals with lower utilization (measured by lower bed occupancy rate) tend to have a longer length of stay than a hospital with higher bed occupancy rate in public and private sectors at different levels, presuming severity remains same. Secondly, there exists a positive correlation between hospitals having

availability of scans and utilization of such facilities across different providers, assuming severity is same across providers.

The present study found that diagnostic firms reported paying 'rewards' to physicians who refer patients to their diagnostic firms. Diagnostic firms working independently charge the highest across the study site. These firms have tie-ups with many private hospitals and public physicians. One of the practices reported is that cases which require complex analysis are referred to some diagnostic facility within a public hospital. One of the physician interview revealed that majority of the scan results reported from these private diagnostic firms have results 'no relevant findings' further confirming the patient being subjected to additional financial burden of injury care. The study supports the view of a scholar who has argued earlier that competition in medical care sometimes lead to 'flat-of-the- curve medicine' (Newhouse JP 1982). Existence of SID in a system starts a vicious cycle of cost escalation and ineffective treatment. Because once the patient is prescribed more than necessary, the patients which follow the earlier one is also likely to be prescribed and it becomes a practical standard later on.

7.4.4 Coping methods

Using Grossman's demand for health framework, health shocks like RTIs are found to be random reductions in the stock of durable capital called health stock which is stochastic and deterministic because a sizeable number of injured were permanently disabled and the associated reductions in the total health stock of the household were also beginning to decline. Wagstaff (2005) finds evidence that health shocks are associated with a reduction in consumption in Vietnam, in particular for uninsured and better-off households. A study which looked into the question of intergenerational well-being finds that health care costs and high interest loans are two of the prominent reasons for loss of intergenerational well-being and entrapped into poverty (Krishna 2004). Households were able to borrow to cover unexpected medical bills but at the risk of being trapped in long-term debt. Indeed, recent evidence from the US suggests that nearly half of personal bankruptcies are due to medical problems, with both out-of-pocket payments and loss of income being contributing factors (Himmelstein, Warren et al. 2005). Smith (1999) finds that onset of a serious health condition reduces wealth by an average of US$17,000. Stephens (2001) finds that disability of the head of a household is associated with a long-

term decline in consumption. Not surprisingly, health shocks have also been shown to have a large impact on medical expenditures (Smith 1999; Wu 2001). Many members of the injured had to forego their routine medical consumption owing to the current episode of the injured.

Dis-saving and borrowing are the two general methods resorted to by households in the face of economic shocks. However, these may incur high level of opportunity costs on other components of household consumption which is called the "costs of consumption smoothing". Illness-related costs particularly affected patients with incomes below the poverty line and their average out-of-pocket expenditures for the disease amounted to more than 15% of annual household income, while incomes were reduced by 5 % due to illness-related effects. However, 11.8% of patient households took out bank loans, and 15.9% sold part of their property (Kamolratanakul et al1999).

The medical cost of a serious injury was over twice that of their poor counterparts. When compared to average household income, rural poor households paid over three times the share that non-poor households paid. Indirect costs were higher for poor households. In rural Bangladesh, the majority of poor households reported suffering a decrease in household income, food production and consumption, and living standard. In Bangladesh over 60 per cent of poor households went into debt. Two–thirds of poor households also had to borrow money to cope with the increased medical costs and reduced earnings in Bangalore, India (Aeron-Thomas et al 2004). Evidence from Vietnam says that in the year 2001, one fifth of the total study population spent more than 20 percent of their non-food consumption on health care (Wagstaff and van Doorslaer 2003).

CHAPTER-8

8. SUMMARY AND CONCLUSIONS

History speaks that economic growth cannot voluntarily reduce the incidence and impact of road traffic casualties in a developing economy, rather deliberate attempts at enhancing all aspects of road safety can only make reduction in road related casualties. Many consider that injuries are random events and the word 'accident' embodies an idea of chance and inevitability and so, a topic to be left 'unattended' (Tursz 1986; Krug et al. 2000). Historically, injuries have been a neglected public health issue (Bartlett 2002).

8.1 What was attempted?

The study endeavoured to decompose the financial burden associated with road traffic injuries in economic terms. The important questions the study addressed were;

- What are the major determinants of financial burden (income, severity, body part affected, source of treatment, provider behaviour, treatment gap, co-morbidity, insurance status,) of treating non-fatal road traffic injuries?
- What are the mechanisms by which inefficiency, *mediflation*, supplier-induced demand and costs of coping methods affect the gross financial burden of treatment?
- How does the financial burden of treatment is distributed across different income groups (differential financial burden) and what are the factors determining catastrophic expenditure?
- What is the enormity of out-of-pocket payments and the different coping methods affecting the economic security of the injured household?

8.2 Major findings

- Around 66 per cent of all accidents occurred during the day time (6 am till 6 pm).
- Accident-fatality rate was fairly uniform across various time zones during a day with a slightly higher probability of fatality per accident during nights.
- The intensity of RTAs was four times higher along the national high ways compared to other roads in the State.

- More than 55 per cent of accidents were the result of head-on collisions.
- Head injury was present in 36.4 per cent; upper limb was involved in 35 per cent, and lower limb in 72.5 per cent of the cases.
- More than 60 per cent of the interactions by the injured were accounted by public health care institutions and about 70 per cent of the injured received hospitalised treatment.
- With increasing severity, public hospitals become the preferred option of treatment.
- Average injury care expenditure per episode is Rs. 4615 which is more than average monthly household income of the studied households.
- Distribution of gross injury care expenses indicates maximum *skewness* in the lowest income quartile, followed by the second income quartile.
- Severity of the injury, income of the injured, provider of care, duration of treatment have been found to be the most significant factors influencing total cost of treatment.
- Income lost as a percentage of the household income due to injury constitutes 68.2 per cent, 54.9 per cent, 48 per cent and 106.5 per cent of the average monthly household income of the income quartiles respectively.
- Out-of-pocket is the most widely used method of financing and the regressive as the lower income groups disproportionately borne the financial burden of treatment.
- Insurance coverage was available to only 1 per cent of the injured.
- Average length of stay of surgery cases is higher in public hospitals compared to private sector and lower for non-surgery cases in public hospitals compared to private hospitals, assuming similar case-mix.
- Diagnostic and medicine market retail mark-up shows wide variation across public and private settings.
- Service intensity was found to be higher in private health services and any private hospitals have been found to engage in prescription and administration of medical interventions over and above the medical justified norms.

8.3 Where do we go from here?

8.3.1 Policy implications

It is being noted that there has been a faster growth of personalized means of transport in India and in Kerala, which is partly in response to an inadequate public transport system. Increase in the number of 2-wheelers and associated casualties may be seen in this context and strengthening mass transport system could help in reducing the two wheeler accidents, at least to some extent.

Road traffic injuries are no more an urban phenomenon in the region called Kerala due to its more or less normal distribution of population and infrastructure. It hints at directing road safety investments evenly to the rural areas based on the movement of traffic. In some of the study areas, patients reported that the private sector transport buses engaged in sheer competition hardly pay any attention to the travellers especially the weaker ones like elderly, women etc. Hence, the issue of road accident control is much beyond the scope of public health and spans across transport, public works department, home department etc.

Vulnerable road users constitute majority of the victims in the study probably showing that they bear very risk on the roads in the face of complex vehicle mix where there is inadequate separation of roads for slow-moving vehicles. Since more than 52 per cent of the study victims were two-wheeler riders, it stresses the need for having separate lanes for two wheelers as complex vehicle mix has been implicated as the prominent reason for road traffic accidents. The complex vehicle mix is probably a reflection of the widespread inequalities of income and wealth in a developing economy like India. Research and development for some protective shields for limbs for two wheeler riders can be thought of as a mechanism to reduce the impact of road accidents so that their vulnerability could be reduced. Given the fact that research and development either in public or private sector is critically lacking in the field, it would be imperative on the part of government to initiate research by considering road traffic injury research a public good.

On average, week ends and holidays, there is higher reporting of RTA cases in hospital casualties. The case load attains a peak during the evening hours as late reporting by the

referred cases from other health care institutions and incidence in the later part of the day. Incidentally, 17 – 21 hours have been reported to have a high degree of alcohol consumption as majority of the working male population return from job and other activities during this time. Breathe analyser tests need to be conducted on a wide basis for drivers and pedestrians showing indication of some signs of intoxication.

Most of the patients were transported by non-ambulance vehicles to the first point of contact from the accident site, rather by auto rickshaw or car. However, from the first point of contact, some of them had been shifted to a higher centre by ambulance. A few reportedly had received the assistance of police force in transportation, generally with a bit delay. Most of the cases who received police assistance were transported to a public hospital and the cases were most often serious. The emergency van system which is operational in some States in India can be an option in which the government in partnership with not-for-profit organizations and other government agencies so that emergency care can be provided with appropriate mode of transport could be provided. Since the geographical distribution of accidents and distributed evenly especially in some high incidence districts, it would be cost-effective to implement such a system in spots.

Road traffic injuries (RTI) have been found to be having a substantial effect on the disposable income of the household, permanent disability forced withdrawal from the labour force and associated losses are too huge in economic and social terms. We have seen in the study that RTI is a health shock (sudden deterioration in health status and health satisfaction) leading to a series of economic shocks (reduction in household income and fall in household consumption of non-medical goods) a starting a process of asset depletion and economic insecurity. The actual and expected withdrawal of the labour force by the injured and immediate bystander constitute more than 110 days and often they constitute bread winners of these households and a consequent reduction in well-being of all household members. The study adds to the existing literature in terms of analyzing health and economic shocks and associated factors which is very scanty in the country.

It is well-known that cost of treating injured due to road accidents and associated financial burden represent only a segment of the overall costs of road traffic accidents which includes the production loss and productivity loss, income loss for the individual

and family, cost of damage to the vehicle, the litigation costs and so on. This study, being a cross-sectional analysis, has been able to capture only a microscopic part of the total costs of road traffic injuries and probably a longitudinal prospective study would be able to capture the interaction between medical costs, physical disability and health status as well as economic capacity. A future research possibility is to examine the injury affecting the overall household income as well as the detailed process of economic reconstruction of the household. The present study assumed the injured household as a single entity. However, in reality, household allocation of resources may probably be influenced by extra-individual consideration and the adjustments at household could affect the members with less bargaining power like elderly, women etc, which can be taken up further.

The prevalence and pervasiveness of out-of-pocket payments (OOP), formal and informal, the extent of OOPs creating barriers to access to health services, and dynamics of payment forms part of the study. It also tried to elicit the experience of the population with paying informal payments meaning whether the informal payment was due to compulsion or voluntary payment. Though compulsion of payment is purely technical, it intends to capture who is the party in the transaction demanding money. While formal mechanisms of paying fee make a distinction between high-income groups and low-income groups and this phenomenon may be missing in case of informal payments. While there is a positive discrimination towards the poor in the context of the former which is expected to be generally absent in the latter.

The major responses to decline in quality emerge in the form of exit and violence. When the patients are so poor that they cannot afford to move to another health care facility for getting treated, they adopt the second route. Patients in highly crowded wards often seen to be arguing with nursing staff over non-availability of beds and the patients are generally not aware of the technicalities of not allowing to occupy a bed from another unit other than the unit where the individual patient is managed. Inadequate working condition of different types of electrical equipment in the observation wards along with inadequate number of beds creates much dissatisfaction among the service users.

Many medicines categorized as essential and needed to be available round the clock as per the hospital policy, were not available in the emergency ward forcing the patients to e

medicines and surgical from non-hospital sources. It is time that the executive machinery of the State made strong commitment to unhindered flow of resources to procure medicines and surgical and hospital managers to ensure the availability round the time.

The hypothesis that there exist wide differences in the utilization pattern across income quartiles raising questions of inequity in the consumption of medical care consequent upon a road traffic injury has been found true. After controlling for severity as well, lower income groups have been found to have under consumed medical care. However, some part of inequity in consumption of medical care was smoothened by the presence of public health facilities. But considering their designated role, it should have reduced the inequities by a substantial degree. The decomposed expenditure pattern further illustrates inequities in terms of financial burden borne by lower income groups. Out-of-pocket payments of the lower income quartiles had a highly regressive pattern. For example, 65 per cent of the lowest quartile spent more than 100 per cent of their income on treating injury care with some spending more than twenty (20) times their monthly income and 60 per cent of the richest quartile had spent more than 100 per cent of their income on injury management with some injured spending more than three (3) times their household monthly income on injury care.

The study unequivocally finds the impact of a health shock cutting deeply into the non-medical consumption of households, whose evidences have been lacking in health research. The general impression that savings and some degree of borrowing could smoothen or insulate the household consumption of non-medical spending in a household has been found to be incorrect. This negative impact of health systems on households that can lead to impoverishment has long been ignored on the health policy agenda. However, catastrophic payments and fairness in financial contributions for health care are becoming increasing concerns for many governments. It is time the government gathers the price of majority of the medical goods and services and construct an index as is done for majority of the necessary commodities of everyday consumption. It may be mandatory on the part of health care institutions to report the prices of different services charged at their facilities to the government and the government can bring the prices to the public's notice so that the patients can, whenever possible, make better informed

decisions regarding facilities and their services. It might bring in more accountability on the part of health care institutions to the public and government.

8.3.2 Different providers and the injured

The fact that Kerala has the highest density of public and private medical facilities among major states in India, the private sector is prominent, with the large majority of the state's doctors (86%) and hospitals (82%); furthermore, 58% of hospital beds (found both in hospitals and physicians' offices) are in the private rather than in the public sector (Varatharajan et al. 2002). Despite this, a very high utilization rate of individuals seeking care public health institutions offers an opportunity for the public sector to protect them from facing catastrophe and impoverishment.

Individuals, with increases in income, not only demand more quantity of services and higher quality, but they become less sensitive to prices. This means that the lower income group would prefer to have more of public sector consumption and the rich may shift to public sector in general cases. If the higher income groups self-select non-government sources of care, it would be a welcome step, at least from the point of view of the health care unit. However, from a broader health system perspective, this view might turn dangerous due to at least two reasons. Firstly, if the rich also utilise a health care facility, since they are politically powerful, these facilities would have a higher probability of providing higher quality care. Secondly, the higher income groups, when shifting their alliance to private sector, the private sector may grow mush faster compared to the public sector and the quality set at the former would be seen as the benchmark for the latter which would actually disadvantage the public system. This is due to the fact that while private sector gives much emphasis to the non-clinical aspects of care that is what normally evaluated by consumers, the public sector is inherently less concerned with this area due to their different objective functions and resource constraints. Thirdly, the issue of brain drain from public to private is a dominant feature of fast rising private sector.

If private health facilities are too much underutilised, the government may take over them. Studies find that in such situations, closing down or exit of the hospital from the market would be efficient, because the patients would need to pay only lower amounts

compared to the pre-exit situation (Roemer 1961; Gaynor & Anderson 1995). Since govt. institutions' charges are generally kept at very low levels, the reduced fees would attract large number of patients to its fold, so that the net welfare would be positive than the former situation, where the private health care unit used to charge high prices due to its underutilisation. This also helps the government avoid duplication of services.

Many public sector providers impose longer waiting times on patients rather than invest the necessary resources to shorten queues for appointments leading to additional financial burden and deterioration in health status. In public hospitals, due to institutional constraints and multiple budgetary resources, managers may not have a complete picture of their cost structure and the associated efficiency gains or level of resources that will be at their disposal over a certain period of time. An examination of the heavy and often catastrophic access costs in public sector, as revealed by many studies, can suggest ways of making or reducing the so-called "free care" burden free. Is the burden of access costs distributed evenly across all users or regressive? If so, what are the conditions under which access costs turn regressive and vice-versa? The access costs can reveal whether the public sector in health care is serving the purpose which is intended to or not?

The dichotomy in terms of market share between outpatient and inpatient service provision by the public sector is in line with the intention of the governments to protect patients against catastrophic medical expenses and as such access to and usage of inpatient services for treating road traffic injuries is over whereas less resource-intensive outpatient care has been mostly left to private providers. However, this mission is not intentionally targeted by the government rather chosen by the patient in the face of uncertainty and higher cost of treatment for private medical care. The present study supports the argument that unutilisation and underutilization of existing funds with the public hospitals and ineffective management of internal resources add to the financial burden of treatment for road traffic accident cases. This feature could be generalized to a larger level to patients other than seeking road accident care from public hospitals.

The private sector in India has grown without a conscious state policy governing hospital size, location, personnel employed, capital invested, physical standards, prices of different services, nature of contracts with purchasers, information management (collection, reporting) etc (Muraleedharan 1999). Given the context, it is unsurprising

that there has been a virtual absence of any measures for appraising the performance (clinical and non-clinical) of them in the above counts. Since health care service market does not often confirm to the standard assumptions of the free market, it ought to have been guided by strong progressive vision even in its minute actions.

Issue of overcrowding in public hospitals is a broader question of political economy of health care. Public hospitals are bound to accept patients by mandate, being the agent of the State; they cannot deny the claim of getting treated even when the health facility has already reached an optimum level of patient flow especially in emergencies. Therefore, this is a political question rather than an economic logic.

The study does not intend to be one which is ignorant of the macro-level issues shaping the type of financing, provision and regulation in the health sector. Rather it sincerely believes that much of the problems concerned with the financial burden of the road traffic injured for that matter all who receive treatment for any illness significantly depend on the macro setting in which under funding of health care is a reality measured by any means, whether over-utilisation or under-utilisation of public health care facilities. In wrapping up, there is no doubt that health care financing mechanisms and equitable access to government facilities have a major impact on household economic burden related to road traffic injuries.

Since it was considered essential to incorporate the suggestions of the injured, a brief list of suggestions made by them is given under:

8.3.3 Recommendations concerning RTA victims

- Increase awareness of road rules and poor follow-up of road signals.
- Improve the poor lighting of roads in many areas
- Reduce the alcoholic driving
- Set up clear signposts to display turns and bumps
- Improve the present poor road conditions & enhance coordination between different departments
- Include road safety in school curriculum
- Revised helmet structure having less weight, better visibility, maximum audibility etc.

- Set-up separate parking system for vehicles in all cities and heavy traffic junctions to reduce unauthorized parking on roads.

8.3.4 General recommendations

- Provide one small iron cupboard to each patient and entrust the maintenance of it to the patient concerned.
- Nurse proportion is very low compared to patients. In a higher tertiary centre meant for complex cases, a higher proportion of nurses is essential to provide timely care to patients and answer the queries of the patients and relatives.
- Provision of more operating tables and associated resources could reduce the surgery waiting list substantially (which indirectly helps the physician to charge a higher rate than its counterpart) and adversely affect the financial burden of treatment.
- Since the mark-up represents not a small proportion of the total medical spending and the autonomous society run within public hospital drug stores sell drugs at a much cheaper rate, setting up of such drug stores might reduce financial burden of the injured and enhance patient welfare. It may indirectly put pressure on private retail drug stores' tendency to put a higher mark-up.

8.4 Strength and Limitation of the present study

8.4.1 Strength

The study complements the existing literature by unearthing the complex and dynamic nature of injury/illness costs and how the cost of injury management influenced household ability to manage costs. Besides, it improves the understanding of vulnerability or resilience to injury costs by capturing the diverse resources, within and outside the household, used by people to cope with cost of treatment for injuries. It also strengthened the cause for some sort of regulation governing the relationships between the different actors in the medical sector especially the physicians and diagnostic firms and medical goods firms. A fair amount of exploitation in the medical care market occurs due to the voicelessness of the demand side, i.e. the unorganized patients. Progressive and proactive mechanisms to strengthen the bargaining power of the latter through their alliance or some agency representing the unorganized need to be in place to make their concerns known to the policy makers as well as to the suppliers of medical goods.

8.4.2 Limitation

The study suffers from certain inherent limitations and hence, the results should be read with caution. This study was a health care institution based one and it tracked RTA victims from health care institutions. Although health care seeking is generally regarded as good in Kerala (NSSO, 2004), the study might have still missed injury victims who were not able to access health care institutions due to financial and other constraints. Moreover, some victims, especially in Kerala, approach alternative systems of medicine such as *ayurveda* and the study missed them as well because the focus of the study was on allopathic system.

Though the study reaches some conclusions regarding the choice of health care providers by the injured, the exact proportion could only be understood from a survey of households, though the study used other scientific methods to reach the maximum population.

The study tried to assess the relationship between some important variables like price of treatment and health facility utilization. But, an expected relationship could not be attained due to a general lack of adequate number of cases from each type of hospital.

It is well-known that costs of treating injuries represent an important but not the most important cost in the overall social and economic cost (direct and indirect) of road traffic injuries and studies incorporating other sectors might be required to bring out the magnitude of the real burden of injuries in a certain society.

One of the intangible but unavoidable limits of the study is the ideological disposition of the researcher which might have affected the conclusions reached in the study, despite the best of attempts at objectivity by the researcher.

8.5 Future research directions

The study, indeed, raises more questions than answers. What is the appropriate mechanism to analyse the health care market behaviour is a major challenge to be addressed by future studies in the context of changing financing methods. What are the methods to reduce inefficiency in public and private sectors? How does one address the

imperfections in the health care market? What are the appropriate incentive and disincentive structure to be implemented among health care providers to follow protocols of injury management so as to reduce the over treatment component in private sectors? How to bring accountability among providers? Whether the existing legislative framework is inadequate to regulate and promote private medical sector? How far changing the incentive structure could work to reduce the magnitude of supplier-induced demand in medical services?

Qualitative studies would be desirable in many situations when narrating the personal stories of failure. Cross - sectional surveys with a quantitative research approach are not fully capable in bringing out the actual burden and the different dynamics involved in the household. This leaves scope for longitudinal studies with a case-study approach to enhance understanding of economic burden and provide additional policy insights on how to better protect households from cost burden and improve resilience. Ethnographic studies could better capture the situation in hospital wards in live form in terms of poverty, frustration, helplessness, violence etc.

> *Without a wider use of economics in health care inefficiencies will abound and decisions will be made less explicitly and hence less rationally than is desirable: we will go on spending large sums to save life in one way when similar lives in greater numbers could be saved in another way. The price of inefficiency, inexplicitness and irrationality in health care is paid in death and sickness.*
>
> - Prof. Gavin H. Mooney (1994)

Bibliography

1. Abbs AA & Walker GJ (1986) Determinants of the utilisation of maternal and child health services in Jordan. *International Journal of Epidemiology,* **15**: 404-407.
2. Abel-Smith B & Rawal P. (1992) Can the poor afford 'free' health services? A case study of Tanzania. *Health Policy and Planning*, **7** (4): 329-341
3. Abel-Smith B (1994). An Introduction to Health Policy, Planning and Financing Longman Group Ltd, New York. (Chap.12; 164-177).
4. Acton (1975). Non-monetary factors in the demand for medical services: some empirical evidence, *Journal of Political Economy*, **83** (3): 595- 614.
5. Adam R, Stedman M, Winn J, William JI & Ali J (1994) Improving trauma care in Trinidad and Tobago. *West Indian Medical Journal.* **43** (2): 36-38.
6. Aeron-Thomas (2000). Under-reporting of road traffic casualties in low-income countries, Unpublished Project Report PR/INT/199/00. TRL, Crownthorne.
7. Aeron-Thomas, Jacobs GD, Sexton B, Gururaj G et al (2004). The involvement and impact of road crashes on the poor: Bangladesh and India case studies. TRL Limited July 2004 Published Project Report PPR 010.
8. Afrkaar FK, Antwi P & Ofosn-Amaat S (2003) Pattern of road traffic injuries in Ghana: Implication for control. *Injury Control and Safety Promotion.* **10** (1-2) 69 -76.
9. Ajay Mahal (2000). Do the Poor or the Rich Benefit More from Government Health Services? The Case of India; H/N/P Seminar Report, World Bank.
10. Akin J. & Hutchinson P (1999) Health care facility choice and the phenomenon of bypassing. *Health Policy and Planning* **14** (2): 135-51.
11. Amin M, Hanson K & Mills A (2004) Price discrimination in obstetric services – a case study in Bangladesh. *Health Economics* **13**: 597-604.
12. Andersen R et al. (1987) Health status and medical care utilisation. *Health Affairs*, 67: 136-156.
13. Arreola-Risa C, Mock CN, Lojero-Wheatly L et al (2000) Low-cost improvements in pre-hospital trauma care in a Latin American city. *Journal of Trauma.* **48** (1): 119-124

14. Arrow, KJ. (1963) Uncertainty and the Welfare Economics of Medical Care, *The American Economic Review,* **53** (5): 941-73
15. Barer ML (1982) Case mix adjustment in hospital cost analysis-Information theory revisited. *Journal of Health Economics* **1** 53-80.
16. Bartlett SN (2002). The problem of children's injuries in low-income countries: a review. *Health Policy and Planning*; **17** (1): 1-13.
17. Barnum H, Kutzin J & Saxenian H (1995) Incentives and Provider Payment Methods HRO Working Papers No. **51** March 1995.
18. Becker GS (1965) A theory of allocation of time. *The Economic Journal*, Vol. **75**; No.299.
19. Bennett S, Dakpalla G, Garner P, et al (1994) Carrot and stick: state mechanisms to influence private provider behaviour. *Health Policy and Planning*: **9** (1): 1-13.
20. Binswanger H & Khandker S (1992) The impact of formal finance on the rural economy of India. Policy Research Paper. Washington, DC: World Bank.
21. Bishai D, Quresh A, James P & Ghaffar A (2006) National road casualties and economic development. *Health Economics* **15**: 65-81.
22. Bonu S, Rani M, Peter DH, Jha P and Nguyen SN (2005) Does use of tobacco or alcohol contribute to impoverishment from hospitalisation costs in India. *Health Policy and Planning*; **20**: 1: 42-49.
23. Bumgarner JR (Ed) (1992) China: Long-term issues and options in the health transition. a World Bank country study. Washington DC. Congressional Budget Office.
24. CII-McKinsey (2002) Health Sector in India: The Road Ahead; Mumbai: Confederation of Indian Industries.
25. Coase R (1960) The problem of social cost. *Journal of Law and Economics*. **3**: 1-44.
26. Corbett J (1988). Poverty and sickness: the high costs of ill health. *IDS Bulletin* **20** (2) 58-62.
27. Cutler DM; McClellan; Newhouse JP & Remler D (1996). Are Medical Prices Falling? NBER Working Paper No.5750, Cambridge
28. Dano AM (2005). Road injuries and long-run effects on income and employment. *Health Economics* **14:** 955-970.

29. Das J & Thomas SP (2006) World Bank Policy Research Working Paper 4086, December 2006.
30. De Geyndt W (1991) Managing health expenditures under National Health Insurance: The case of Korea. Technical Paper 156, Washington DC, World Bank.
31. Deepa Sankar (2001). Access to health care. Unpublished PhD thesis submitted to Jawaharlal Nehru University, New Delhi.
32. Devi, Rema. C & Marickar, Fazil Y.M (2003) Health economics in polytrauma patients, Proceedings of the Fifteenth Kerala Science Congress, 29-31 January 2003, Thiruvanthapuram, pp 358-360).
33. Devi, Rema C (2005). Trauma epidemiology and duration of hospitalization. *Kerala Calling* April 2005 35-36.
34. Dilip TR & Duggal Ravi (2002). Incidence of non-fatal outcomes and debt in urban India: Paper presented at Urban Research Symposium, World Bank, Washington. December 2002.
35. Ensor T & San BP (1996). Health care charges and exemptions in Vietnam. Bamako Initiative Operations Programme. Research Paper No. **1**. New York, UNICEF.
36. Ettner SL (1995). The Opportunity Costs of Elder Care. *The Journal of Human Resources.* **31** (1).
37. Fabricant SJ; Kamara CW & Mills A (1999). Why the poor pay more: household curative expenditures in rural Sierra Leone. *International Journal of Health Planning and Management.* **14**: 179-199.
38. Feldstein PJ (1998) Health Care Economics Fifth Edition, New York: Wiley.
39. Furjou SN & Gyebi-Ofusu (1993). Injury surveillance: should it be a concern to developing countries? *Journal of Public Health Policy* **14**: 355-359.
40. Gaynor. M & Anderson GF (1995). Uncertain demand, the structure of hospital costs, and the cost of empty hospital beds. *Journal of Health Economics*, **14**: 291-317.
41. Gertler P; Locay L & Sanderson W (1987). Are user fees regressive? The welfare implications of health financing proposals in Peru. *Journal of Econometrics* **36**: 67-88.

42. Gertler PJ (1988) A latent variable model of quality determination. *Journal of Business and Economic Statistics*, **6**: 97-104.

43. Gertler P & Solon O (2002). Who benefits from social health insurance in developing countries? (accessed on 29 Oct 2006). http://adfdell.pstc.brown.edu.classes/readings/gerso100.pdf

44. Ghaffar A, Hyder AA, Mastoor MI, et al (1999). Injuries in Pakistan: directions for future health policy. *Health Policy and Planning*. **14**: 11–17.

45. Ghee G, Silcock D, Astrop A & Jacobs G (1997). Socio-economic aspects of road accidents in developing countries. TRL Report 247. Transport Research Laboratory, Crowthorne.

46. Gilson L (1997). The lessons of user fee experience in Africa. *Health Policy and Planning* **12** (4): 273-285.

47. GoI, National Crime Records Bureau (2000). Accidental deaths and suicides in India, Ministry of Home Affairs, New Delhi.

48. Gordon, JE (1949) The Epidemiology of accidents. *American Journal of Public Health*. **39**: 504-15.

49. Goudge J & Govender V (2000). A review of experience concerning household ability to cope with the resource demands of ill health and health care utilization, Equinet Policy Series No.3, Equinet, South Africa.

50. Grossman (1972). A model of demand for health. *Journal of Political Economy*.**72**: 237-252.

51. Gumber A (1994) Burden of injury in India: utilization and expenditure pattern. Takemi Research Paper No. **88**. Harvard School of Public Health.

52. Gururaj, G (2004) Socio-economic impact of road traffic injuries in India, Proceedings of Forum 8, Eighth Annual Meeting of Global Forum for Health Research, Mexico City, Mexico.

53. ____ (2004a). Report of the project "Neurotrauma Registry in NIMHANS". NIMHANS/EPI/PR/2004-06.

54. _____ (2006). Road Traffic Injury Prevention in India. National Institute of Mental Health & Neuro Sciences, Publication No. **56** Bangalore, India, 2006.

55. Haddad S & Fournier P (1995) Quality, cost and utilisation of health services in developing countries. A longitudinal study in Zaire. *Social Science and Medicine*, **40**: 743-753.

56. Haddon, W (1980) Options for the prevention of motor vehicle crash injury. *Israel Journal of Medicine*. **16**. 45-68.
57. Heller P (1982). A model on the demand for medical and health services in Peninsular Malaysia. *Social Science and Medicine*, **16**: 267-84.
58. Hensher M (2001) Financing Health Systems through Efficiency Gains. Commission of Macro Economics and Health WP Series No. WG **3: 2**.
59. Hijar M, Vazquez-Vela E & Arreola-Risa C (2003) Pedestrian traffic injuries in Mexico: a country update. *Injury Control and Safety Promotion*, **10**: 37-43.
60. Himmelstein, DU, Warren, E et al. (2005). Market Watch: Illness and injury as contributors to bankruptcy. *Health Affairs* (Millwood).
61. Hofman K, Primack A, Keusch G & Hrynkow (2005). Addressing the growing burden of trauma injury in low and middle-income countries. *American Journal of Public Health* **95**: 13-17.
62. Hotchkiss DR, Hutchinson PL, Malaj A & Berruti AA (2005) Out-of-pocket payments and utilisation of health care services in Albania: Evidence from three districts. *Health Policy* **30** doi: 10.1016/j. healthpol.2005.02.003.
63. Hurst JW (1992) The Reform of Health Care: a Comparative Analysis of Seven OECD Countries. OECD Health Policy Studies No. **2**. Paris: OECD.
64. International Federation of Red Cross and Red Crescent Societies (1998). Must millions more die from road traffic accidents? In World Disasters Report, Societies IFoRCaRC (ed) Oxford University Press, New York.
65. Jacobs G, Aeron-Thomas A & Astrop A (2000) Estimating global road fatalities. Crowthorne, Transport Research Laboratory Report No. 445.
66. Joshipura MK, Shah HS, Patel PR, Divatia PA & Desai PM (2003). Trauma care systems in India. *Injury* **34**: 686-692.
67. Kamolratanakul P, Sawert H, Kongsin S, Lertmaharit S, et al (1999) Economic impact of tuberculosis at the household level International *Journal of Tuberculosis and Lung Diseases*. **3** (7), 596-602.
68. Kennedy, L, & Dumas, MB. (1983) Hospital closures and survivals: An analysis of operating characteristics and regulatory mechanisms in three states. *Health Services Research*, **18** (4), 489–512.

69. Khan AQ (1997). Current problems in Bangladesh. Paper presented at the seminar on the impact of Structural Adjustment Programmes in South Asia. New Delhi, India.

70. Kochar A (1997) An empirical investigation of rationing constraints in rural credit markets in India. *Journal of Development Economics* **53**: 339-371.

71. Koptis E & Cropper M (2003) Traffic fatalities and economic growth. Policy Research Working Paper No. 3035. Washington DC: The World Bank.

72. Krishnan, T.N (1999). Access to health and burden of treatment in India: An inter-State comparison [In Disinvesting in health Rao, M (Ed)] Sage publications, New Delhi

73. Krug EG, Sharma GK & Lozano R (2000) The global burden of injuries. *American Journal of Public Health* **90** 523-526

74. Krug E, (ed) Injury: a leading cause of the global burden of disease. Geneva: WHO, 1999. www.who.int/violence_injury_prevention /index.html (accessed on 25 Oct 2001).

75. Kutzin J and Barnum H (1992) Institutional features of health insurance and their effects on developing country health systems. *International Journal of Health Planning and Management* 7 (1): 51-72.

76. LaFlamme (1998) Social inequality in injury risks: knowledge accumulated and plans for the future. Stockholm, National Institute of Public Health.

77. Lindrooth, RC, Lo Sasso, AT., & Bazzoli, GJ (2003). The effect of urban hospital closure on markerts. *Journal of Health Economics*, **22**, 691–712.

78. Litvack J & Bodart C (1993). User fees plus quality equals improved access to health care: results of a field experiment in Cameroon. *Social Science and Medicine* **39** (3): 35-42.

79. Litvack, J. & Bodart C (1996) The Impact of raising fees and service quality: a field experiment in Cameroon', In Shaw, R P and M. Ainsworth (eds.) *Financing Health Services through User Fees and Insurance*, World Bank Discussion Paper No 249, Washington DC, World Bank 123-40.

80. Liu X & Mills A (1999) Evaluating payment mechanisms: how can we measure unnecessary care? *Health Policy and Planning*; **14** (4):409-13.

81. Lo AY, Hedley AJ, Pei GK, Ong SG, Ho LM, Fielding R, et al. (1994) Doctor-shopping in HongKong: implications for quality of care. *International Journal of Quality Health Care* **6**: 371–81.
82. Longo, DR., & Chase, GA. (1984) Structural determinants of hospital closure. *Medical Care*, **22** (5): 388–402.
83. Lucas & Nuwagaba (1999) Household coping strategies in response to introduction of user charges for social service: a case study on health in Uganda. IDS Working Paper **86**.
84. Lynch, JR., & Ozcan, YA. (1994). Hospital closure: An efficiency analysis. *Hospital and Health Services Administration,* **39** (2), 205–220.
85. Magnus Lindelow & Adam Wagstaff (2005). World Bank Policy Research Working Paper 3740, October 2005
86. Mahapatra P (2001). Estimating National Burden of Disease-The burden of disease in Andhra Pradesh 1990s, Hyderabad, Institute of Health Systems.
87. Manjula Singh (2006) Exploring the perceptions of ultra poor for low utilization of micro-health insurance schemes, BRAC, Bangladesh: A Qualitative study (Unpublished Ph.D Thesis) BRAC University, Bangladesh.
88. Mavlankar, D & Nair J (2003) Study on the aetiology of traffic accidents and injuries in Sabarkantha district of Gujarat, Report of the third study of TNO supported Prevention and Health aspect of ORET project, Ahmedabad, Indian Institute of Management.
89. Meng QY, Liu X & Shi Junshi (2000) Comparing the services and quality of private and public clinics in rural China. *Health Policy and Planning* **15** (4): 349-356.
90. Meyer JD (1985) Household survey of health expenditures, Mali. Mimeo. Agency for International Development, Washington DC.
91. Misra R; Chatterjee R & Rao S (2003). India Health Report, Oxford University Press, New Delhi.
92. Mock CN, NII-Amon-Kotei & Maier RV (1997) Low utilization of formal medical services by injured persons in a developing nation: health service data underestimate the importance of trauma. *Journal of Trauma.* **42**: 504-513.

93. Mock CN, Tiska M, Adu-Ampofo M & Boakye G (2002) Improvements in prehospital trauma care in an African country with no formal emergency medical services. *Journal of Trauma* **53**: 90-97.

94. Mock CN, Gloyd S, Adjei S, Acheampong F & Gish O (2003) Economic consequences and resulting coping strategies in Ghana. *Accident Analysis and Prevention*, **35:** 90-91.

95. Mohan D (2002) Economic costs of road traffic injuries in India. In Report of the Working Group on Prevention of Road Accidents and Injuries, New Delhi Planning Commission.

96. Mooney, Gavin (1994) Economics, medicine and health care. Pearson Education.

97. Muraleedharan, VR (1999) Characteristics and structure of the private hospital sector in urban India: a study of Madras city. Small Applied Research Paper No. **5**, Partnership for Health Reform Project, Abt. Associates, Bethesda, USA.

98. Murray CJL & Lopez AD (1996) Global Health Statistics: A Compendium of Incidence, Prevalence and Mortality Estimates for Over 200 Conditions. Cambridge, Mass: Harvard University Press.

99. NATPAC (2004). Handbook on Road Accident Statistics in Kerala. GoK, Thiruvananthapuram.

100. Nantulya VM & Reich MR (2002). The neglected epidemic: road traffic injuries in developing countries. *BMJ*; **324**: 1139-41

100. National Sample Survey Organisation (1995-96). 52nd Round, New Delhi: Department of Statistics, GoI 1998.

101. _____ (NSSO 1998, 2004). Morbidity and Treatment of Ailments, Report No.441, 502 New Delhi: Department of Statistics, GOI 1998.

102. NCMH (2002). National Commission on Macro Economics and Health, Ministry of Health and Family Welfare, GoI, New Delhi.

103. Newhouse JP (1982). Is competition the answer? *Journal of Health Economics* **1**: 109-116.

104. Nilambar Jha, Srinivasa DK, Gautam Roy & Jagdish S (2004). Epidemiological study of road traffic accident cases: a study from South India. *Indian Journal of Community Medicine* **XXIX**, No.1, Jan.-Mar. 2004.

105. Odero W, Khayesi M & Heda PM (2003) Road traffic injuries in Kenya: magnitude, cause and status of intervention. *Injury Control and Safety Promotion*, **10**: 53-61.

106. Patton MQ (1978) Utilisation focused evaluation. Beverly Hills, Sage Publications.

107. Peden M, Scurfield R, Sleet D et al (ed) (2004) The world report on road traffic injury prevention. World Health Organisation, Geneva.

108. Peters DH, Yazbeck AS, Sharma RR, Ramana GNV et al (2002) Better Health Systems for India's Poor: findings, analysis and options. Hindustan Publishing Corporation for the World Bank.

109. Pramod Kumar Verma & Tewari KN (2004). Epidemiology of Road Traffic Injuries in Delhi: Result of a Survey. *Regional Health Forum* **8** (1).

110. Rane, Wisvas, (1995). Drug prices: sharp rise after decontrol. *Economic and Political Weekly*; **30**: 2977-2980.

111. Rasell E, Bernstein J & Tang K (1994) The impact of health care financing on family budgets. *International Journal of Health Services* **24** (4): 691-714.

112. Roemer MI (1961) Bed supply and hospital utilisation: A natural experiment. *Hospitals*, **35** (21), 36-42.

113. Russel S. (1996) Ability to Pay for Health Care: Concepts and Evidence. *Health Policy and Planning*, **11** (3): 219-37.

114. Russell S & Gilson L (1997). User fee policies to promote health service access for the poor: A wolf in sheep's clothing? *International Journal of Health Services*, **27** (2): 359-379.

115. Sahdeva P., Lacqua MJ., Singh B & Dogra TD (1994). Road traffic fatalities in Delhi: causes, injury pattern and incidence of preventable deaths. *Accident Analysis and Prevention*, **26** (3) Jun 1994 p 377-384.

116. Sauerborn R; Nougtara A & Latimer E (1994). The elasticity of demand for health care in Burkina Faso: differences across age and income groups. *Health Policy and Planning*, **9** (2): 193-203.

117. Savano K (2001) Access to hospital and the demand for ambulatory care services in Japan. *Ozaka Economic Papers*, **50**: 25-40.

118. Seplaki L (1997) Economic scarcity and health care quality: tradeoffs in delineations and dilemmas. Dartmouth Publishing Company Ltd, England.

119. Sharma AK, Sarin YK, Manocha S et al (1993) Patterns of childhood trauma: Indian perspective. *Indian Paediatrics* **30**: 57-60.

120. Shengelia B, Murray CJL & Adams OB (2001). Beyond access and utilisation: defining and measuring health system coverage.

121. Smith, JP (1999). Healthy bodies and thick wallet: the dual relation between health and economics status. *Journal of Economic Perspectives* **13** (2): 145-66.

122. Sonia, A (2002). Structural and functional dynamics of private health care sector. Unpublished MPH Dissertation, Achutha Menon Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram, India.

123. State Crime Records Bureau, Govt. of Kerala (2004). Road accident statistics. Thiruvananthapuram.

124. Stephens, M. Jr. (2001). The long-run consumption effects of earnings shocks. *Review of Economics and Statistics* **83** (1): 28-36.

125. Tay R (2003) Marginal effects of changing vehicle mix on fatal crashes. *Journal of Transport Economic Policy*. **37** (3): 439-450.

126. Thomas WJ & Penchansky (1984) Relating satisfaction with access to utilisation of health services. *Medical Care*, **22**: 553-570.

127. Thomas M; Killingsworth R J & Acharya S (1998). User fees, self-selection and the poor in Bangladesh. *Health Policy and Planning*, **13** (1): 50-58.

128. Trevino-Siller & Hijar (2005). Mexican mass information campaign for youngsters aimed to prevent RTAs. Conference paper at 8th World Conference on Injury Prevention and Safety Promotion, Durban, South Africa March-April 2006.

129. Tursz A (1986) Epidemiological studies of accident morbidity in children and young people: problems of methodology. *World Health Statistics Quarterly* **39**:257-268.

130. van Beeck EF, Borsboom GJ & Machenbach JP (2000) Economic development and traffic accident mortality in the industrialised world, 1962-1990. *International Journal of Epidemiology,* **29** (3): 503-509.

131. Varatharajan D; Sadanandan R; Thankappan KR and Nair VM (2002). Idle capacity in resource strapped government hospitals in Kerala: Size, distribution and determining factors. AMCHSS, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram.

132. Vickrey W (1968) Automobile accidents, tort law, externalities, and insurance: an economist's critique. *Law of Contemporary Problems*. **33**: 464-487.

133. Waddington, CJ. & Enyimayew KA (1989). A Price to Pay: The Impact of User Charges in Ashanti-Akim District, Ghana *International Journal of Health Planning and Management*, **4** (1): 417-47.

134. Wagstaff and Doorslaer (2001). Paying for health care: Quantifying fairness, catastrophe, and impoverishment, with applications to Vietnam, 1993-98, World Bank Discussion Paper No. 582, Washington.

135. Wagstaff, A. (2005). The economic consequences of health shocks. World Bank Policy Research Working Paper WPS3644.

136. Wennberg JE, Barnes WA & Zubkoff M (1992) Professional uncertainty and the problem of supplier induced demand. *Social Science and Medicine*, **42**: 811-824.

137. Whitehead M Dahlgren G & Evans T (2001). Equity and health sector reforms: can low-income countries escape the medical poverty trap? *The Lancet* **358**: 833-836.

138. Wilkes A, Hao Yu, Bloom G & Xinguyuan Gu (1999). Coping with costs of severe illness in rural China. IDS Working Paper No.**58**. Sussex.

139. Wood, PHN (1989) Measuring the consequences of illness. *World Health Statistics Quarterly.* **42**: 15-121.

140. World Bank (1993) The organization, delivery and financing of health care in Brazil Report 12655-BR. Latin America and the Caribbean Country Department 1. HR Division World Bank, Washington DC.

141. _____ (1993). World Development Report: Investing in Health. Oxford University Press, New York.

142. _____ (2000). Reducing poverty. Oxford University Press, Washington.

143. World Health Organisation (1977) Health services concepts and information for national planning and management experiences based on the WHO/International Colloborative Study of Medical Care Utilisation. Geneva, World Health Organisation.

144. _____ (2000). The World Health Report: Health Systems: Improving Performance, Geneva: WHO.

145. _____ (2002) Global Burden of Disease project, Version 1, Geneva.

146. _____ (2002). Gender and road traffic injuries; *Gender and Health*, February 2002, Geneva, World Health Organisation.

147. _____ (2002). World Health Report 2002: Reducing risks, promoting healthy life. Geneva, World Health Organisation.

148. _____ (2004). World Report on Road Traffic Injury Prevention p 45. WHO Geneva.

149. Wouters A (1995). Improving quality through cost recovery in Niger. *Health Policy and Planning*, **10** (3): 257-270.

150. Wu, S. (2001). The effects of health events on the economic status of married couples. Unpublished manuscript.

151. Xu Ke, Evans, Kawabata, Zeramdini, Klavus & Murray (2003). Household Catastrophic Health Expenditure: A Multi-country Analysis. *The Lancet* Vol. **362**; 111-117.

152. Yang, Bong-Min (1991) Health insurance in Korea: opportunities and challenges. *Health Policy and Planning* **6** (2): 119-129.

153. Yesudian CAK (1994).The behaviour of the private sector in the health service market of Bombay. *Health Policy and Planning* **9** (1): 72-80.

154. Zwi AB, Forjouh S, Murugusampillay S, Odero W & Watts C (1996). Injuries in developing countries: policy responses needed now. *Transactions of the Royal Society of Tropical Medicine and Hygiene* **90**: 593-595.

Appendix

Individual no. _____

FINANCIAL BURDEN OF TREATMENT FOR NON-FATAL ROAD TRAFFIC INJURIES: A DECOMPOSITION ANALYSIS

Godwin SK, Ph.D. Scholar

Achutha Menon Centre for Health Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram, Kerala 695 011

Questionnaire for the injured

The information collected shall be used only for study purpose and necessary confidentiality of the study subjects will be maintained.

- **Investigator**

The purpose and objective of the study have been explained to me and I understand that there are no direct benefits to me from the stuffy. I voluntarily agree to participate in the study and retain the right to withdraw from the study at any stage.

Signature or thumb impression of the respondent: _____

Witness: _____ **Date:** _____

PART-1: HOUSEHOLD DETAILS

Table: 1 Demographic & economic details of the household

Name of the injured	Age	Sex	Marital status	Yrs of school	Profession	Income (Rs. Pm)	Healthy (yes/no/ average)	Days hospitalized in 2006

Location: (1) Urban (2) Semi-urban (3) Rural

Community: (1) Forward (2) Backward (3) SC/ST (4) Other

Who generally takes important decisions?

(1) Individuals (2) Joint (3) Bread winner (4) Others (Specify)

Roof: (1) Concrete (2) Tiled (3) Thatched (4) Other

Availability/Accessibility of health services within a reach of 3 kms.

(1) PHC/CHC (2) Government hospital (3) Pvt. clinic (4) Pvt. hospital

Table: 2 Assets

Name of the asset	Availability	Own/Rental
Rooms in the house (no.)		
Latrine (no.)		
Agricultural land (acres)		
Other land (cents)		
Automobiles (no.)		
Consumer durables (no.)		
LPG connection (no.)		
Electric/other stove (no.)		

Table: 3 Household expenditure last month

Expenditure item	Expenditure (Rs.)	Expenditure source	Remarks
Rent			
Food			
Electricity			
Cooking fuel			
Transport or petrol			
Dress materials			
Education			
Health care			
Social function			
Others			

Total			

PART-2: DETAILS OF THE ACCIDENT

Date and time of accident: _____

Place: _____ **Distance from present residence (km):**_____

Could you describe the events related to your road accident? _____

_____

Was there anyone with you when the accident occurred? _____

Purpose of your travel: (1) Way to job (2) Way to home (3) Part of the job

(4) Excursion (5) Walk (6) Others (specify)

Accident spot: (1) National highway (2) State highway (3) Other roads

Nature of road: (1) Curved (2) Straight (3) Narrow/steep (4) Other

Persons injured: (1) Pedestrian____ (2) Passenger____ (3) Driver_____(4) Other_____

Persons dead: (1) Pedestrian____ (2) Passenger____ (3) Driver_____(4) Other_____

Table: 4 Vehicles involved

Vehicles	Cycle	Mo-bike	Light	Heavy	Other
Your own (halted/moving)					
Other vehicles (halted/moving)					
Ownership[1]					
Direction (same/opposite)					

Table: 5 Characteristics of the accident

Predisposing factors	Response	Remarks
Number of accidents you suffered?		
If two-wheelers, were you using helmet?		

[1] *Commercial - Private (PC), Govt. (GC), Non-commercial - Private (PNC), Govt. (GNC)*

If four-wheelers, were you wearing seat-belt?		
Were you using mobile phone?		
Did you consume alcohol on the day of accident?		
The reason for accident, in your opinion.		

PART-3: DETAILS OF THE INJURED AND THE INJURY

Table: 6 Severity of the injury (as perceived by the injured & immediate attendant)

Attribute	Nil		Mild		Moderate		Severe	
	Injured	Immediate attendant	Injured	Immediate attendant	Injured	Immediate attendant	Injured	Immediate attendant
Pain								
Loss of consciousness								
Blood loss								
Head injury								
Spine injury								
Chest injury								
Abdominal injury								
Upper-limb injury								
Lower-limb injury								
Neck injury								
Face injury								
Temporary disability								
Permanent disability								

Other health problems present?

(1) BP (2) Diabetic (3) Cardiac disease (4) Other illness (specify)

Was there anyone (relative/friend) with you when the accident occurred? _____

Agencies (public/private) reported after the accident? _____

PART-4: ACTIONS PERTAINING TO THE INJURY

Type of first aid: (1) Bandaging (2) Splint (3) Artificial respiration

(4) Tourniquet (5) Others (specify)

Table: 7 Action taken

Action/Institutions	Govt./ Private (name)	Distance (km)	Time taken (hrs)	Duration of treatment	No of visits	Expense (Rs.)	Source of expense	Reason for choice
First aid								
First contact point								
Second contact point								
Third contact point								
Surgery[2]								
Rehabilitation								
Any other								

Table: 8 Injury care expenditure (Rs.)

Expenditure item	OP		IP		Rehabilitation	
	Inside	Outside	Inside	Outside	Inside	Outside
Doctor fees						
Room rent (Patient)						
Room rent (Others)						
Surgery						
Medicines						
Supplies						
Equipment						
Lab charges						
X-Ray and Scan						
Transport (Patient)						
Transport (Others)						
Food (Patient)						
Food (Others)						
Unofficial payments						
Others						

[2] (1) Minor (2) Major

Table: 9 Pattern of spending

Pattern of spending over different days of treatment	Point of contact			Remarks
	First	Second	Last	
The day of accident				
First day of admission				
The day of surgery				
On day/days admitted in intensive care unit (ICU)				
All days, more or less equal				
Others (specify)				

Table: 10 Waiting time for medical interventions

Waiting time	Contact point			Remarks
	First	Second	Last	
Time spent at health facility before treatment				
X-ray				
CT Scan				
MRI Scan				
ECG				
Laboratory tests				
Others (specify)				
Original date given for surgery				
Actual date of surgery				
Stated reason for postponement				

Did you leave the waiting list or queue to seek surgery from other sources including the different systems of medicine? (1) Yes (2) No

If yes to the above question, specify the name of the health facility where you have undergone the surgery._____

When the hospital had given you a long waiting time, why you did not prefer another hospital?

_____

Could you explain the different health facilities where you visited or sought care from the day of accident till your last health facility? _____

_____

Table: 11 Gap between proposed and actual treatment

Items	OP		IP		Rehabilitation	
	Proposed	Actual	Proposed	Actual	Proposed	Actual
OP visits (no.)						
Hospital days (no.)						
Rehabilitation days (no.)						
X-Ray (no.)						
Scans (no.)						
Lab tests (no.)						
Tablets (no.)						
Injections (no.)						
Dressings (no.)						
Massages (no.)						
Exercises (no.)						
Surgery (no.)						

Reason for the gap between proposed and actual duration/treatment

(1) Own choice due to monetary reasons (2) Own choice as the injury healed

(3) Doctor reduced it (4) Doctor extended it (5) Other illness (6) Other reasons

Compensation (Rs.): Applied _____ Received _____

Table: 12 How much more amount do you expect to spend on treatment?

OP		**Surgery**		**Others**	
IP		**Rehabilitation**			

Table: 13 Sources of financing (Rs.)

Met from current income		Past savings	
Interest-free loan		Loan with interest	
Selling of assets (in chronological order) • •		Insurance	
		Employer	
		Others	

Monthly interest rate for the loan (%): _____

Value of sold asset (Rs.): **Actual** _____ **Received (Rs.):** _____

Wage/work loss due to injury (injured):

No. of missing days from work: _____ **Days for which wage was paid:** _____

Wage/work loss due to injury (for one by-stander):

No. of missing days from work: _____ **Days for which wage was paid:** _____

Can you do all the activities voluntarily you undertook before the accident? (1) Yes (2) No

Table: 14 Monthly household expenditure during the injury management

Expenditure item	Expenditure (Rs.)	
	Normal routine	During injury
Income		
Rent		
Food		
Electricity		
Cooking fuel		
Transport or petrol		
Dress materials		
Education		
Medical		
Social function		
Others		

Has any of the members of the household been withdrawn from school? (1) Yes (2) No

Did anyone forgo health care when they had illness? (1) Yes (2) No

Did any of the members of the household have to migrate to find better job to pay for your income? (1) Yes (2) No

Did someone in your family over work to substitute your income? (1) Yes (2) No

Has anyone in the household been forced to forego job on a partial or full basis? (1) Yes (2) No

If given a free choice, which facility you might have preferred for treating the current episode of injury (name & place of the facility). Why? _____

_____

PART-5: QUALITY OF INJURY CARE

Directions: For the following questions, you may rank your experience with the health facilities from where you are seeking/sought care.

**Ranking for quality questions: Excellent – 1, Good – 2, Average – 3, Bad – 4, Worst – 5, No opinion – 6, Not applicable/have not experienced such a situation – 7*

Table: 15 Perceived quality of care by the injured at different health facilities

Variable	Contact point			Remarks
	First	Second	Third	
Physician's behaviour				
Respect for privacy during physical examination				
Respect and care by physicians at the facility				
Frequency of the physician visit				
Doctor's willingness to hear your complaints patiently and answer your questions				
Time spent in consultation with the physician				
Explanations about injury were clear and complete				
Appropriateness of tests and exams prescribed by the physician				
Necessity of medicines advised				
Reduction in fears and anxieties				
Motivation to follow-up of treatment prescribed				
Auxiliary staff behaviour				
Respect and care by nursing staffs & other paramedical staff at the facility				
Frequency of nurse visit				
Monitoring the progress of the patient by nurse				
Supervising the ward's overall cleanliness and functioning by nurse				
Response of the nurse in emergencies				
Health facility characteristics				
Adequate non-medical facilities are available				
The health facility provides all necessary medicines				
The equipments in the facility work properly				
The facility is always clean and tidy				

There is running water in the water taps				
Facility gives receipt for all the medical goods and services you paid for				
Availability of chairs in waiting room				
Convenience in the operating time of the facility				
Availability of medical facilities required for treating injury in the facility				
The data on your file is accurate and comprehensive				
Level of satisfaction with the treatment provided to you in the facility				
Level of satisfaction with the services received at the facility compared with what you paid				
Improvement in state of health (reduction in pain and other symptoms)				

Who should finance injury care (whether government or individuals or any others) in your opinion? Why?

_____

Thanking you for your time and co-operation. **- Investigator**

Remarks:

District:

Village:

Health Facility Check List

FINANCIAL BURDEN OF TREATMENT FOR NON-FATAL ROAD TRAFFIC INJURIES: A DECOMPOSITION ANALYSIS

Godwin SK, Ph.D Scholar
Achutha Menon Centre for Health Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram, Kerala 695 011.

Serial No. _____

Name of the Institution: _____

Name & Designation of the Respondent: _____

Address: _____

District: _____ **Tel:** _____

PART 1

Year of establishment: _____

Location: Urban – 1, Rural – 2

Registration Status: Unregistered – 1, Registered – 2

System of Medicine: Allopathic – 1, Ayurvedic – 2, Homeopathic – 3, Others – 4

Ownership: Central Govt. – 1, State Govt. – 2, Local Self-Govt. – 3, Private proprietorship – 4, Private Ltd. – 5, Public Ltd. – 6, Private partnership – 7, Public-Private Partnership – 8, Trust – 9, Society – 10, Others (specify) – 11

Type of facility: Primary level health facility – 1, Secondary level – 2, Tertiary care centre – 3, Others (specify) – 4

Provider type: Primary Health Centre – 01, Community Health Centre – 02, Taluk Hospital – 03, District Hospital – 04, General Hospital– 05, Govt. Medical College – 06, Private practitioner – 07, OP clinic – 08, Nursing home – 09, General private hospital – 10, Private specialty hospital – 11, Private Medical College – 12, Others (specify) – 13

Table 1 **General details of the facility**

Sr No	Major details	Response	Remarks
1	Number of branch/es		
2	Bed Strength		
3	Operating hours		
4	Hospital admissions (2005)		
5	Surgeries performed (2005)		
	a) Minor		
	b) Major		
6	RTA Cases		
	a) OP		
	b) IP		
7	Medico-legal cases (2005)		
8	Average length of stay of patients		
	a) Medical		
	b) Surgical		
	c) Orthopeadics		
	d) Gynecological		
	d) Others		
9	Average bed occupancy rate		
10	Monthly expenditure		
11	Monthly revenue		
12	Where do you generally refer the patients (name & place of the hospital)		
13	Criteria used to refer injury		
	a) Seriousness of injury		
	b) Absence of medical facilities to treat such cases		
	c)Tie-up with the facility where to be referred		
	d) Others (specify)		

Table 2 Availability of specialties

Specialty	No. of Units	Patients utilizing facility per day		Bed Strength
		OP	IP	
1. Medical				
2. Surgical				
3. Anesthetics				
4. Orthopeadics				
5. Casualty				
6. ICU				
7. Emergency				
8. Ophthalmology				
9. ENT				

10. Peadiatric				
11. Psychiatry				
12. Physical Medicine & Rehabilitation				
13. Dental				
14. Blood bank				
15. Others (specify)				

Table 3 Infrastructure and Facilities

Facility	No. of Units	Capacity
1. OPD Block		
2. Total space available (sq. ft)		
3. Waiting hall/Rooms		
4. Consultation Rooms		
5. No of rooms		
6. Electricity		
7. Means of waste disposal		
• No facility		
• Garbage barrels		
• Burning		
• Medical incinerator		
• Others (specify)		
8. Wards		
9. Casualty Room		
10. Pharmacy		
• Direct purchase from wholesaler		
• Purchase from retailer		
• Others (specify)		
11. Medical Records Office		
12. Laundry		
13. Kitchen		
14. Laboratory		
15. Operating Theatre		
• Operating bed		
• Anesthesia machine		
• Small surgical set		
• Large surgical set		
• Cauterization		
• Patient monitor		
• Defibrillator		
• Fixed lamp		
• Mobile lamb		

• Boiling sterilizer		
• Steam autoclave		
• Hot air sterilizer		
• Others (specify)		
16. Maintenance Dept.		
17. Ambulance		
18. X-ray facility		
19. ECG Facility		
20. EEG Facility		
21. Ultrasound Scan		
22. CT Scanner		
23. MRI Scanner		
24. Mortuary		
25. Other Vehicles		
26. Other Facilities		
27. Total No. of Doctors		
28. No. of Specialists		
29. Nursing Personnel		
30. Administrative Staff		
31. Other Staff		

Payment Structure:

Type of payment to the physician: Fees sharing between hospital and physician – 1, Fixed per day – 2, Fixed per case – 3, Salary – 4, Others – 5 (specify)

Pricing Practice of Hospitals: No fees charged – 1, Fees charged – 2, Partial charging of fees – 3

Basis of charging: Cost-based pricing – 1, Random pricing – 2, Charging based on market price – 3, Price fixed by association – 4, Others (specify) – 5

Price exemption practices

Is your institution mandated (by statute or agreement/contract) to provide free care to a certain proportion of patients?

Is there any mechanism in place to exempt poor patients?

What are the criteria used to give free care/concessions to patients

Who is the authority to exempt charges?

The proportion of patients given fully free care (monthly/annually)

The proportion of patients given fee concessions (monthly/annually)

Do you provide any free care specifically provided to road accident cases?

Provision of credit facilities at the health facility (Y = 1, N = 2)

PART 11

INJURY CARE FACILITY AVAILABILITY

TABLE 1. AIRWAY MANAGEMENT

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1 (a)	***Airway: knowledge & skills***				
	Assessment of airway compromise				
	Manual manoevours (chin lift, jaw thrust, recovery position etc)				
	Insertion of oral or nasal airway				
	Use of suction				
	Assisted ventilation using bag-valve mask				
	Endotracheal intubation				
	Cricothyroidotomy (with or without trachestomy)				
1 (b)	***Airway: equipment & supplies***				
	Oral or nasal airway				
	Suction device: at least manual (bulb)/foot pump				
	Suction device: powered: electric/pneumatic				
	Suction tubing				
	Yankauer/Other suction tip				
	Laryngoscope				
	Endotracheal tube				
	Oesophageal detector device				
	Bag-valve-mask				
	Basic trauma pack				
	Magill forceps				
	Capnography				
	Other advanced airway equipment				

TABLE 2 – BREATHING MANAGEMENT OF RESPIRATORY DISTRESS

Sr. No	Availability	Response			Remarks
		Yes	No	No.of units	
1 (a)	***Breathing: knowledge & skills***				
	Assessment of respiratory distress and adequacy of ventilation				
	Administration of oxygen				
	Needle thoracostomy				
	Chest tube insertion				
	Three-way dressing				
1 (b)	***Breathing: equipment & supplies***				
	Stethoscope				
	Oxygen supply (cylinder, concentrator/other source)				
	Nasal prongs, face mask, associated tubing				
	Needle & syringe				
	Chest tubes				
	Underwater seal bottle (or equivalent)				
	Pulse oximetry				
	Arterial blood gas measurements				
	Bag-valve-mask				
	Mechanical ventilator				

TABLE 3 – MANAGEMENT OF CIRCULATION AND SHOCK

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Circulation: knowledge & skills***				
1 (a)	***Assessment & external control of heamorrhage***				
	Assessment of shock				
	Compression of control of heamorrhage				
	Arterial tourniquet				
	Splinting of fractures for heamorrhage control				
	Deep interfascial packing for severe wounds				
	Pelvic wrap for heamorrhage control				
1 (b)	***Fluid resuscitation***				

	Knowledge of fluid resuscitation				
	Peripheral percutaneous intravenous access				
	Peripheral cutdown access				
	Central venous access for fluid administration				
	Intraosseous access for children under 5 years				
	Transfusion knowledge and skills				
1 (c)	***Monitoring***				
	Knowledge of resuscitation parameters				
	More advanced monitoring (central venous pressure)				
	More advanced monitoring (right heart)				
1 (d)	***Other***				
	Differential diagnosis of causes of shock				
	Use of pressors in neurogenic (spinal) shock				
	Use of fluids and antibiotics for septic shock				
	Recognition of hypothermia				
	External rewarming in hypothermia				
	Use of warmed fluids				
	Knowledge of core warming				
	Circulation: equipment & supplies				
1 (e)	***Assessment and external control of heamorrhage***				
	Clock or watch with second cuff				
	Stethoscope				
	Blood pressure (BP) cuff				
	Gauze and bandages				
	Arterial tourniquet in extreme situations				
1 (f)	***Fluid resuscitation***				
	Crystalloid				
	Colloids				
	Blood transfusion capabilities				
	Intravenous infusion set (lines and cannulas)				

	Intraosseous needle or equivalent				
	Central venous lines				
1 (g)	***Monitoring***				
	Stethoscope				
	BP cuff				
	Urinary catheter				
	Electronic cardiac monitoring				
	Monitoring of central venous pressure				
	Right-heart catheterization				
	Laboratory facilities for haemoglobin or haematocrit				
	Laboratory facilities for electrolytes, lactate and arterial blood gases				
1 (h)	***Others***				
	Pressors (for neurogenic/spinal shock)				
	Nasogastric (NG) tube				
	Thermometer				
	Fluid warmers				
	Weighing scale for children				

TABLE 4 MANAGEMENT OF HEAD INJURY

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
	Recognize altered consciousness: lateralizing signs, pupils				
	Maintain normotension and oxygenation to prevent secondary brain injury				
	Avoid overhydration in the presence of raised ICP				
	Monitoring and treatment of raised ICP				
	CT Scans				
	Burr holes (skill plus drill or other suitable equipment)				
	More advanced neurological procedures				
	Surgical treatment of open				

	depressed skull fractures				
	Surgical treatment of closed depressed skull fractures				
	Maintanance of requirements for proteins and calories				
	Full compliance of AANS guidelines*				

*AANS: American Association of Neurological Surgeons

TABLE 5 MANAGEMENT OF NECK INJURY

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
	Recognize platysmal penetration				
	External pressure for bleeding				
	Packing, balloon tampode for bleeding				
	Contrast radiography, endoscopy				
	Angiography				
	Surgical skills to explore neck				

TABLE 6 MANAGEMENT OF CHEST INJURY

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
	Autotransfusion from chest tubes				
	Adequate pain control for chest injuries/rib fractures				
	Respiratory therapy for chest injuries/rib fractures				
	Rib block or intrapleurul block				
	Epidural analgesia				
	Skills and equipment for intermediate thoracotomy				
	Skills and equipment for advanced thoracotomy				

TABLE 7 MANAGEMENT OF ABDOMINAL INJURY

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
	Clinical assessment				
	Diagnostic peritoneal lavage (DPL)				
	Ultrasonography				
	CT Scan				
	Skills and equipment for intermediate laparotomy				
	Skills and equipment for advanced laparotomy				

TABLE 8 MANAGEMENT OF EXTREMITY INJURY

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
	Recognition of neurovascular compromise; disability-prone injuries				
	Basic immobilization (sling, splint)				
	Spine board				
	Wrapping of pelvic fractures for haemorrhage control				
	Skin traction				
	Closed reduction				
	Skeletal traction				
	Operative wound management				
	External fixation (or its functional equivalent: pins & plaster)				
	Internal fixation				
	Tendon repair				
	Hand injury: assessment and basic splinting				
	Hands: debride, fix				
	Measurement of compartment pressures				
	Fasciotomy for compartment syndrome				
	Amputation				
	X-ray				

	Portable X-ray				
	Image intensification				
	Proper management of immobilized patient to prevent				

TABLE 9MANAGEMENT OF SPINAL INJURY

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
	Assessment-recognition of presence or risk of spinal injury				
	Immobilisation: C-collar, backboard				
	Monitoring of neurological function				
	Assessment by ICD				
	Maintain normotension and oxygenation to prevent secondary neurological injury				
	Holistic approach to prevention of complications – especially pressure scores and urinary retention/infection				
	CT Scan				
	MRI Scan				
	Full compliance with AANS guidelines				
	Non-surgical management of spinal injury				
	Surgical treatment of spinal injury				
	Surgical treatment of neurological deterioration in the presence of spinal cord compression				

TABLE 10 MANAGEMENT OF BURNS AND WOUNDS

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
1 (a)	***Burns***				
	Assessment of depth and				

	extent				
	Sterile dressings				
	Clean dressings				
	Topical antibiotic dressings				
	Dedridement				
	Escharotomy				
	Skin graft				
	Early excision and grafting				
	Physiotherapy and splints to prevent contractures in burn wounds				
	Reconstructive surgery				
1 (b)	***Wounds***				
	Assess wounds for potential mortality and disability				
	Non-surgical management: clean and dress				
	Minor surgical: clean, suture				
	Major surgical debridement and repair				
	Tetanus prophylaxis (toxoid, antiserum)				

TABLE 11 REHABILITATION OF THE TREATED INJURED

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
	PT/OT for recovery of extremity injuries				
	Full spectrum of physiotherapy (PT)				
	Full spectrum of occupational therapy (OT)				
	Prosthetics				
	Psychological counseling				
	Neuropsychology for congnitive dysfunction				
	Speech pathology				
	Physical medicine and rehabilitation specialist-level care				
	Electromyography				
	Specialised rehabilitative nursing				
	Discharge planning				

TABLE 12 PAIN CONTROL AND MEDICINES

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
1 (a)	***Anaesthesia (WHO EML section I)***				
	Bupivacaine (or equivlvalent)				
	Gen. anaesthetic (ether, halothane or equivalent)				
	Ketamine				
	Lidocaine (or equivalent)				
	Nitrous oxide				
	Oxygen				
	Thiopental (or equivalent)				
	Diazepam (or equivalent)				
	Atropine				
1 (b)	***Pain, Fever, Inflammation (WHO EML section 2)***				
	Morphine (or equivalent)				
	Codeine (or equivalent)				
	Acetylsalicyclic acid				
	Ibuprufen (or equivalent)				
	Paracetamol (acetaminophen)				
1 (c)	***Anaphylaxis (WHO EML section 3)***				
	Dexamethasone, hydrocortisone (or equivalent steroid)				
	Epinephrine				
1 (d)	***Poisoning (WHO EML section 4)***				
	Naloxone				
1 (e)	***Anticonvulsants (WHO EML section 5)***				
	Phenobarbital				
	Phenytoin				
	Magnesium sulphate				
1 (f)	***Infections (WHO EML section 6)***				
	Amoxycillin/ampicillin				
	Amoxycilllin & clavulanic acid (C)[2]				
	Amphetericin				
	Benzylpenicillin				
	Ceftazidime (C)				
	Ceftriaxone (C)				
	Chloramphenicol				
	Ciprofloxacin (or equivalent)				
	Clindamycin (C)				

	Cloxacillin (or equivalent)				
	Fluconazole (or equivalent)				
	Gentamicin (or equivalent)				
	Imipenem & cilastin (C)				
	Levofloxacin (C)				
	Metronidazole				
	Sulfamethozole & trimethoprim (or equivalent)				
1 (g)	***Medicines affecting blood (WHO EML section 10)***				
	Heparin				
	Warfarin (or equivalent)				
1 (h)	***Blood products and plasma expanders (WHO EML section 11)***				
	Dextran 70, polygeline (or equivalent)				
	Factor IX concentrate (C)				
	Factor VIII concentrate (C)				
1 (i)	***Cardiovascular disorders (WHO EML section 12)***				
	Dopamine				
	Epinephrine (C)				
1 (j)	***Skin diseases: topical applications (WHO EML section 13)***				
	Sulfadiazine				
1 (k)	***Antiseptics and disinfectants (WHO EML section 15)***				
	Antiseptics: chlorhexidine, ethanol, polyvidone or equivalent				
	Disinfectants: chlorine base compound, chloroxylenol, glutarel or equivalent				
1 (l)	***Diuretics (WHO EML section 16)***				
	Furosemide (or equivalent)				
	Mannitol (C)				
1(m)	***Gastrointestinal disorders (WHO EML section 17)***				
	Aluminium hydroxide				
	Cimetidine (or equivalent)				
	Mangnesium hydroxide				
1 (n)	***Hormone disorders (WHO EML section 18)***				
	Insulin				
1 (o)	***Muscle relaxants (WHO EML section 20)***				
	Alcuronium, suxamethonium or equivalent				
	Neostigmine (or equivalent)				
	Vecuronium (C)				
1 (p)	***Fluid and electrolyte balance (WHO EML section 26)***				
	Glucose section (5%, 50%)				
	Normal saline solution (0.9%				

	isotonic)				
	Glucose with sodium chloride (4% glucose, 0.18% NaCl)				
	Compound solution of sodium lactate (Ringer's lactate or equivalent)				
	Potassium chloride solution				
1 (q)	***Vitamins and minerals (WHO EML section 27)***				
	Calcium chloride/gluconate (C)				

EML: WHO's Model list of essential medicines (WHO, 2002)
C: WHO's Complementary model list

TABLE 13 DIAGNOSIS AND MONITORING

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Resources***				
1 (a)	***Monitoring***				
	Stethoscope				
	BP cuff				
	Torch (flashlight)				
	Thermometer				
	Foetal stethoscope				
	Urinary catheter with collection bag				
	Electronic cardiac monitoring				
	Pulse oximetry				
	Central venous pressure monitoring				
	Right heart catheterization				
	Intracranial pressure monitoring				
1 (b)	***Radiological investigations***				
	Plain films				
	Portable plain films				
	Contrast radiography (barium, gastrograffin)				
	Ultrasound for trauma (heamoperitoneum)				
	CT Scanner				
	Angiography				
	Image intensifier/fluoroscopy				
	MRI Scanner				
	Nuclear medicine				
1 (c)	***Laboratory tests***				

	Haemoglobin/haemotocrit				
	Glucose				
	Gram stain				
	Bacterial cultures				
	Electrolytes (Na, K, Cl, CO_2, BUN[1], Creatinine)				
	Arterial blood gas measurements				
	Serum lactate				
1 (d)	***Others***				
	Paediatric length-based tape (Broselow tape)				
	Otoscope				
	Opthalmoscope				
	Compartment pressure measurement				

BUN: Blood urine sugar

TABLE 14 SAFETY FOR HEALTH CARE PERSONNEL

Sr. No	Availability	Response			Remarks
		Yes	No	No. of Units	
1	***Safety for health care personnel***				
	Training in universal precautions				
	Gloves				
	Goggles				
	Sharps disposal				
	Biological waste disposal				
	Gowns				
	Post-exposure prophylaxis for HIV				

Comments:

The information collected shall be used only for study purposes and necessary confidentiality of the study subjects shall be maintained.

Principal Investigator

FACILITY CHECKLIST: DIAGNOSTIC FIRMS

FINANCIAL BURDEN OF TREATMENT FOR NON-FATAL ROAD TRAFFIC INJURIES: A DECOMPOSITION ANALYSIS

Godwin SK, PhD Scholar

Achutha Menon Centre for Health Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram, Kerala 695 011

Serial No._____

Name of the diagnostic unit: _____

Address: _____

Telephone: _____

Name of the respondent: _____

Facilities available:

Location: Rural – 1, Urban – 2

Nature of the firm: Stand alone – 1, Part of a health facility – 2, Others (specify) – 3

Year of establishment: _____

Operating hours: _____

Ownership:

(a) Central govt. (b) State govt. (c) Local self govt. (d) Private proprietorship (e) Private Ltd. (f) Public Ltd. (g) Private partnership (h) Public-Private Partnership (PPP) (i) Trust (j) Society (k) Others (Specify)

Registration Status: Unregistered – 1, Registered – 2

Registered with: State government – 1, Medical Council of India – 2, Indian Medical Association – 3, Others – 4 (specify)

Owned by: (a) Doctor (b) Doctor's relative (c) Others (specify)

Number of branches:_____

X-Ray

Details of the X-ray machines

X-ray machine*	Year of purchase	Cost of purchase (Rs.)	Expected life (Yrs)	Time taken per exposure	No. of X-rays per day	
					Capacity	Actual yesterday

* Portable – 1, Permanent – 2

Basis of charging: Cost-based pricing – 1, Random pricing – 2, Charging based on market price – 3, Price fixed by association – 4, Others (specify) – 5

Price per exposure (Rs.) & waiting time

X-Ray item		Waiting time		Price per exposure (Rs.)							
		For admission	For report availability	Now				Last			
	No. of films used			Full price	Discounted price			Full price	Discounted		
Head											
Neck											
Spine											
Chest											
Abdo men											
Upper limb											
Lower limb											
Others (Specify)											

Whether film is supplied to patients? _____

Proportion of tests given price concessions: _____

Referral

Institution/Doctor	No. of cases referred last week	
	Discount price	Full price

Any tie-up with health facilities. If yes, number of institutions: _____

Any tie-up with insurance companies: _____

From which health facility (doctor), you get the highest number of referred cases?

Number of shut downs in the last 6 months _____

Reason for shut down: (a) Non-availability of technical staff (b) Technical problems in the machine (c) Others (specify)

Average time to rectify the problem: _____

Remarks:

CT Scan

Year of establishment: _____

Details of the CT Scan machines

CT Scan machine	Year of purchase	Cost of purchase (Rs.)	Expected life (Yrs)	Time taken per exposure	No. of CT Scans per day	
					Capacity	Actual yesterday

Basis of charging: Cost-based pricing – 1, Random pricing – 2, Charging based on market price – 3, Price fixed by association – 4, Others (specify) – 5

Price per exposure (Rs.) & waiting time

CT Scan item	Waiting time		Price per exposure (Rs.)							
	For admission	For report availability	Now				Last			
			Full price	Discounted			Full price	Discounted		
Head										
Neck										
Spine										
Chest										
Abdomen										
Upper limb										
Lower limb										
Others (Specify)										

***Price without contrast**

Proportion of tests given price concessions:_____

Quality of CT Scan

CT Scan Type#	No. of slices taken	No. of films used	Amount of contrast used	Type of contrast*	Qualification of the personnel

#Helical or

***Ionic or Non-ionic**

Referral

Institution/Doctor	No. of cases referred last week	
	Discount price	Full price

From which health facility (doctor), you get the highest number of referred cases?

Number of shut downs in the last 6 months _____

Reason for shut down: (a) Non-availability of technical staff (b) Technical problems in the machine (c) Others (specify)

Average time to rectify the problem: _____

Remarks:

MRI Scan

Year of establishment: _____

Details of the MRI Scan machine/s

MRI Scan machine	Year of purchase	Cost of purchase (Rs.)	Expected life (Yrs)	Time taken per exposure	No. of MRI Scans per day	
					Capacity	Actual yesterday

Basis of charging: Cost-based pricing – 1, Random pricing – 2, Charging based on market price – 3, Price fixed by association – 4, Others (specify) – 5

Price per exposure (Rs.) & waiting time

MRI Scan item	Waiting time		Price per exposure (Rs.)							
	For admission	For report availability	Now				Last			
			Full price	Discounted			Full price	Discounted		
Head										
Neck										

Spine										
Chest										
Abdomen										
Upper limb										
Lower limb										
Others (Specify)										

***Price without contrast**

Proportion of tests given price concessions:_____

Quality of MRI Scan

MRI Scan Type[#]	No. of slices taken	No. of films used	Amount of contrast used	Type of contrast[*]	Qualification of the personnel

[#]Helical or

[*]Ionic or Non-ionic

Magnetic strength: _____ tesla units.

Referral

Institution/Doctor	No. of cases referred last week	
	Discount price	Full price

From which health facility (doctor), you get the highest number of referred cases?

Number of shut downs in the last 6 months _____

Reason for shut down: (a) Non-availability of technical staff (b) Technical problems in the machine (c) Others (specify)

Average time to rectify the problem: _____

Remarks:

Ultrasound Scan

Year of establishment: _____

Details of the US Scan machine/s

MRI Scan machine	Year of purchase	Cost of purchase (Rs.)	Expected life (Yrs)	Time taken per exposure	No. of US Scans per day	
					Capacity	Actual yesterday

Basis of charging: Cost-based pricing – 1, Random pricing – 2, Charging based on market price – 3, Price fixed by association – 4, Others (specify) – 5

Price per exposure (Rs.) & waiting time

US Scan item	Waiting time		Price per exposure (Rs.)							
	For admission	For report availability	Now				Last			
			Full price	Discounted			Full price	Discounted		
Neck										
Chest										
Abdomen										
Others (Specify)										

Proportion of tests given price concessions:_____

US Scan Type: _____

#Helical or

Qualification of the key personnel: _____

Referral

Institution/Doctor	No. of cases referred last week	
	Discount price	Full price

Laboratory Tests

Year of establishment: _____

Details of the Lab Tests

Price per unit (Rs.)

Lab test details	Number of tests taken per day	Number of tests taken yesterday	Time required to complete one test	Price per exposure (Rs.)			
				Now		Last year	
				Full price	Discounted	Full price	Discounted
Urine							
Blood							
Stool							
Sputum							

Basis of charging: Cost-based pricing – 1, Random pricing – 2, Charging based on market price – 3, Price fixed by association – 4, Others (specify) – 5

Do you have any tie-up with any health facilities? If yes, with how many institutions?

From which health facility (doctor), you get the highest number of referred cases? (Specify name)

Proportion of tests given price concessions:

Waiting time for admission:

Waiting time for report availability:

Referral

Institution/Doctor	No. of cases referred last week	
	Discount price	Full price

From which health facility (doctor), you get the highest number of referred cases?

Number of shut downs in the last 6 months _____

Reason for shut down: (a) Non-availability of technical staff (b) Technical problems in the machine (c) Others (specify)

Average time to rectify the problem: _____

Remarks:

Is your institution mandated (by statute or agreement/contract) to provide free care to a certain proportion of patients?

Is there any mechanism in place to exempt poor patients?

What are the criteria used to give free care/concessions to patients

Who is the authority to exempt charges?

Any free care specifically provided to road accident cases

Provision of credit facilities at the health facility (Y = 1, N = 2)

The information collected from the facility shall be used only for study purposes and necessary confidentiality shall be maintained.

Principal Investigator

Financial Burden of Treatment for Non-Fatal Road Traffic Injuries: A Decomposition Analysis

Godwin SK, PhD Student[#]
Achutha Menon Centre for Health Centre for Health Science Studies, Sree Chitra Tirunal Institute for Medical Sciences & Technology, Thiruvananthapuram, Kerala 695 011.

Participation Observation Form*

IA. Patient New Repeat IB. Age: Less than 5, 6-25, 26-55, 56 and above
IC. Gender ID. Provider's Name:

II. Presented with injury to:

Lower limb	Upper limb	Head	Spine	Abdomen	Chest	Others

Injury details:

III. Number of history questions

Existence of co-morbidities:

IV.a: Physical examination Yes No

IV.b: Type of physical examinations (note below)

Stethoscope/ BP Apparatus	Routine lab tests	X-ray	CT Scan	MRI Scan	Pulse	ECG	Others

V.

Sr No	Treatment details	Response	Remarks
1	Tests ordered (Y=1, N=2)		
	Treatment given (Y=1, N=2)		

	Written documents (Y=1, N=2)		
	Instructions given (Y=1, N=2)		
	F/U instructions given (Y=1, N=2)		
	Referred elsewhere (Y=1, N=2)		

VI. Treatment given:

Tablet	Injection	T/I	Dosage	Injections	Others
1	1	1			1
2	2	2			2
3	3	3			3
4	4	4			4

VII. Total time Hours Minutes
IX. Fees charged

Adapted from: ISERDD & The World Bank: Participant Observation Form*
Observation is limited to areas where it is feasible and permitted.

The information collected from the facility shall be used only for study purposes and necessary confidentiality shall be maintained.

Principal Investigator