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Research Paper

Decomposition of Demand for Medical Care for non-fatal Road Traffic Injuries: A Conceptual Framework

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ABSTRACT
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.
KEYWORDS*: Decomposition;Demand for medical care; road traffic injuries; financial burden*

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I. CURATIVE VS PREVENTIVE/PROMOTIVE CARE

Conceptually, there is a need to make 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 nature and so, need not take the individual back to the pre-illness 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 here is that such an expenditure possesses a negative connotation. Uncertainty in 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 one of the fundamental assumptions of microeconomics like consumer sovereignty and thus choice, transitivity, 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

promotiveutility function. Since disease reduces general well-being of the society at large, 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 extent, it has the potential to entail heavy opportunity costs in terms of the general wellbeing 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.

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"

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

Ht = H (*ht-1, gt ,xt , et , mpt , mct*)

WhereHt is health stock at time 't'

ht-1 is health status at time 't-1'

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

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

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

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

mct is the consumption of curative care at time t

The focus here is on the injury care sub-component of *mct*. 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 ht-1, xt , et , mct and mpt . 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. 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 58 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.

The demand for injury care can, thus, be stated as

MIpt = M *(spt, ypt, pmit, hfpt, hst ,upt)*

whereMIpt is quantum of injury care sought by patient 'p' at time 't'

*spt*is the level of severity of the injury of the patient 'p' at time 't'

ypt is the household income of the patient 'p' at time 't'

pmit is the price of injury care at time 't'

hfpt is health facility type from where the patient 'p' seeks care at time 't'

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

upt is other exogenous factors not controlled by the patient 'p' at time 't'.

Among these factors, severity (spt) 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 (ypt) 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 (pmit), 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 (hfpt) too plays a positive role on the demand for injury care. But, this goes hand-in-hand with the severity (spt) and income (ypt); patients with mild injury and poor patients are likely to seek care from lower level facilities. Health system factors (hst) 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 (upt) would include all the exogenous factors such as community support, cultural factors, social aspects, etc.

Financial burdenOnce 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.

Welfare lossThe 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 reduction 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. 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 paper.

Assumptions: 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).

Utilisation 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.

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.

Supplier induced demandThe 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 individualised 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.

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.

MediflationThe 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.

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. Costs of uncertainty by households implies the level of difficulties households face in financing medical care for the injury victim and household due to the economic shock called road traffic injury.

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