

Short but not Sweet

New Evidence on Short Duration Morbidities from India

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The World Bank
Development Research Group
Public Services
February 2003



Abstract

India spends 6 percent of its GDP on health—three times the amount spent by Indonesia and twice that of China—and spending on non-chronic morbidities is three times that of chronic illnesses. It is normally assumed that the high spending on non-chronic illnesses reflects the prevalence of morbidities with high case-fatality or case-disability ratios. But there is little data that can be used to separate out spending by type of illness. Das and Sánchez-Páramo address this issue with a unique dataset where 1,621 individuals in Delhi were observed for 16 weeks through detailed weekly interviews on morbidity and health-seeking behavior.

The authors' findings are surprising and contrary to the normal view of health spending. They define a new class of illnesses as "short duration morbidities" if they are classified as non-chronic in the international

classification of disease and are medically expected to last less than two weeks. The authors show that short duration morbidities are important in terms of prevalence, practitioner visits, and household health expenditure: Individuals report a short duration morbidity in one out of every five weeks. Moreover, one out of every three weeks reported with a short duration morbidity results in a doctor visit, and each week sick with such a morbidity increases health expenditure by 25 percent. Further, the absolute spending on short duration morbidities is similar across poor and rich income households. The authors discuss the implications of these findings in understanding household health behavior in an urban context, with special emphasis on the role of information in health-seeking behavior.

This paper—a product of Public Services, Development Research Group—is part of a larger effort in the group to understand health expenditures. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Hedy Sladovich, room MC3-311, telephone 202-473-7698, fax 202-522-1154, email address hsladovich@worldbank.org. Policy Research Working Papers are also posted on the Web at <http://econ.worldbank.org>. The authors may be contacted at jdas1@worldbank.org or csanchezparamo@worldbank.org. February 2003. (44 pages)

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**Short but not Sweet:
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*This study is part of an ongoing investigation on Morbidity and Illness Behavior in India, conducted by the Institute for Socio-Economic Research on Development and Democracy, Delhi, India, with funds from the Johns Hopkins University. Jishnu Das and Carolina Sánchez-Páramo also acknowledge financial support from the MacArthur Foundation and the Fundación ICO respectively. The authors would like to thank Renu Addlakha, Abhijit Banerjee, David Cutler, R. K. Das, Saumya Das, Veena Das, Jeff Hammer, Caroline Hoxby, Larry Katz, Michael Kremer, and Jeff Williamson for useful comments.

1 Introduction

India spends 6 per cent of its GDP on health, three times the amount spent by Indonesia or Philippines and twice the amount spent by China (World Bank, 1993). Based on existing surveys¹, 60 per cent of this expenditure is on primary care, out of which households contribute more than 80 per cent. Moreover, spending on non-chronic morbidity is three times that on chronic illnesses (Shariff, 1999).

It is normally assumed that the large proportion of expenditure devoted to non-chronic illnesses reflects the prevalence of morbidities with high case-fatality ratios (e.g. tuberculosis) or with high probability of leading to permanent disability (e.g. leprosy). However, existing data does not allow us to discern the pattern of spending, either by categories of chronicity, or by categories of severity. As a result, morbidities that do not exhibit high case-fatality or case-disability ratios have not received much attention in the literature². This may not be a matter for concern if such illnesses have little impact on the overall disease burden or on health expenditure. However, if individual behavior is based on self rather than clinical assessment of the severity of the illness, such morbidities could account for a large proportion of doctor visits and health expenditure. Limited survey data arising from small scale studies suggest that this is actually the case (Phadke, 1992; Kumar, 1993).

In this paper we use unique data collected for 1,621 individuals in Delhi to provide a more detailed description of the patterns of morbidity and health seeking in the Indian urban context. The focus of our exposition will be on a special class of illnesses, referred to as 'Short Duration Morbidities', that satisfy two criteria. First, they are classified as non-chronic in the International Classification of Disease. Second, since this group still includes diseases like tuberculosis, through consultations with doctors³ we select only those illnesses that are medically expected to last less than two weeks (e.g. 'viral fever' or 'minor allergies'). It is important to note that our construction of a short duration morbidity is based on the *report* of the individual and not the actual underlying sickness. Thus such a morbidity is likely to be an illness that the individual (and the practitioners treating the individual) believe to be non-chronic and of short duration. While the distinction between the underlying morbidity and the actual report is an important one, for now our reference

¹ National Sample Survey (1973-74), (Sarvekshana,1980), and an all-India survey conducted by the National Council of Applied Economic Research, NCAER (Shariff, 1999).

² For example, it has been argued that the high frequency of self-reported symptoms in Indonesia indicates "many minor health problems that do not need expensive medical care or affect labor supply" (Gertler and Gruber, 1999).

³ S. Das, Harvard Medical School and Massachusetts General Hospital; A. Taneja, Holy Family Hospital (Delhi); K. Taneja, Holy Family Hospital (Delhi).

to a 'short duration morbidity' should be interpreted as the report of a short duration morbidity, and we return to the distinction between these two in Section 6 below.

We find that a large proportion of reported illnesses in our sample correspond to Short Duration Morbidities, and moreover such reported morbidities account for a significant share of practitioner visits and health expenditure. In particular, 95 per cent of all non-chronic episodes and 90 per cent of all episodes reported during the sample period are Short Duration Morbidities, and these episodes account for **80 per cent** of all practitioner visits and **57 per cent of private health expenditure**.

Moreover poor individuals visit a practitioner more often and spend a larger share of their income on Short Duration Morbidities than the rich. This is specially surprising once we recognize that if health is a normal good and agents have access to the same information set, the gradient between health expenditure (as well as quality of health care sought) and income should *increase* with a decrease in the severity of the illness (on this, see Section 6 below). Our results on the frequency of visits and health expenditure by the poor hence argues for a more nuanced view of the health environment in Low Income Countries, where poor health outcomes are usually understood to be a consequence of both the lack of access to health practitioners and the lack of economic resources on the part of individuals.

The second part of our study then examines the incidence of Short Duration Morbidities (SDMs henceforth) using the longitudinal nature of our survey. Our interest in this section is to disaggregate further the impact of short duration morbidities on households- is it the case that there is a class of individuals/households that are particularly susceptible to such illnesses? Alternatively, is it the case that the bulk of doctor visits and expenditure are driven by a particular kind of morbidity or set of individual/household attributes?

Our findings show that SDMs tend to cluster at the level of the individual; that is, some individuals experience a large number of SDMs, while others report just one or no episodes at all. Furthermore, while a significant part of this clustering can be explained by individual demographic characteristics, the community that the individual lives in plays an equally important role. While we do not offer an explanation at this stage of why this may be so, we hypothesize that community characteristics may be a proxy for the quality of the existing medical system.

This paper is the first step in a project on morbidity and health seeking behavior in India. As such, it has two objectives. Our first goal is to provide a detailed description of the morbidity profile of the area (with special emphasis on SDMs), and to present a thorough investigation of

the health environment we are dealing with. In doing so we discover a set of novel elements that lead us to rethink several (economic) issues related to health. Our second objective is to lay out a broad research agenda motivated by this findings. For this purpose, at the end of the paper we speculate on the way in which our results could potentially affect our understanding of the relationship between key economic and health variables, such as health seeking and labor market behavior.

The remainder of our paper is structured as follows. Section 2 and 3 provide an introduction to the institutional set up and the data. Section 4 establishes the importance of SDMs in our sample using three related measures: prevalence of, practitioner visits induced by, and expenditure associated with such morbidities. In Section 5, we show that SDMs tend to cluster at the individual level, even after controlling for observables, and that this phenomenon is directly correlated with expenditure clusters. Section 6 discusses the implications of the findings presented in the paper for the standard model of health seeking-behavior with well-informed, utility-maximizing individuals and Section 8 concludes.

2 Institutional Setup

Medical care in India is provided by both the public and the private sector. Government provision of health is based on a territorial model, with the urban sector catered to through the use of Government dispensaries (at the first tier) and hospitals. A consistent problem with government health services has been the lack of monitoring and proper incentives in the sector, resulting in crowded and poorly staffed facilities and tremendous variation in the quality of services provided (Kamat, 1995). As a result households overwhelmingly use private sources of health care. Doctor visits in our sample show a similar pattern, with the private sector accounting for more than 70% of all visits.

Such ample use of the private sector, together with the lack of health insurance (less than 1 per cent of the population is insured), implies that 75 per cent of all health expenditures are met from out-of-pocket sources, with 46 per cent of this expenditure incurred on primary outpatient care. This amount accounts for a high fraction of total household expenditure, varying from 2.9 per cent (Gujarat) to 7.2 per cent (Uttar Pradesh). Across expenditure quintiles, the proportion of income spent on health care increases sharply for the lower quintiles, as does the fraction of expenditure on primary as opposed to hospital care (Berman, 1998; World Bank, 1997).

Combined with the low use of government resources is the lack of *de facto* regulation of pharmacies and practitioners. Poor pharmaceutical regulation implies that it is possible to buy most

medications over-the-counter (Kamat and Nichter, 1998; Saradamma et al., 2000). Similarly, the lack of regulation of practitioners has led to a proliferation of care-givers with varying qualifications. Statistics based on the formal sector report only 0.7 doctors/1000 population (this includes public and private sector doctors), but once the informal sector⁴ is accounted for, this increases to between 2.5/1000 and 4/1000, a level comparable to that of Germany and the US. The high density of pharmacies and practitioners is evident in the patterns of self-medication and the structure of the health market for our sample. For every household in our sample, there are *at least 80 doctors and 5 pharmacies* within a 15 minute walking distance, thus affording easy access to both health care providers and medicines.

3 Data

3.1 Methodology and Summary Statistics

Our study uses a 16 week panel of 1,621 individuals living in seven different localities in Delhi (India). Five of these localities were initially chosen through informal contacts, while the remaining two were chosen using a health questionnaire administered in 6 schools of Delhi. In this questionnaire households were asked, among other questions, if they would like to participate in a longer survey. Households which answered positively then served as an entry into these two communities⁵. In all seven localities households were chosen randomly. In particular, in each neighborhood a street was chosen at random, and every fourth household located on that street was asked to participate in the survey. Refusal rates were less than 4 per cent in all localities.

The survey methodology incorporates two innovations. First, the recall period for the survey was shortened from one month (as in the LSMS) to one week, enabling us to collect extremely accurate information on doctor visits, expenditure and medication. Hence, during the four month survey period, each household was sampled weekly (i.e. the interviewer visited each household on the same day each week) to collect quantitative as well as narrative information. Second, information was collected separately on chronic and non-chronic conditions. Chronic conditions were identified through initial interviews, and these were individually followed each week (for instance, someone reporting diabetes would be asked about the diabetes each week). Apart from chronic conditions, a general question ("Were you sick last week") was used to screen for other illnesses, and conditional on a positive response, questions were asked about the morbidity and resulting actions.

⁴ The informal sector includes all medical practitioners who are not registered with any certifying authority (Non-Registered Medical Practitioners).

⁵ B, Kheda, J. Puri, Noida, S. Vihar and K. Nagar were chosen through research contacts. P. Nagar and South Delhi were chosen through the administration of a general health questionnaire in different schools in Delhi.

In each week, the information from the *previous* week was summarized in a ‘feedback form’, and this was used by surveyors to follow up and link morbidities across weeks in the survey period. In addition to the weekly questionnaires, basic demographic, facility and expenditure data was also collected for all households⁶ .

Given the structure of the data on morbidity in the sample, and since some illness *episodes* may last for more than a week, we use two different morbidity measures throughout the paper: *sick-weeks* and *full episodes*. To illustrate, consider the following hypothetical set of responses obtained over a three week period:

Week	Were you sick?	What illness did you have?
1	yes	stonachache
2	yes	headache
3	yes	headache

The information reported by this individual will be coded in two different ways. First we will record **two full episodes**, based on the observation that the individual reports one illness in week 1, and a different illness in weeks 2 and 3. Second we will also record **three sick-weeks**, corresponding to the number of weeks that the individual reports an illness episode. The main rationale for simultaneously using these two measures is that the latter is more efficient when dealing with within-episode dynamics (e.g. timing of doctor visits), while the former provides a better measure of the severity of the illness (e.g. in terms of duration and expenditure associated with the episode). Following this definition, Table 2 shows that there were 3,324 full episodes (5,630 sick weeks) during the period of the survey with an average duration of 7.59 days⁷ .

3.2 Sample Characteristics

Summary statistics for all individuals (households) in the sample are presented in Table 1.A (Table 1.B). Individuals in our sample tend to be young (with a median age of 22), poorly educated (50 per cent of all individuals are either illiterate or have less than primary education) and live in nuclear households with an average of 5.4 members per household. Regarding the labor force status of the individuals in the sample, about 50 per cent of those above 15 are employed, resulting in 1.5 income

⁶ The data was collected during the months of August-December of 2000 in the first four localities (wave 1), and during the months of January-April, 2001 in the last three localities (wave 2). While there is no period during the year when morbidity is expected to be higher than average, the nature of the morbidity profile does exhibit some seasonality. For instance, the monsoons occur during the summer months, increasing the risk of gastroenteritis, cholera, and malaria, while rain is scarce in the winter months, leading to numerous respiratory problems associated with high pollution levels.

⁷ Information on episode duration is missing for 221 SDM episodes out of total of 3,545 (6 per cent). Ninety per cent of these episodes were recorded for a maximum of 1-2 weeks.

earners per household, although only a third of them are in the formal sector (public and private)⁸

Table 1.A also presents summary statistics by income groups⁹. Per capita income among rich households (using the square root of the number of household members as a deflator to account for potential scale economies) is more than three times that among poor households (Table 1.B). Since both household size and the number of employed adults per household are similar across income groups, this variation in income levels is mainly due to differences in the earning capacity of employed adults. As expected, average age and education are higher for the rich, who also enjoy better access to infrastructure facilities and sanitation systems such as flush toilets and piped water. Employment rates are not substantially different across income groups, but the composition of employment does vary with a higher incidence of public sector employment among the middle and upper income groups.

Anticipating the results of the paper, one of the issues that we will be concerned about is whether the sample that we have drawn is particularly biased towards high morbidity and/or health expenditures, compared to a representative sample of Delhi. Appendix I explores this issue in some detail through comparisons of our sample with that of the (Delhi) National Family Health (1993) and National Sample Survey (2000). The differences that emerge point towards a slightly younger population (with a one year difference in the mean age) and a greater density of households in the upper income groups for our sample. As the Appendix indicates, these differences do not appear to be large, and (assuming a positive relationship between income and health), should actually bias our results towards less morbidity than what is representative for Delhi as a whole.

4 How Important are Short Duration Morbidities?

4.1 Prevalence, Doctor Visits and Expenditures

One out of every five observations in the sample corresponds to a SDM report, with more than 75 per cent of all individuals and 95 per cent of households experiencing at least one SDM episode

⁸ The skewness of the age distribution towards younger groups (35 per cent of all individuals are below 15) implies that a large fraction of the sample has never been married (50 per cent) and that there are a substantial number of individuals of school-going age in the sample. For this reason we report the individual's actual education level for those above the age of 15, and the individual's mother's education level for those ages 0 to 15.

⁹ Following Filmer and Pritchett (???) household per capita income was constructed using information on the household assets to correct for problems associated with measurement error in reported income/consumption, the presence of outliers and differences in tastes across households. In particular log per capita consumption expenditure (corrected to account for economies of scale in consumption at the household level) was regressed on a number of assets and indicator variables for access to different types of infrastructure and facilities. The coefficients from this regression were then used to predict consumption expenditure for each household. This measure correlates strongly with reported household income, while mitigating the problems mentioned above.

during the 16 weeks of the survey. This translates into every household having one sick member every week or alternatively, that 20 per cent of all weeks are spent sick with an short duration morbidity among the individuals in our sample. The bulk of SDM episodes are either respiratory (colds/coughs/allergies), musculo-skeletal (sprains/strains/minor injuries) or gastrointestinal (acidity or diarrhea) and last just over 7 days on average (Table 2). Moreover the report of a short duration morbidity is negatively correlated with income - 18 per cent of all weekly reports by the rich correspond to a SDM compared to 22 per cent for the poor, and 71 per cent of rich individuals report having been ever sick with a SDM compared to 82 per cent for the poor.

In itself, these results may not be surprising- given the short recall period and the frequency of visits, it is entirely likely that a number of 'minor' morbidities (such as a headache from work) are reported and these reports are uncorrelated to subsequent actions. However, a surprising finding is that the reports of such morbidities have real consequences, both in terms of doctor visits and health expenditure.

We find that individuals in the lowest income group make 0.12 weekly practitioner visits for SDM reports¹⁰ (i.e., one member of a household visits a doctor with a SDM every fortnight), while these numbers are 0.08 and 0.06 respectively for those in the middle and highest income groups (Table 3). Although poor people may be sick more often and thus visit the doctor more, when we condition on the occurrence of an SDM episode (contact rate), we find that the poor still visit a practitioner more often per sick-week than the rich¹¹. In particular, 1 out of every 2.5 SDM weekly reports corresponds to a practitioner visit for the poor, while this number drops to only 1 out of every 3.3 for the rich. Similarly, the poor visit a practitioner in 1 out of every 2 SDM (full) episodes, while the rich do so in 1 out of every 2.7. The inverse relationship between income and health service use that we observe in the sample is further characterized by the following three observations:

1. This relationship is **not** a characteristic of the (observable) epidemiological profile across income groups. The relationship continues to hold even after we condition on type of illness (e.g. fever or respiratory conditions), duration of illness (e.g. illness that last less than 7 days) and interactions between the type and duration of illness (e.g. fevers that last less than 7 days).
2. Interestingly though, the higher number of visits by the poor does not correspond to greater use of *overall* health resources by the poor: recall from our previous discussion that due to the

¹⁰ Where the term practitioner refers to government facilities, trained biomedical doctors, homeopaths, indigenous practitioners, and untrained practitioners, *but* not pharmacies.

¹¹ The difference is significant for a 99% confidence interval.

lack of pharmaceutical regulation, almost all medicines can be purchased over-the-counter, and as a consequence the pharmacy may be used as a substitute for a practitioner visit¹². Graph 2 shows that the incidence of self-medication is high and varies considerably across income groups with the rich self-medicating for SDM episodes (50 per cent of the time) far more than the poor (30 per cent).

3. A third possibility is that this relationship arises due to differences in the use of public/private providers across income groups. Given the density of public providers and the very low cost, it could be that these visits are largely accounted for by the public sector, and thus have no associated expenditures for the poor. Although the poor do use public health resources more than the rich, higher contacts rates for the poor cannot be explained by high use of these resources. In fact approximately 70 per cent of the visits made by this group are to the private sector, with more than 45 per cent to private doctors in the formal sector alone. The high number of visits to the private sector impact directly on expenditure, as detailed below.

Expenditure on SDMs represents a high share of overall spending and tends to be regressive in nature. Individuals in the sample spend an average of Rs.25.5 on SDMs each month, which accounts for 46 per cent of total monthly expenditure on health (Table 4.A). This translates into an annual per capita expenditure on SDMs of Rs.306. The bulk of expenditure is accounted for by medication (65 per cent)¹³, followed by consultation fees and diagnostic tests (20 and 4 per cent, respectively). Transportation costs are almost negligible (2 per cent) with most people visiting practitioners located near their homes.

When we examine differences in expenditure on SDMs by income groups, it becomes apparent that the poor spend relatively more than the rich on these episodes. In particular, poor individuals spend an average of Rs.24.5 per month on SDMs, or 75 per cent of their monthly health expenses, compared to Rs.26.0 (37 per cent) for the middle income group and Rs.27.1 (40 per cent) for the rich. In this respect it is important to notice that high expenditure on SDMs by the poor is not driven by abnormally high expenditures on the part of a few individuals compared to other income groups: Graph 2 shows that the distribution of expenditure on SDMs is fairly similar across the three income groups.

¹² Medication (and advice) obtained in this manner is recorded in our data as 'self-medication'. Self-medication refers to both genuine self-medication (85 per cent of all self-medication events) and chemist prescription ('chemist as doctor', 15 per cent). Genuine self-medication mainly results from the use of an old prescription (37 per cent), prior knowledge (combined with a positive experience) of the medicine (31 per cent) or advice by a family member (20 per cent).

¹³ Because a large fraction of practitioners also dispense medicines (60 per cent), the cost of these may sometimes reflect consultation fees as well.

If we examine instead SDM expenditure at the household level, the numbers are equally striking. Poor households spend on average roughly the *same* amount on SDMs as rich households (Rs.130-140/month), while they report much lower health and overall expenditure levels than the rich. This implies that poor families are spending a significantly larger fraction of their health and overall budgets on SDMs than rich ones. Specifically expenditure on SDMs represents 70 per cent of total health expenditure and 3.3 per cent of total expenditure in poor households, whereas these numbers are 40 and 1 per cent respectively in rich households. The results on SDM expenditure are particularly stark when compared to other human capital investments: the median monthly expenditure on SDMs represents 85 per cent of the median outlay on education for the average household in the sample, while this number is 200 per cent and 10 per cent for the poor and rich households respectively- a striking difference.

Further, the expenditure on short duration morbidities arises due to the high spending on a number of exceptionally severe episodes *combined with* the frequent occurrence of small outlays on such morbidities throughout the survey period. To elaborate further on this point it is instructive to decompose the expenditure on SDMs by individuals into two separate components- expenditure that is driven by the incidence of an episode, and expenditure that is driven by the duration of an episode. In addition to providing more detail on the structure of spending, this exercise also addresses the concern that the large number of SDM reports we find is a product of our methodology- under this hypothesis, 'real' expenditure is driven by a few, severe episodes, with the bulk of SDM reports resulting in very little spending.

We thus estimate the following model:

$$y_i = \alpha + \beta X_i + \gamma Ep_i + \delta dur_i + \varepsilon_i$$

$$\varepsilon_i \text{ iid } \sim N(0, \sigma_\varepsilon^2)$$

where y_i is the per capita log of expenditure on SDM¹⁴, X_i is a matrix of demographic variables including gender, age, income and education, Ep_i is the number of SDM episodes reported by each individual during the sampling period, dur_i is the average duration of a SDM episode, and ε_i is an individual specific error term. We find that the coefficients on both the number of full SDM episodes and average duration of the episode (γ and δ above) are positive and significant (not reported), suggesting that expenditure on SDMs is indeed driven by both the duration of the illness and the

¹⁴ A formal test establishes the normality of the distribution of log expenditure

absolute number of reported episodes.¹⁵

The evidence presented so far shows that SDMs are integral to the health status of the individuals in our sample: they contribute significantly to the morbidity burden and account for a large proportion of doctor visits and expenditure. Moreover, SDMs impact differentially on income groups, with the poor spending significantly higher shares of income and their overall health budget than the rich. These results are especially surprising if we think of SDM's as illnesses that are fairly frequent and are associated with a list of common medicines that can be used to alleviate symptoms or provide relief. The different mix of actions across income groups- with the rich using chemists to purchase their own medicine and the poor visiting doctors for their treatment- has important consequences for expenditures and seems to point towards systematic differences in the information available to different income groups.

Before exploring this topic in greater detail below, it is instructive to further decompose the incidence of SDMs in our sample. Is it the case that SDMs impact certain individuals/households more than others? In the next section we concentrate on these questions through an examination of the temporal dimension of illness making use of the longitudinal nature of our survey.

5 SDMs: Incidence Patterns

There are 1,621 individuals in our sample, out of whom 76 per cent ever report a SDM. Since a total of 3,545 full SDM episodes are recorded, the number of episodes per capita is 2.20, and the number of episodes per sick individual is 2.87. However, the experience of a large number of sick individuals differs substantially from this 'average morbidity profile'. In particular, some individuals suffer a large number of SDMs, while others only report a single episode. A useful typology to facilitate this analysis is the division of individuals into three types:

- Type I : Individuals who report no SDM episodes
- Type II: Individuals who report one or two episodes
- Type III: Individuals who report more than two episodes

The choice of two SDM episodes as the cut-off value between Type II and Type III is motivated by two observations. First, more than 60 per cent of all individuals in the sample suffer two or

¹⁵ This finding is also important because it provides an argument for using self-reported morbidity as the variable of interest when the actions we are trying to explain are related to the perception of the illness rather than to an underlying clinical condition even though the 'self-report' may measure the 'true' clinical morbidity with error (see Johansson, 1991 or Dow et al. 1997).

fewer SDM episodes, and (ii) the average number of SDM episodes per individual is 2.19. Moreover, it is important to notice that under this classification, even a Type II individual could spend a substantial portion of her time sick during the survey period. The distribution of subjects across types is then as follows: 26 per cent are Type I, 38 per cent are Type II and 36 per cent are Type III.

Within this particular classification, morbidity profiles are quite different across types. Type II individuals experience 1.42 SDM episodes and spend 2.38 weeks sick on average, compared to 4.53 and 7.03 respectively for Type III individuals (Table 5). Further, Type II individuals use 1.28 different diagnostic categories, and this increases to 3 diagnostic categories for the Type III subjects. Thus, it appears that there are three broad categorizations of individuals: those who report no illness at all, those who report one or two episodes that are different in nature, and those who seem to be affected by a combination of different illnesses, some of which recur over time.

Given its important implications in terms of both health status and expenditure, the question then arises as to what explains the differences in the incidence of SDMs at the individual level. To what extent is this polarization a result of demographic and infrastructure characteristics as opposed to random incidence patterns? The exercise below shows that while demographics are important in understanding the origin of SDM incidence, other factors that may constitute the ‘health-environment’ and the ‘health-market’ play an equally significant role.

In order to check for (observable) differences across the three types, sample proportions by type are presented in Table 6. Individuals of Type III suffer from chronic illnesses more than those of Type I and II, and have a greater share of women and young children. As a result, a larger fraction of individuals in this group are out of the labor force or in the informal sector. Finally, we also find differences across the households where individuals from different groups live. In particular, Type III individuals are overrepresented among the poor and in certain areas, and they tend to inhabit households where in-house piped water and flush toilets are less common (Table 6.B).

To disentangle the effect and relative importance of these different factors, we then model the occurrence of a SDM episode as a Poisson distribution so that the probability that individual i experiences a certain number y of SDM episodes is:

$$\Pr(y|\mu) = \frac{e^{-\mu} \mu^y}{y!} \quad \text{for } \forall y = 0, 1, 2, \dots, N$$

and

$$\mu_i = E(y_i|x_i) = \exp(x_i\beta)$$

where x_i represents a set of individual i 's characteristics. For the purpose of the estimation we construct four groups of individual characteristics (demographic characteristics, household income, access to water and sanitation, and area of residence), and introduce them sequentially into the model. Table 7 presents the results from the four models generated by this exercise.

The first model containing the demographic characteristics of the individual confirms to a large extent the impressions we had derived from the sample proportions. Women and those who suffer from a chronic condition appear to be more likely to experience a high number of SDM episodes, and so do married individuals, young children and those who are out of the labor force. Education, measured as having completed at least primary school, does not seem to have a strong effect on morbidity however. These results are fairly robust to different model specifications, especially the results concerning gender, marital status and age.

Model 2 incorporates income and Model 3 introduces information about household sanitation infrastructure and access to (clean) water. While income is negatively and significantly correlated with the number of reported SDM episodes in Model 2, this correlation disappears once we introduce the facilities variables. To explore this point Table 8 presents data on sanitation infrastructure and access to water by income levels, making it clear that both the presence of a flush toilet and running water in the household are strongly correlated with income hence making these two sets of variables highly multicollinear¹⁶.

Finally Model 4 includes area-of-residence indicators together with the demographic and income variables. Because potentially we could also encounter a multicollinearity problem between area of residence and income if neighborhoods in the survey were very homogenous, Table 8 also presents the distribution of income in all seven localities. We feel that there is substantial variation in income both within and across areas to justify the conclusion of both income and area variables in the regression, and although the effect of income disappears once we control for area of residence it is important to notice that the locality-specific effects are not a direct reflection of the locality's average income level (e.g. Noida, the second poorest community, enters the regression with a significant negative coefficient, larger in magnitude than those of other 'better-off' localities).

The full model then presents a world in which SDM clustering is mainly a function of the individual's gender, age and marital status, as well as of her labor force status and area of residence. While the interpretation of the demographic variables is fairly straight forward, the question arises as to what exactly are the community indicators capturing. Based on our knowledge of these areas

¹⁶ The hypothesis that both infrastructure indicators are not significantly different from zero when a model including these indicators as well as income is estimated cannot be rejected at the 5 per cent confidence level.

and on some preliminary evidence regarding health practitioners and their practices generated by a practitioner survey that is currently being administered in these same localities, we would like to argue here that to a large extent these indicators are capturing the effects of the 'health environment', or more precisely the 'health market', in which different individuals operate¹⁷ - an issue that we explore in more detail in the next section using qualitative information (narratives and case studies) collected during the survey period.

This concludes our documentation of the importance of SDMs, both in terms of the population's morbidity profile and the expenditure they generate. Two key features emerge from our discussion: (i) SDMs are extremely important in terms of prevalence, as well as doctor visits and expenditure and, (ii) the incidence of SDMs is affected both by demographic characteristics of the sample as well as 'environmental' factors captured by community fixed effects.

6 Discussion

The picture of morbidity and health seeking behavior that we have constructed so far is very different from what is normally encountered. For instance, approximately 40 per cent of our sample would have reported 'yes' to the question "*Did you have at least one SDM episode in the last month?*"¹⁸ which is more than 300 per cent higher than that reported by the National Center for Applied Economic Research (NCAER) for all India (400 versus 122). Similarly, expenditures on SDMs alone are 250 per cent higher than that reported by the NCAER survey for all India, and more than 150% higher than *all* medical expenditures reported by the Nation Sample Survey (NSS) in Delhi. Our discussion focuses on two aspects of these findings. First, we examine if the exceptional use of health resources for SDMs is a facet of our sample rather than of the health environment in Delhi. Second (if the picture of health behavior that we have constructed is in some sense 'representative' of the population of Delhi) we discuss what the implications of these findings are for the economics of health care in the urban context for a low-income country.

To an extent, doubts about the nature of our sample are mitigated by the close fit between the observable characteristics of our sample with that of the NSS (Figure 3) in Delhi (particularly the kernel densities of health expenditure based on the *budget* questionnaire) and this leads us to think that the differences that have emerged are largely due to the two characteristics specific to our dataset (the separation of chronic and acute reports, and the short recall period) that have not been replicated thus far by other surveys.

¹⁷ By the term 'health environment' we imply both failures of the medical system represented by poor doctor practices as well as patient behavior, such as inability to comply with medical regimes.

¹⁸ The question reproduces the format of the NCAER survey, which uses a monthly recall questionnaire.

Preliminary evidence that this is indeed the case¹⁹ follows from a simple counter-factual exercise where we ask what morbidity profile would arise from our data if we imposed the restrictions inherent in other available surveys²⁰. Although this exercise is fraught with difficulties since we cannot identify the behavioral changes that result from a change in the recall period²¹, we find that the accounting of explicit restrictions in themselves yields significant insights.

For this purpose we consider two types of restrictions frequently imposed in those questionnaires: (i) the number of episodes that can be reported by each individual is restricted to one (all questionnaires except NSS), and (ii) an illness is usually recorded *only* if it resulted in the loss of work (NCAER, SLC). When these restrictions are applied to our dataset the number of SDM reports decreases sharply²². Only 75 per cent of the SDM episodes reported in our survey would have been recorded had we restricted ourselves to one episode per individual per month, while this number would have been around 10-15 per cent had we recorded exclusively those episodes that caused the individual to lose at least one day of work. Finally the adoption of both criteria simultaneously would have resulted in less than 8 per cent of the SDM episodes being recorded.

While this does provide some evidence that the nature of questions used in standard health surveys severely underestimates the incidence of SDMs, our suspicion is that the length of the recall period has an equally important role. Subsequent waves of data for the same sample that were collected on a monthly recall basis will allow us to examine this issue with greater clarity in the near future. If we then propose that the differences in our data arise not from the nature of the sample, but from differences in the methodology, what are the implications of these findings for our understanding of the health environment?

6.0.1 Implications for the Economics of Urban Health

Consider a standard model, as in Gertler and Van Gaag (1992), where individuals choose from a number of options to maximize their utility. Following the Gertler-Van Gaag specification, let there be n options, $i = 1, 2, \dots, n$, and let each option be indexed by two attributes, $\{p^i, q^i\}$ where p and q are respectively the price and quality of attribute i . Further, let an individual's utility be given by $U_j(C_j, H, \omega, I)$ where $C_j = Y_j - p_j^i$ is the consumption net of expenditure on health care, H is

¹⁹ This section is based on Jishnu Das & Carolina Sánchez "Self-Reported Morbidity Questionnaires: Reporting Issues and Design Issues", 2002 mimeo.

²⁰ For India we consider the following surveys: NCAER, SLC - Survey of Living Conditions (World Bank) and LSMS - Living Standards Measurement Survey (World Bank).

²¹ This is particularly troublesome if most illnesses are 'minor' as seems to be the case in our sample.

²² Comparisons were done on a monthly basis so that numbers arising from our sample were comparable to those from the standard surveys.

the utility derived from good health, ω is a state variable indicating the type of morbidity and I is the information available to individual j .

If $U_j(C_j, H|\omega, I)$ is quasiconcave in its two arguments (conditional on the illness and information) and individuals choose i to $\max U_j(\cdot)$, the following two claims follow immediately:

Claim 1 *For the same illness and the same information set, richer individuals will choose higher quality (and more expensive) treatment options*

Claim 2 *The quality-income gradient will increase with a decrease in the severity of the illness, H .*

The intuition for both claims follows from the quasiconcavity of $U(\cdot)$ - richer individuals will care more about the health costs of an illness than the poor, and will thus choose better quality options. Moreover, this difference must be greater for less severe illnesses since the loss from ill health is smaller, and hence, the marginal loss of utility from higher priced treatment options is accentuated at lower level of incomes. In other words, it is likely that a rich and a poor individual who suffer from a fracture visit high quality treatment options, but unlikely that a poor individual chooses a very high quality treatment option for a self-limiting cold relative to the rich.

The behavior across income groups in our sample however, is exactly the opposite of what would be predicted by this theory with poor individuals spending inordinately high amounts on 'minor' morbidities compared to the rich. Given the general formulation above, and noting that the claims hold *once* we condition on ω and I , there could be two different broad hypothesis for this behavior.

The first hypothesis is that even within SDMs, the epidemiological profiles that we observe are very different for the rich and the poor- the results we obtain do not condition on the illness, ω . The inherent problem of not observing the underlying sickness (often referred to as the problem of 'differing reporting thresholds') is shown in the figure below: Due to the nature of the disease profiles and the reporting thresholds, the rich are observed to self-medicate more and visit doctors less than the poor, but once we condition on the illness, the gradient between income and quality is restored.

To an extent the problem of differing thresholds cannot be addressed due to the intrinsic nature of the problem: while it may be possible to say that one individual has a compound fracture (more severe) and another has a simple fracture (less severe), it is more difficult to claim that one person's headache is more or less severe than others. Given that over 50 per cent of the symptoms and diagnosis in our profile represent exactly those cases where the severity **must** be

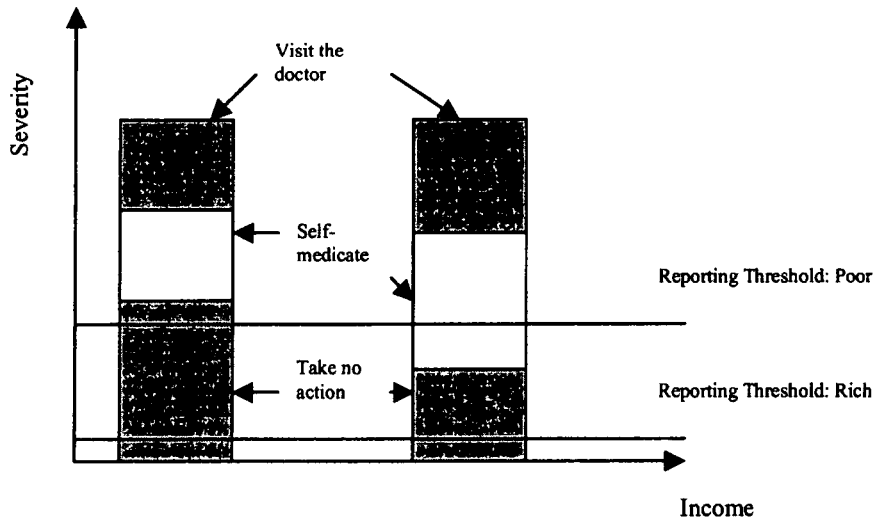


Figure 1: Reporting Thresholds and Income

self reported (pain, anxiety and weakness are three major categories), the problem of different reporting thresholds must remain, to some degree, unresolved.

However, we note that the relationships that we observe regarding quality and income remain robust to *observable* differences in morbidities: lower income groups choose higher quality choices (doctors vs. self-medication) even if we condition on the type of illness, the duration of the illness, and the interaction between the type and duration of the illness. Thus, we can say with some confidence that poorer individuals who suffer from a headache for a week or less visit the doctor more than rich people suffering from a headache for a week or less, but this still leaves open the question of whether the poor persons headache is more or less painful than that of the rich.

A second hypothesis is that there are systematic differences in the information available to individuals in different income groups. Qualitative evidence collected during the survey indicate that there are two broad type of differences in information among individuals in our survey. First, individuals in higher income groups may be more informed about the type of illness they have (diagnosis), and second, they may have more information about the mapping between illness and medication (treatment).

A possible reformulation of the problem of diagnosis is to think of this as a problem of *labeling* whereby observed differences in the treatment and reporting across income groups are inherently linked to the construction of the category of short duration as opposed to chronic morbidities. As an example, consider the case of an individual with diabetes. The report of this illness may take

one of two forms: either, the person may be aware of her diabetic condition, and when asked about her health incorporates this illness into her health report. Alternatively, if the person is not aware that she is diabetic, she may report the illness *only* when symptoms occur- as a result, she may report 'boils' or 'loss of sensation' as two unconnected illness episodes, each lasting a short while as two different episodes. In this case, while the first report would be coded as 'chronic', the second would be coded as a 'short duration morbidity'. Thus, what we construe to be a short duration morbidity in high income groups may be 'truly' such illnesses, but are a combination of chronic and other morbidities in lower income groups. This problem is potentially important since only 10% of the poor, but 40% of the rich, report chronic conditions in our sample.²³

One way to probe this hypothesis further is to consider a group that we would ex-ante expect to be less prone to chronic illnesses than the entire population so that conditioning reporting and behavior on this particular group would allow us to examine differentials across income groups independent of the assumptions required in the construction of SDMs. One natural way to construct this group is to rely on the sharp differentials in the incidence of chronic illnesses by age²⁴ and the results of conditioning reporting and health-seeking on the sample restricted to individuals less than 30 years are presented in Tables 2a, 3b and 4c..

First, as expected, (Table 2a) there is a sharp increase (between 5 and 7 times) in reported chronic illnesses with age, although the lower reporting of chronic illnesses among the poor remains in the restricted sample. Second, Table 3b shows that the pattern of doctor visits in the full sample remains unchanged when we examine only individuals under 30. The probability of visiting a practitioner is higher among the poor (11% of all weeks) compared to the rich (6.7% of all weeks) and further, higher visit proportions among the poor are retained when we condition on the occurrence of an SDM report (39% for the poor compared to 33% for the rich) or an SDM episode (47% for the poor compared to 37% for the rich). As with the entire sample, the high rates of doctor visits among the poor directly translates into higher proportional expenditure as well. Table 4c shows absolute and proportional expenditure on SDMs and other morbidities disaggregated by age and income groups. While the spending on SDMs as a proportion of total health spending is now

²³ For example, J., with undiagnosed tuberculosis, reports episodes like 'fever', 'headache' and 'body-ache' for 12 weeks of the survey, visits the same practitioner 5 times, but is not asked to undertake a single diagnostic test. Every week that she reports a new illness she makes no connection to her previous episode, which she regards as 'cured'. Further, each week she takes a number of medicines, ranging from antibiotics to steroids and pain-killers, and over the 16 weeks, she spends Rs.400, representing 2.5 per cent of the household income. After the visit by the project doctor and a subsequent chest X-ray, which she paid for on her own, a lesion detected in her right lung was diagnosed as tuberculosis. She was then advised to visit the government TB clinic, where free treatment and medication are provided under the DOTS program.

²⁴ For instance, mortality due to chronic illnesses such as cancers and diabetes in the US increase by almost 50 times between the ages of 35 and 80 (National Center for Health Statistics, 2002).

roughly equal across income groups (83% for poor and middle, 76% for the rich), as a proportion of total spending the poor continue to spend 4 times as much as the rich on such morbidities.

Although not conclusive, these results suggest the observed patterns of doctor visits and health expenditure on short duration morbidities is not entirely driven by the misclassification of chronic illnesses. To the extent that this misclassification exists (one such case is detailed in the footnote below), it is critical to recognize that the nature of this problem is *qualitatively different* from the normal construction of the problem (see for instance, Belcher, 1976). Traditionally it is assumed that the inability of individual to diagnose a chronic illness is related to the lack of medical resources. Our study shows that *despite very high access and use* of medical resources, the reporting of chronic illnesses is high in rich income groups but remains low among the poor- for the poor, both individuals and the medical system continue to treat most illness episodes as short duration morbidities.

The third assumption in the model above that may fail is the assumption of equal-information across income groups regarding the mapping between illness and treatment. In particular, if it is the case that low income households have systematically less information about the treatment regimen for a given illness one would expect patterns similar to that observed in the data to arise naturally. Data from the sample on the prescription practices across low and high income households generates some support for this hypothesis. In particular, the use of written documents a doctor increases with the income of the individual, with 32 per cent of doctor visits among the poor resulting in a prescription compared to 44 per cent for the rich. Similarly, the number of cases where a person is dispensed medication that is not identifiable decreases sharply from 474 to 151 moving from the poor to the rich.²⁵ Both of these statistics point towards a simple informational based explanation for the pattern of doctor visits and expenditures that we observe in the sample, with greater self-medication among the rich arising from more information regarding both their illness and the types of medications appropriate for their illness compared to the poor. The figure below summarizes this discussion of the potential failures of the standard model in our data.

Our presentation so far has proposed a more nuanced view of the connection between health and poverty. The impressive body of work that examines differences in health expenditure patterns across income groups at best provides information on *how much* individuals are spending (Berman, 1998). We have argued that additional information on *what* individuals are spending on can provide a very different picture. We have hypothesized that the differences in our data from what is normally

²⁵ Why is a medicine not 'identifiable'? It is a common practice among practitioners in our sample to provide a 'cocktail' of medicines to their patients. This cocktail is prepared by taking multiple tablets and crushing them together before dispensing the mixture to the patient. As a result, almost no information is available, either to the patient or to the researcher, about the type of medication dispensed in these cases.

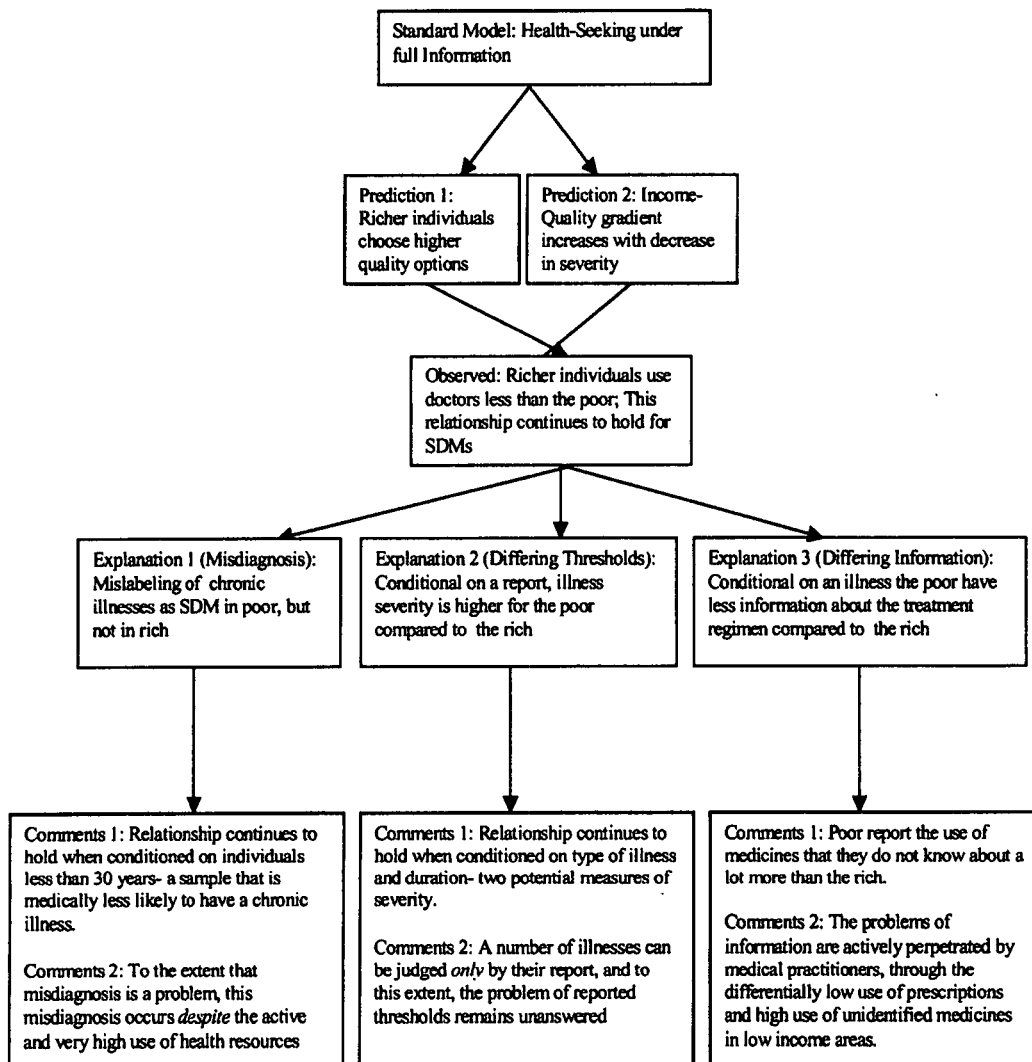


Figure 2: The Standard Model and the Delhi Data: Potential Reconciliations

observed is not a facet of the sample, but of the study methodology and in doing so hypothesize on the centrality of information in the health seeking behavior of individuals.

7 Conclusion

The health problems of Low Income Countries have been closely tied to the ability of individuals to access and pay for quality medical services. The implied corollary is that improvements in access and ability to pay will translate directly into improvements in health. While such improvements are clearly a necessary condition, the picture that we have presented suggests that there are other complex barriers to improved health which deserve closer attention. We have argued that one way to better understand the nature of these barriers and the relationship between poverty and health is to focus our attention on a class of morbidities we have called 'Short Duration Morbidities'.

These morbidities are highly prevalent, induce a large number of doctor visits (1 out of every 3 weeks with an SDM results in a doctor visit) and every week of sickness with such a morbidity is associated with a 25 per cent increase in health expenditure. SDMs tend to cluster by individuals, with those reporting 'multiple-episodes' accounting for more than 70 per cent of the sick-time and expenditure on such morbidities. While part of these multiple episodes are a reflection of observable demographic characteristics, the specific neighborhood that the individual resides in also plays an important role, independent of the availability of sanitary and infrastructure facilities.

Finally, significant differences arise between income groups in the treatment of such morbidities. The poor people in our sample report a large number of SDMs, and nearly one out of every two such reports is tied to a doctor visit. Since most of these visits are to the private sector, the poor also end up spending a large proportion of their income on SDMs. In some cases, the reports of such morbidities arise from an underlying condition that remains undiagnosed, and preliminary research with medical practitioners shows that the medication that they receive is often inappropriate or contra-indicated. At best, this prolongs the length of time spent sick; at worse, this in itself generates further sickness and ill health. This evidence challenges the view that frequent doctor visits are beneficial since they may actually result in early diagnosis of severe conditions (Saradamma et al. 2000).

The rich also report a large number of SDMs. However, instead of going to the doctor, they overwhelmingly tend to self-medicate for such conditions. Although they spend more money than the poor, the amount spent, both as a proportion of income and as a proportion of total health expenditure is much smaller. As opposed to the poor, who report no expenditure-generating chronic illnesses, more than 40 per cent of all individuals report such morbidities in the higher income

groups, and such illnesses account for the bulk of their medical expenditure. The prevalence, nature of spending, and variation across income groups raise several questions regarding economic and health outcomes in such environments.

One out of every ten individuals in our sample spends two months out of four sick with SDMs. As a percentage of the potential labor force, this number increases to almost one out of every five. What then, are the consequences of such morbidities for the labor supply decisions of the household? Potentially, it could be argued that such morbidities do not result in loss of labor days since they do little to impair the normal functioning of the individual.

However, as Morduch (1995) has argued, the 'loss of work' may not be the correct variable to look at, if households build their health profiles into their choice of production techniques. For instance, households which are more likely to have poor health may choose an inherently less productive but more flexible production process, however the effect of such a choice will not show up in analysis that takes the choice of production as exogenous to health. In a sample such as ours, where the overwhelming majority (65 per cent) of the employed work in the informal sector, this argument is especially relevant²⁶. Further, since the choice between employment in the formal and the informal sector (which is more flexible) may itself be a function of health, restrictions to wage-earners (Schultz and Tansel, 1997) would bias the estimated coefficients. One way to tackle this issue that we will explore in future work is to study the direct impact of illness on productivity and income, rather than concentrate on the work-days lost due to sickness.

Our findings also raise questions regarding the constraints to health improvements in such environments. On the one hand, households spend significant proportions on SDMs, while on the other, health outcomes, especially among the lower income groups are extremely poor. Individuals primarily visit the same doctors, always in their neighborhood, who prescribe and dispense medication that is often unsuited to their underlying medical condition, and that may even contribute to the development of other drug-resistant infections (research currently being undertaken).

It could be argued that this pattern of frequent visits to poor-quality private practitioners and the associated consumption of inadequate medication are specific to urban settings. For instance, it is possible for dense urban areas to have a much thicker network of 'bad' private doctors who over-prescribe than rural areas where use of public resources or more traditional health care approaches may be made. However, evidence from rural survey data shows that this is not the case. Using data collected by the World Bank from 125 randomly selected villages in rural India, Das (2000) shows

²⁶ For example, when asked about the number of work days missed due to illness, we often heard answers like "How can I not work? I went to sell vegetables, but then I was feeling tired all day and could not do much"

that the probability of visiting an untrained practitioner is 70 per cent for low income households, and remains high (at 42 per cent) for those in the 90th income percentile²⁷. Moreover, as in urban areas, such visits to low-quality private doctors translate into extensive misuse of medication, including antibiotics. For example, Dineshkumar et al. argue that "[...] broad spectrum antibiotics constitute a high proportion of prescription in rural areas" (Dineshkumar et al., 1995; also see Kuruvilla et al., 1994).

The crucial question that arises then is why individuals return time and again to doctors who provide standards of care below the acceptable norm. Is it the case that other doctors in the city are too expensive, while the time costs of going to government hospitals (which are free) are too high? Or, do such patterns reflect behavioral constraints, such as a reluctance by women to leave their neighborhoods? An alternative hypothesis, discussed in Das is that these patterns of use reflect inefficiencies in the process through which households learn about doctor quality (J. Das, 2000). Sick individuals initially go to neighborhood doctors due to the low cost of such visits. Doctors heavily medicate such individuals, often in forms that are not recognizable. A 'cure' in such cases is then attributed to the (high) quality of the doctor rather than the self-limited nature of the illness and for future illnesses, the same pattern repeats itself.

The answer to these questions have important implications for policy: if it is the case that information plays a significant role in the nature of health spending and the choice of doctors, then demand side interventions, aimed at providing more information to households and making them better 'consumers' may be more beneficial than supply side interventions that aim to increase the accessibility of households to medical providers. In fact it may even be the case that supply side interventions, in an environment where information is scarce, actually worsens inefficiencies in the health environment.

Clearly the role of information and the structure of the health market in urban regions where access constraints are not of primary importance needs to be examined in greater detail. Nevertheless, we feel that the results generated so far provide key insights into the relationship between health seeking behavior and health resources in Low Income Countries. The findings presented lead us to reconstruct some of the dominant notions regarding the health environment in such contexts and opens up an agenda for future work.

²⁷ Note that these visits are *not* visits to traditional doctors, who are accounted for by separate categories in the survey.

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Appendix I - Comparison with the Delhi Sample from the National Family and Health Survey (1993)

The data used in this paper (ISERDD henceforth) is compared here to the Delhi sample from the National Family and Health Survey collected in 1993 (NFHS henceforth) to evaluate the extent to which it is representative of the Delhi population. The analysis concentrates on different demographic characteristics of individuals in the sample, such as age, marital status, and education attainment, as well as on household characteristics. Unfortunately the NFHS does not contain income or expenditure information.

Age. Table A.1 presents the age distribution in the ISERDD and NFHS samples (numbers for the latter appear in parentheses), disaggregated by gender. Both distributions are fairly similar.

Marital Status. Table A.2 presents data for individuals in four different categories (never married, currently married, widowed and divorced/separated) by age groups and gender for the ISERDD and NFHS samples (numbers for the latter appear in parentheses). Again figures for both data sets are similar, although the fraction of individuals who are currently married (never married) is slightly higher (lower) in the NFHS sample than in the ISERDD sample.

Education attainment. Table A.3 presents the distribution of both samples across different education levels by age group and gender. In general education attainment is somewhat higher in the ISERDD sample than in the NFHS sample for most age groups and independent of gender. This is due to both samples being roughly one generation apart, combined with the fact that younger generations are more educated than older generations.

Household composition and size. Table A.4 presents information on the demographic characteristics of the household head and Table A.5 presents the distribution of households according to size. Given that there are no significant differences in neither the age distribution nor the marital status distribution between the NFHS and the ISERDD samples, differences in the characteristics of the household head are interpreted as resulting from differences in the definition of household head rather than from true underlying sample differences. In particular, most household heads in the NFHS sample are middle-aged, married males (household head as bread winner), while this group seems to share household-head responsibilities with older, widowed women (household head as eldest person in household) in the ISERDD sample.

Average household size is similar in both samples, although the NFHS contains a larger fraction of small and large households (1, 2, 3 and 8(+) -people households) than the ISERDD sample.

Household facilities. Table A.6 contains information on light and drinking water sources, and type of latrine for both samples. The main differences arise regarding the type of latrine, with a much larger fraction of the NFHS using flush toilet or no toilet - as opposed to services latrines or septic tanks.

Expenditure: Figure A.1 presents the kernel densities of expenditure under various categories for the ISERDD and the NSS (2000) sample for Delhi. Although efforts were made to remain as close as possible to the NSS Schedule 10, there were some changes made to better reflect the spending patterns of our sample. For both studies however, the food questionnaire is identical. The kernel densities show that the ISERDD sample has a greater proportion of households in the upper income groups, and this is accounted for by a decrease in the proportion of households in the middle income groups. Note however, that in all cases, expenditures match up closely for the lower income groups. For the entire sample, tests of equality of distributions holds for food expenditure, but not for others.

Table 1.A Sample Proportions - Individuals

Individual Characteristics	Categories	Poor	Middle	Rich	Total
Morbidity	Reported ever sick	82.74	77.40	78.79	80.49
	Reported ever SDM	81.86	74.57	71.72	76.37
	(Diagnosed) Chronic Condition	9.33	15.63	31.81	18.14
Gender	Female	45.07	48.77	50.72	48.05
Age Distribution	0-4	10.85	6.74	5.29	8.05
	5-14	32.90	22.16	15.64	24.03
	15-29	25.18	32.95	27.27	28.34
	30-49	25.00	26.40	31.92	27.52
	50-64	3.31	8.09	13.95	8.12
	> 65	2.76	3.66	5.92	3.93
Education ^B	Illiterate	51.41	20.34	4.16	27.14
	< Primary	7.04	6.59	2.91	5.49
	Primary	10.21	13.18	2.49	8.95
	Middle	17.25	18.46	6.86	14.44
	High School	13.73	29.94	25.57	22.64
	> High School	0.35	11.49	58.00	21.34
Marital Status	Now Married	38.73	41.05	50.73	43.16
	Never Married	58.27	55.18	42.62	52.47
	Widowed	2.99	3.58	6.44	4.24
Migrant Status	First Generation Migrant	34.86	34.46	30.56	33.42
Labor Force Status (≥ 16 years old)	Public Sector	4.66	8.80	8.38	7.46
	Private Sector	16.85	10.26	9.22	11.76
	Informal Sector	29.75	25.22	28.21	27.61
	Unemployed	3.94	3.52	1.68	2.97
	Retired	1.08	2.64	4.19	2.76
	Out of Labor Force	43.73	49.56	48.32	47.44
Number of individuals ^C		568	531	481	1,621

^A All numbers in percentages

^B Individuals of schooling age (0 to 15) were assigned the education level of an adult in the household selected according to the following rules: (i) female head or spouse of head under 45, (ii) female daughter or daughter-in-law of head under 45, (iii) female head or spouse of head over 45, and (iv) female daughter or daughter-in-law of head over 45.

^C Income information is not available for 9 households (41 individuals)

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 1.B Sample Proportions - Households

Household Characteristics	Categories	Poor	Middle	Rich	Total
Income	Average Monthly Income – Rs. (per capita)	1,666	2,384	5,493	3,181
Household size		5.85	5.47	4.96	5.40
Sanitation	No Latrine	6.19	1.03	5.15	4.12
	Flush System	0.00	75.26	92.78	56.01
	Septic Tank	25.77	9.28	1.03	12.03
	Service Latrine	52.58	12.37	1.03	21.99
	Open Air	4.12	0.00	0.00	1.37
	Other Latrine	11.34	2.06	0.00	4.47
Cooking Fuel	LPG	45.36	83.33	94.85	74.48
	Local Gas	0.00	2.08	5.15	2.41
	Electricity	2.06	2.08	0.00	1.38
	Kerosene	31.96	7.29	0.00	13.10
	Coal	1.03	0.00	0.00	0.34
	Firewood	19.59	5.21	0.00	8.28
Light Source	No Light	4.12	1.03	3.09 (check)	2.75
	Electricity	88.66	98.97	95.88	94.50
	Gas/Oil	1.03	0.00	1.03	0.69
	Other	6.19	0.00	0.00	2.06
Drinking Water Source	Tap	77.32	96.91	100.00	91.41
	Tube well/Hand pump	0.00	1.03	0.00	0.34
	Tank/Pond	22.68	2.06	0.00	8.25
Number of households ^B		97	97	97	300

^A All numbers in percentages

^B Income information is not available for 9 households (41 individuals)

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 2a. SDM Profile: Nature and Duration of Episodes

Categories	Number of Full Episodes (duration known)	Average Duration of Episode (in days)
Gastrointestinal	460	4.50
Respiratory (except TB)	1249	6.75
Cardiac	12	11.67
Dermatological	292	14.42
ENT	253	9.76
Urinary	22	11.86
Gynecological	53	10.58
Neurological	110	2.85
Muscular	498	8.87
Fever	296	4.86
Other non-chronic	8	16.00
No diagnosis available	71	11.51
All	3324	7.59

^A 'Gastrointestinal' includes acidity, diarrhea, dysentery, and worms. 'Respiratory' cold and cough, respiratory allergy, tonsillitis, and influenza. 'Cardiac' high/low blood pressure. 'Dermatological' boils, scabies, burns, and dermatological allergy. 'ENT' includes ear or eye infection, nose bleeding and ear wax. 'Urinary' includes urinary infection, and cystitis. 'Gynecological' includes menstrual problems, cramps, and STDs. 'Neurological' includes headache. 'Musculo-skeletal' includes sprain/strain, muscle pull, and minor injuries. 'Fever' includes viral fever and non-specific fevers. 'Other non-chronic' includes dehydration, chicken pox, weakness, tension/anxiety.

^B Duration (measured in days) is missing for 6 per cent of the SDM episodes (221 episodes), evenly distributed across categories. Out of these 221 episodes 90 per cent were reported for a maximum of 1 or 2 weeks.

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 2a. Chronic Illnesses: % reporting a chronic condition by age group and Income

	Poor	Middle	Rich	Total
Under 30	3.7	4.5	10.1	5.52
Over 30	22.86	35.08	53.39	38.30
Total	9.33	15.63	31.81	

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 3a. Distribution of Practitioner Visits for SDMs, by Income Group. Chemist Excluded.

Income Group	% Weeks when a practitioner was visited for SDM	% Shek weeks when a practitioner was visited for SDM (weekly contact all)		
All	8.75	34.46	42.05	0.55
Poor	11.62	39.66	47.10	0.62
Middle	7.90	32.08	40.02	0.54
Rich	6.50	29.87	36.30	0.45

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 3b. Distribution of Practitioner Visits for SDMs, by Income Group: Sample Restricted to Individuals under 30 years. Chemist Excluded.

Income Group	% Weeks when a practitioner was visited for SDM	% Shek weeks when a practitioner was visited for SDM (weekly contact all)		
All	8.82	36.47	44	0.56
Poor	11.04	39.02	47	0.60
Middle	7.60	34.69	44	0.57
Rich	6.68	33.29	37	0.45

Table 4.A Average Monthly Health Expenditure by Nature of Episode and Income Group - Individuals

SDM episodes	25.5	24.5	26.0	27.1
Chronic episodes	22.5	4.5	32.2	34.2
Total health expenditure	55.1	34.2	69.1	67.0

Note: Amounts reflected in the SDM and chronic columns do not add up to total health expenditure because some episodes, such as tuberculosis, as neither SDMs or chronic episodes.

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 4.B Average Monthly Health Expenditure by Nature of Episode and Income Group - Households

SDM episodes	138.1	143.5	142.5	134.0
Chronic episodes	121.3	26.2	177.7	170.0
Total health expenditure	297.7	200.2	378.5	333.1
Total expenditure	8017.9	4310.7	5763.0	14029.6

Note: Amounts reflected in the SDM and chronic columns do not add up to total health expenditure because some episodes, such as tuberculosis, as neither SDMs or chronic episodes.

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 4.C Average Monthly Health Expenditure by Nature of Episode and Income Group – Sample Restricted to Individuals under 30 (% of household spending in brackets)

SDM episodes	21.5 (2.7)	27 (2.1)	28 (0.6)
Chronic episodes	0.9 (0.1)	3.9 (0.3)	4.5 (0.1)
Total health expenditure	26	32.5	36.5

Note: Amounts reflected in the SDM and chronic columns do not add up to total health expenditure because some episodes, such as tuberculosis, as neither SDMs or chronic episodes.

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 5. Morbidity Profiles for Individuals of Types I, II, and III

Average number of full SDM episodes	1.42	4.53
Average number of sick-weeks	2.38	7.05
Number of individuals in group	625	586

1	350	0
2	275	0
3	0	213
4	0	128
5	0	105
6	0	62
7	0	42
8	0	22
9	0	6
10	0	6
11	0	1
12	0	1
Number of individuals in group	625	586

	1 Episode	2 Episode	
1	245	0	0
2	59	159	0
3	18	71	76
4	5	23	82
5	1	4	80
6	3	7	79
7	1	3	47
8	0	1	47
9	1	0	46
10	3	3	37
11	0	0	29
12	2	0	16
13	2	2	8
14	0	2	13
15	1	0	10
16	4	0	16
Number of individuals in group	350	275	586

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 6.A Sample Proportions by Type * - Individual Characteristics

Individual Characteristics	Categories ^A	Type I	Type II	Type III
Morbidity	(Diagnosed) Chronic Condition	14.14	17.60	21.50
Gender	Female	38.05	44.16	59.21
Age Distribution	0-4	2.68	7.52	11.77
	5-14	23.17	26.88	19.79
	15-29	34.87	28.32	21.67
	30-49	26.58	24.00	29.86
	50-64	8.53	6.72	8.70
	> 65	3.17	5.28	2.73
Education ^B	Illiterate	22.19	30.40	27.13
	< Primary	5.12	4.32	6.99
	Primary	8.78	8.16	9.89
	Middle	13.90	14.24	15.01
	High School	22.68	23.84	21.33
	> High School	27.31	19.04	19.62
Marital Status	Now Married	41.22	40.00	47.61
	Never Married	54.39	56.16	47.61
	Widowed	4.39	3.84	4.78
Migrant Status	First Generation Migrant	35.12	32.80	32.76
Labor Force Status (≥ 16 years old)	Public Sector	11.93	7.77	3.31
	Private Sector	12.28	14.51	7.73
	Informal Sector	26.67	25.13	29.01
	Unemployed	4.56	2.85	1.38
	Retired	3.16	2.85	2.21
	Out of Labor Force	41.40	46.89	56.35
N		410	625	586

* Type I: Reports no SDM episodes, Type II: Reports at most tow SDM episodes, Type III: Reports three or more SDM episodes.

^A All numbers in percentages

^B Individuals of schooling age (0 to 15) were assigned the education level of an adult in the household selected according to the following rules: (i) female head or spouse of head under 45, (ii) female daughter or daughter-in-law of head under 45, (iii) female head or spouse of head over 45, and (iv) female daughter or daughter-in-law of head over 45.

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 6.B Sample Proportions by Type^{*} - Household Characteristics and Area of Residence

Individual Characteristics	Categories	Type I	Type II	Type III
Income ^B	Poor	28.93	36.02	40.81
	Middle	36.16	34.70	30.65
	Rich	34.91	29.28	28.55
Water and sanitation	Main water source - private tap	67.97	61.12	58.02
	Toilet - private flush	51.83	44.16	39.41
Area of residence	B. Kheda	9.51	15.20	23.21
	J. Puri	12.93	14.56	18.77
	Noida	15.37	18.08	14.33
	S. Vihar	6.59	11.20	17.58
	K. Nagar	12.93	11.84	7.00
	P. Nagar	16.83	18.72	16.72
	S. Delhi	25.85	10.40	2.39
N	Number of individuals	410	625	586

^{*} Type I: Reports no SDM episodes, Type II: Reports at most tow SDM episodes, Type III: Reports three or more SDM episodes.

^A All numbers in percentages

^B Income information is not available for 9 households (41 individuals)

Source: ISERDD Health Panel Data Study - designed and collected by a team of which the authors are members (Delhi, India)

Table 7. Determinants of the Number of SDM Episodes at the Individual Level – Poisson Model (Sample Means need to be added)

Chronic condition	0.140** (0.047)	0.162** (0.049)	0.167** (0.049)	0.063 (0.050)
Female	0.320** (0.041)	0.332** (0.042)	0.329** (0.042)	0.344** (0.042)
Married	0.421** (0.049)	0.402** (0.049)	0.400** (0.049)	0.352** (0.050)
Age [5, 15)	-0.445** (0.063)	-0.428** (0.064)	-0.429** (0.064)	-0.463** (0.065)
Age [15, 50)	-0.569** (0.069)	-0.532** (0.070)	-0.531** (0.070)	-0.526** (0.071)
Age [50, +)	-0.573** (0.086)	-0.505** (0.088)	-0.511** (0.088)	-0.548** (0.089)
Primary or higher	-0.064* (0.038)	-0.001 (0.043)	0.005 (0.044)	-0.083* (0.047)
Out of LF	0.129** (0.050)	0.129** (0.050)	0.134** (0.050)	0.093* (0.051)
Middle income		-0.132** (0.043)	-0.032 (0.051)	-0.061 (0.049)
High income		-0.194** (0.049)	-0.012 (0.071)	-0.114 (0.077)
Private tap			-0.062 (0.046)	
Private flush			-0.154** (0.055)	
J. Puri				-0.119* (0.063)
Noida				-0.453** (0.068)
S. Vihar				0.150 (0.091)
K. Nagar				-0.530** (0.086)
P. Nagar				-0.373** (0.057)
S. Delhi				-1.305** (0.109)
N ^A	1,580	1,580	1,580	1,580
Chi ²	278.23	283.68	295.69	643.99

** Significantly different from zero at the 5% level. * Significantly different from zero at the 10% level
Robust standard errors in parentheses

^A Income information is not available for 9 households (41 individuals), and data on water and sanitation is missing for 1 household (1 individual).

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Table 8. Sample Variation – Infrastructure, Income Categories and Area of Residence

Water and Sanitation by Income Level (% of Households)

Poor	26.80	0.00
Middle	71.13	49.48
Rich	94.84	91.72

Income information is not available for 9 households (41 individuals), and data on water and sanitation is missing for 1 household (1 individual).

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Distribution of Income by Area (% of Households)

Poor	73.33	14.58	65.12	0.00	0.00	56.52	7.69
Middle	24.44	72.92	25.58	0.00	45.95	32.61	20.51
Rich	2.22	12.50	0.00	100.00	48.65	6.52	69.23
N	45	48	43	42	37	46	39

Income information is not available for 9 households (41 individuals).

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

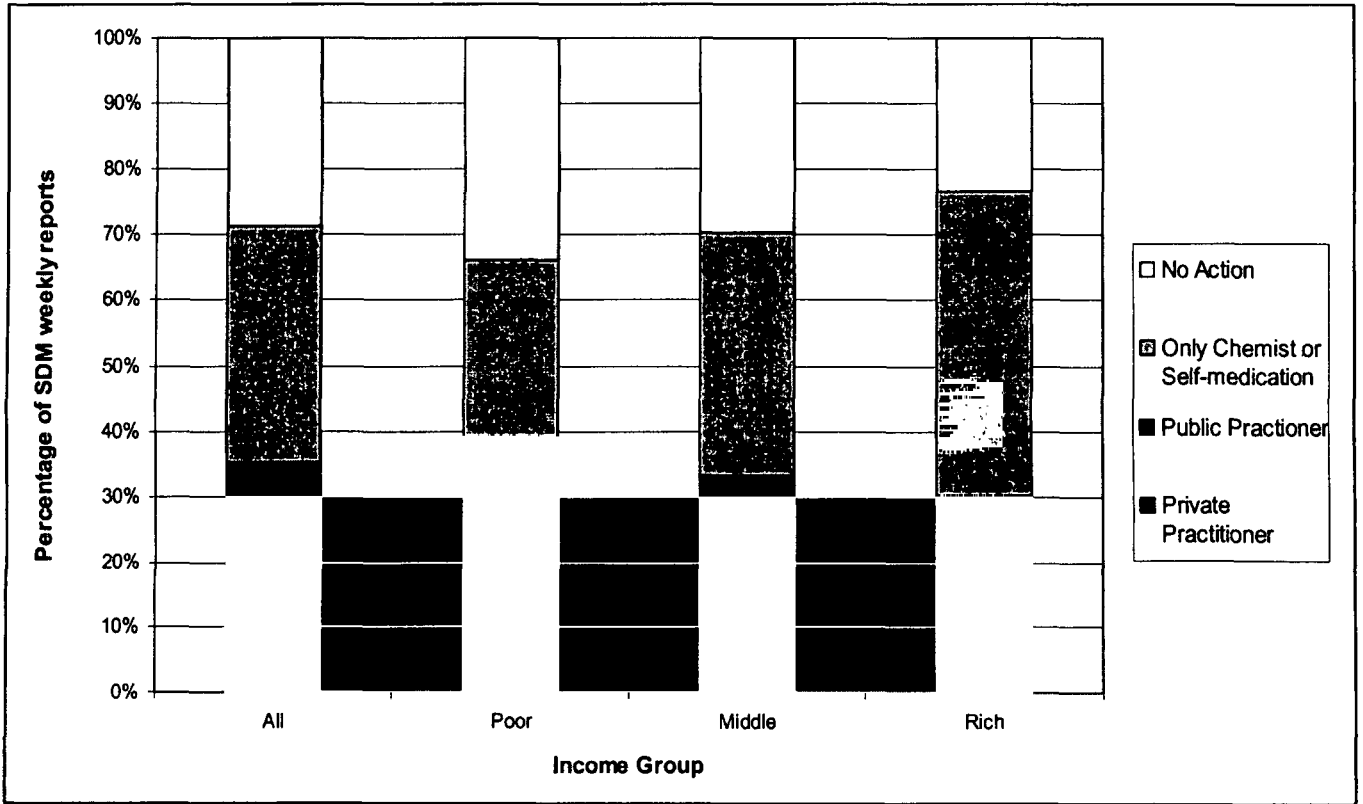
Water and Sanitation by Area (% of Households)

B. Kheda	37.77	0.00
J. Puri	77.08	64.58
Noida	23.25	20.93
S. Vihar	95.23	90.47
K. Nagar	80.55	63.88
P. Nagar	52.17	13.04
S. Delhi	89.74	87.17

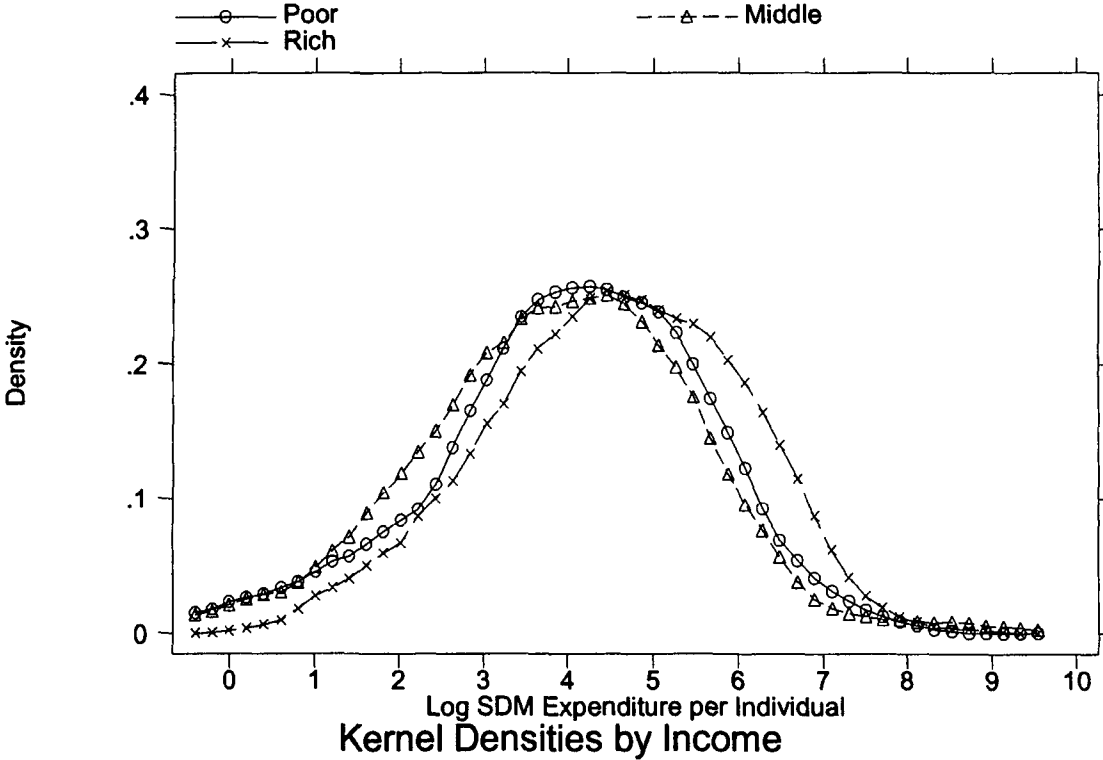
Data on water and sanitation is missing for 1 household (1 individual).

Source: ISERDD Health Panel Data Study – designed and collected by a team of which the authors are members (Delhi, India)

Graph 1. Practitioner Use and Self-Medication, by Income Group



Graph 2. Distribution of Individual Expenditure on SDMs by Income Group



Appendix I – Tables

Table A.1 Age Distribution

Age Group	Males	Females
0-4	10.93 (11.4)	10.14 (12.6)
5-14	23.63 (22.3)	23.11 (24.0)
15-29	25.89 (31.6)	29.40 (30.7)
30-49	27.55 (24.7)	25.93 (23.0)
50-64	8.31 (7.0)	7.45 (6.6)
>65	3.68 (2.9)	3.98 (3.1)
Median Age	22	22

All numbers in percentages. National Family and Health Survey in parentheses
Source: ISERDD Health Panel Data Study – Delhi and National Family and Health Survey (1993)

Table A.2 Marital Status Distribution

Age	Never Married		Currently Married		Widowed		Divorced/ Separated	
	Male	Female	Male	Female	Male	Female	Male	Female
All groups	55.70 (46.4)	49.29 (39.3)	41.69 (51.5)	44.54 (53.7)	2.38 (1.8)	6.03 (6.4)	0.24 (0.3)	0.13 (0.4)
0-14	98.97 (99.0)	100.00 (99.5)	0.34 (0.2)	0.00 (0.2)	0.69 (0.2)	0.00 (0.3)	0.00 (0.2)	0.00 (0.00)
15-19	100.00 (96.4)	95.29 (81.2)	0.00 (3.50)	4.71 (18.5)	0.00 (0.00)	0.00 (0.00)	0.00 (0.1)	0.00 (0.4)
20-24	83.78 (64.5)	54.79 (29.7)	14.86 (34.7)	43.84 (69.2)	1.35 (0.3)	1.37 (0.4)	0.00 (0.5)	0.00 (0.6)
25-29	34.00 (23.9)	5.63 (6.7)	66.00 (75.5)	94.37 (92.5)	0.00 (0.4)	0.00 (0.3)	0.00 (0.3)	0.00 (0.4)
30-34	4.35 (5.6)	0.00 (1.5)	95.65 (93.1)	100.00 (94.8)	0.00 (0.8)	0.00 (2.4)	0.00 (0.5)	0.00 (1.3)
35-39	3.57 (2.3)	0.00 (0.8)	92.86 (95.9)	96.83 (94.1)	1.79 (1.4)	3.17 (4.1)	1.79 (0.3)	0.00 (1.0)
40-44	1.61 (1.1)	0.00 (0.8)	98.39 (95.8)	97.73 (91.4)	0.00 (2.7)	2.27 (7.0)	0.00 (0.4)	0.00 (0.8)
45-49	0.00 (1.9)	0.00 (0.5)	100.00 (95.6)	86.49 (83.8)	0.00 (2.4)	13.51 (15.1)	0.00 (0.00)	0.00 (0.5)
50-54	3.45 (2.4)	0.00 (1.1)	93.10 (94.1)	89.47 (77.7)	3.45 (2.8)	10.53 (21.2)	0.00 (0.6)	0.00 (0.00)
55-59	0.00 (1.3)	0.00 (0.5)	94.74 (93.8)	76.19 (73.1)	0.00 (4.6)	19.05 (25.1)	5.26 (0.4)	4.16 (1.4)
>60	1.89 (0.8)	0.00 (1.4)	69.81 (81.4)	34.69 (43.8)	28.30 (17.2)	65.31 (54.4)	0.00 (0.2)	0.00 (0.2)

All numbers in percentages. National Family and Health Survey in parentheses

Source: ISERDD Health Panel Data Study – Delhi and National Family and Health Survey (1993)

Table A.3 Education Attainment Distribution

Age Group	Illiterate		Less than Primary		Primary		Middle		High School		More than High School	
	M	F	M	F	M	F	M	F	M	F	M	F
All groups	10.11 (14.3)	23.58 (29.2)	10.25 (16.0)	8.73 (15.8)	13.34 (15.9)	13.94 (15.1)	23.46 (14.4)	17.76 (11.2)	23.31 (23.3)	17.92 (16.0)	19.52 (15.7)	18.07 (12.5)
6-9	13.56 (19.4)	13.46 (20.6)	45.76 (77.1)	44.23 (76.7)	33.90 (2.0)	36.54 (2.4)	6.78 (0.00)	5.77 (0.1)	0.00 (0.00)	0.00 (0.0)	0.00 (0.00)	0.00 (0.0)
10-14	4.90 (5.6)	7.50 (8.9)	18.63 (32.0)	15.00 (29.6)	34.3 (49.3)	32.50 (47.5)	41.18 (12.5)	43.75 (13.7)	0.98 (0.5)	1.25 (0.3)	0.00 (0.00)	0.00 (0.00)
15-19	7.45 (11.3)	3.53 (14.4)	4.26 (4.6)	1.18 (2.7)	7.45 (17.2)	5.88 (14.6)	39.36 (34.4)	44.71 (28.9)	39.36 (29.2)	43.53 (33.5)	2.13 (3.2)	1.18 (5.8)
20-24	4.05 (13.0)	17.81 (27.0)	2.70 (3.3)	2.74 (2.7)	5.41 (12.9)	5.48 (9.4)	27.03 (16.1)	8.22 (12.3)	43.24 (33.1)	31.51 (24.6)	17.57 (21.3)	34.25 (24.0)
25-29	14.00 (12.8)	29.58 (31.7)	2.00 (4.2)	4.23 (3.8)	4.00 (9.6)	7.04 (10.6)	22.00 (16.3)	14.08 (10.8)	24.00 (33.6)	21.13 (21.1)	34.00 (23.4)	23.94 (21.7)
30-34	15.94 (14.7)	25.86 (33.5)	2.90 (4.3)	3.45 (4.0)	10.14 (11.2)	13.79 (11.4)	15.94 (13.9)	8.62 (8.4)	27.54 (31.7)	15.52 (20.1)	27.54 (24.0)	32.76 (22.5)
35-39	8.93 (16.3)	38.10 (36.0)	0.00 (4.1)	9.52 (3.1)	14.29 (12.9)	12.70 (10.0)	23.21 (12.3)	7.94 (8.8)	25.00 (29.4)	12.70 (18.5)	28.57 (24.9)	19.05 (23.2)
40-44	9.68 (16.6)	25.00 (39.7)	9.68 (5.5)	2.27 (5.1)	4.84 (12.2)	4.55 (11.3)	20.97 (11.1)	6.82 (6.2)	22.58 (28.8)	15.91 (19.3)	32.26 (25.6)	45.45 (18.5)
45-49	17.78 (14.6)	27.03 (41.5)	6.67 (5.1)	0.00 (4.1)	6.67 (10.7)	2.70 (12.6)	6.67 (12.1)	18.9 (9.7)2	20.00 (27.7)	13.51 (19.0)	42.22 (29.6)	37.84 (13.1)
50+	11.88 (21.9)	49.44 (57.8)	8.91 (8.8)	6.74 (5.9)	5.94 (12.3)	14.61 (11.9)	12.87 (9.1)	4.49 (7.1)	27.72 (25.8)	13.48 (10.0)	32.67 (21.8)	11.24 (6.7)

All numbers in percentages. National Family and Health Survey in parentheses

Source: ISERDD Health Panel Data Study – Delhi and National Family and Health Survey (1993)

Table A.4 Household Head Characteristics

Gender		Age				Marital Status			
Male	Female	<30	30-44	45-59	60+	Never Married	Currently Married	Divorced/ Separated	Widowed
85.86 (93.7)	14.14 (6.3)	4.04 (17.9)	41.75 (43.9)	30.64 (25.9)	23.57 (12.3)	0.00 (3.4)	83.50 (88.4)	0.67 (0.4)	15.82 (7.8)

All numbers in percentages. National Family and Health Survey in parentheses

Source: ISERDD Health Panel Data Study – Delhi and National Family and Health Survey (1993)

Table A.5 Household Size Distribution

Members	1	2	3	4	5	6	7	8+	Mean HH size
Frequency	0.33 (6.1)	4.00 (7.6)	6.67 (11.2)	22.33 (18.8)	26.00 (18.6)	19.00 (14.5)	10.00 (9.3)	11.66 (13.9)	5.4 (5.1)

All numbers in percentages. National Family and Health Survey in parentheses

Source: ISERDD Health Panel Data Study – Delhi and National Family and Health Survey (1993)

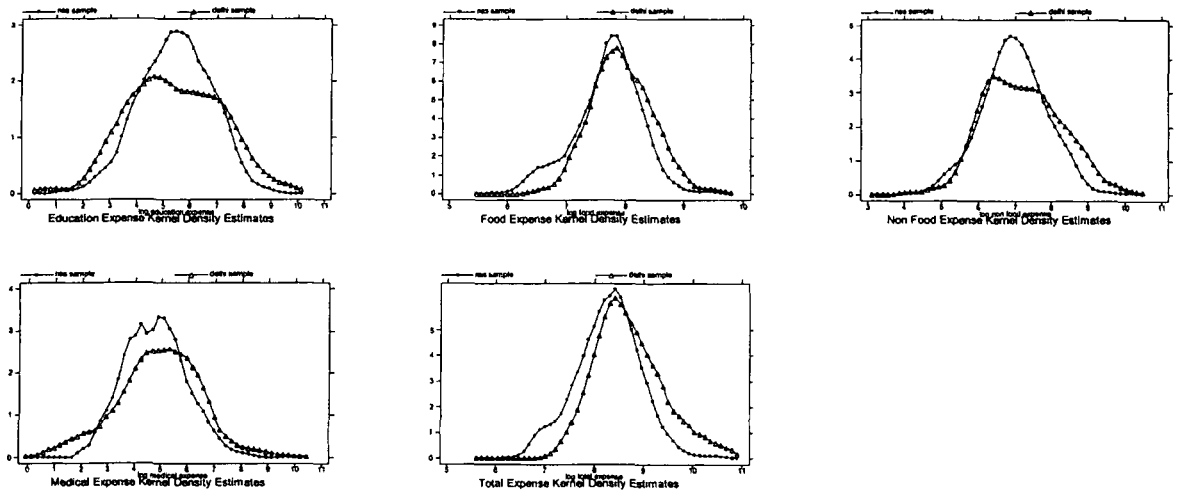
Table A.6 Household Facilities

	Light Source		Drinking water source			Type of Latrine			
	Electricity	Other	Tap	Tube well/ Hand pump	Water Tank	Flush System	Service Latr./ Septic Tank	No Latrine	Other
Frequency	94.65 (95.5)	5.35 (4.50)	90.64 (84.30)	0.33 (15.20)	9.03 (-)	55.85 (72.50)	22.41 (11.20)	5.35 (15.90)	4.35 (0.90)

All numbers in percentages. National Family and Health Survey in parentheses

Source: ISERDD Health Panel Data Study – Delhi and National Family and Health Survey (1993)

Figure A.1: Kernel Densities of Expenditure: NSS and ISERDD sample



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