Do Acute Health Care Needs of the Poor Crowd Out Their Chronic Care Utilization? Evidence from Rural India

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Abstract

In rural India, much of the public health facilities are better equipped to provide treatment for either acute ailments or reproductive and child health needs. Chronic diseases are treated mainly in secondary or tertiary hospitals located in sub-division or district headquarters or in the big cities, which makes their treatment more expensive. This paper uses demographic and health surveillance data from Birbhum to test whether there is a crowd-out effect on treatment of chronic diseases in the event of acute ailments in the household. We also test whether households ration the amount they spend on care for chronic ailments based on age and gender. With limited financial means, households prioritize treatment of acute conditions, reduce resources and efforts to treat chronic health care needs and these trade-offs are particularly strong in poorest households, and most disadvantageous to the elderly members within the households.

Keywords: Non-communicable disease, health expenditure, chronic care, acute care, crowding out, rural India.

I. Introduction

Non-communicable diseases (NCDs), also known as chronic diseases, encompassing cardiovascular and lung diseases, cancer, diabetes and respiratory conditions are the leading causes of death globally, estimated to cause 70 per cent of total deaths annually. Nearly 80 per cent of these deaths occur in low- and middle-income countries (WHO, 2018). On top of the unfinished agenda of infectious diseases worldwide, rapid development, industrialization, urbanization, globalization and increased life expectancy have become drivers of an epidemic of sorts. NCDs are the cause of 5.8 million deaths (60% of all deaths) in India (Nethan et al., 2017). Demographic changes and changes in lifestyle along with increased rates of urbanization are the major reasons responsible for an increase in NCDs (Upadhyay, 2012).

While in developed countries, lower socio-economic groups experience higher mortality rates from NCDs, in India until the 1990s, NCDs mostly afflicted the affluent (Chadha, 1990). This has changed significantly in the last two decades and the risks of NCDs such as cardio-vascular diseases are now higher among people living in the lower socio-economic strata (Xavier et al., 2008). Malnutrition and infection in early life increases the risk of NCDs in later life, making the poor even more vulnerable (Bygbjerg, 2012). The effects of NCDs are inequitable with higher risk factors among lower socio-economic groups and greater financial implications for the poorer households in India (Thakur et al., 2011). Research has shown that although NCD prevalence is higher in urban areas, rural India is not far behind (Office of Registrar General, 2009; Mini, 2014).

Among the top ten economies of the world, total public health expenditure as a share of GDP is the lowest in India at only 1.3 per cent (World Bank, 2019). Health care is provided by both public and private providers but funded mostly by out-of-pocket spending by households. Acute conditions

account for a larger share of out-of-pocket spending (Dror et al., 2008). Acute ailments are defined as those that have sudden onsets, periodic episodes, are short term in nature, mainly arising from virus, infections, falls and accidents that require immediate attention and can lead to absences from work and loss of income but can be treated and cured relatively quickly. Some examples are influenza, malaria, dysentery, diarrhoea, eye and ear infections, abdominal pain, etc. Much of the public health network in rural areas is equipped to provide treatment for these acute episodes that are mostly infectious and vector-borne diseases or reproductive and child health needs.

On the other hand, chronic ailments such as NCDs are longer lasting, slow to manifest in full-blown symptoms and need lifestyle changes as well as long-term and often expensive medical care. Examples of NCDS are diabetes, arthritis, hypertension, heart disease, asthma, cancer, etc. The technology and medication needed for NCDs are available mostly through hospitals in India (Thakur, 2011). Therefore, to get the right kind of care for an NCD, rural population has to travel to secondary or tertiary hospitals located in sub-division or district headquarters or in big cities. Consequently, treatment of such ailments become prohibitively expensive, particularly for the rural poor.

With limited resources available to spend on health care, especially for poor households, it is likely that acute ailments that result in a loss of productivity or income should get immediate attention. There is less incentive to treat NCDs that end up being more expensive over the long term, as long as they do not interfere with daily activities. One would therefore, *a priori*, expect households, especially the poorer ones, in the presence of both types of ailments, to spend their scarce resources on acute care and postpone spending on NCDs. We have used a Demographic Surveillance Survey data from the Birbhum district of West Bengal to test the hypothesis that acute ailment treatments *crowd out* treatment for chronic ailments within the households, particularly in the poor households. Further, the importance different members enjoy in the household may depend on how productive or financially well off they are. Therefore, productive or earning members may get higher preference for treatment in a poor family. The poor households may ration the amount they spend on chronic care overall, but more so for the less productive members. Hence, in addition to the crowd-out hypothesis, we test if there is any implicit *rationing* of medical treatments for certain members in a household.

Family concordance studies have shown that genetic and environmental reasons may lead family members within households to develop similar chronic diseases. Prevalence of extended family and multi-generation households, especially in rural India, makes it important to examine these questions at the household level (Patel et al., 2017). Further, studies of household behaviour around health care treatment can determine effective policy interventions.

Our paper has several contributions for economics of health as well as for economics of the household. First, it provides evidence on the simultaneous decisions that households make when confronted with different kinds of diseases. The expectation is that everyone who falls sick get treated and taken care of. However, economic theory posits that household members will prioritize use of scarce resources based on the cost of the sickness and the potential returns from treating the person who is sick. When households have different types of health episodes occurring at the same time, it provides an opportunity to examine household health-seeking behaviour as well as human behaviour with a priori hypothesis that constrained households choose the option with highest returns. Second, this paper confronts the growing impact of NCDs on poor households and particularly on certain members of households such as women and the elderly who are not perceived as earning members. Discussions at the highest levels of policymaking in India could use insights into how poor and rural households may deal with NCDs in the absence of infrastructure available to provide adequate care. Finally, this paper provides evidence for inadvertent age discrimination that occurs within the households when they are constrained for resources, thus adding to the literature on the economics of the family.

II. Methodology

Data

Data used for this paper comes from the Society for Health and Demographic Surveillance (SHDS) project in Birbhum district of West Bengal. It is one of the less developed districts (Appendix, Map 1) and one of the aspirational districts identified by the NITI Aayog programme (National Institution for Transforming India, https://www.niti.gov.in). SHDS was initiated by the Government of West Bengal in 2008 in rural Birbhum in order to derive population-based health and socio-economic information. SHDS survey collected data set on general morbidity, health care consumption and health expenditure along with essential information on household and individual characteristics. The survey covered four Community Development Blocks in Birbhum district based on diversity in socio-economic profile. Within the blocks, villages were selected by stratified random sampling and in selected villages all the households were surveyed. The data were collected in 2012 from 351 villages with 13,053 households and a total population of 59,395. The details of SHDS project can be found in Ghosh et al. (2015) and about the data in Mukherjee et al. (2015).

The survey collected information on self-reported health conditions. Reported ailments were classified into 45 categories based on respondent's description of their health episodes or diseases, if diagnosed. These episodes were further divided into five categories: acute (including acute manifestation of apparently chronic ailments), chronic (both communicable and non-communicable), injuries and accidents, reproductive & child health care (immunization), and routine care/others with the help of doctors associated with the surveillance system including one of the co-authors of this paper who is a physician. The category 'other' was created as some ailments overlapped with multiple categories. A table showing these classifications are presented in Table A1 in the Appendix. The survey collected information on consumption expenditure for each household, which allowed us to use per capita consumption expenditure (PCCE) as a reasonable proxy for its economic status. We used the 2011–12 poverty line for rural West Bengal (₹783, approximately or 15 USD in January 2012 exchange rates) set by India's erstwhile Planning Commission (Government of India 2013) to classify sample households into four economic classes. Households with PCCE less than ₹783 were considered poor; those with PCCE equal to or higher than ₹783 but lower than twice the poverty line (i.e. ₹1,566) were considered as lower middle class; those with PCCE higher than ₹1,566 but lower than four times the poverty line (i.e. ₹3,132) were considered upper middle class; and those with PCCE equal to or higher than ₹3,132 were considered as rich. The mean and median PCCE, distribution of population across economic classes, are presented in Appendix Table A2. As per our classification, the shares of poor, lower middle, upper middle and rich households are 25.70 per cent, 51.76 per cent, 17.34 per cent and 5.24 per cent respectively.

Our classification of households into four economic classes based on per capita consumption expenditure was validated by other indicators (Table 1). The percentages of adult individuals who can write and read, and of households with concrete floor, concrete wall, concrete roof, toilet, drainage facility, electricity, LPG connection, television, phone and separate kitchen showed a sharp and gradual increase moving from poor to rich classes. While the percentage of children gradually declined from poor to rich class, the percentage of elderly sharply increased. The percentage of Scheduled Tribes (STs) gradually and sharply declined from poor to rich groups.

Reported prevalence of chronic ailments (Table 2) was much lower compared with acute ailments, but chronic ailments followed a clear class-gradient which acute ailments did not. The reported prevalence of chronic ailments was greater for richer classes compared with the poor. Females exhibited a much higher prevalence of chronic ailments than males. Middle-aged and elderly had a higher prevalence of chronic ailments than the other two age groups. In fact, for the elderly, prevalence of chronic ailments was 1.8 times more than that of acute ailments. Figure 1 shows how the reported prevalence of acute and chronic ailments changes with economic classes by gender and age groups. The prevalence of acute ailments does not show any systematic change with economic class both for males and females but reporting of chronic ailments seem to increase with economic

class with females reporting higher prevalence of chronic ailments than males for any given economic class. For the elderly group, reporting of chronic ailments shows a systematic increase with economic class.

Table 1: Sample characteristics

Characteristics	Poor	Lower middle class	Upper middle class	Rich	Total
Total sample households	3227	6500	2172	658	12557
Total sample individuals	19849	31124	9166	2891	63030
Average household size	6.2	4.8	4.2	4.4	5.0
Children (%)	13.6	8.3	4.6	3.3	9.2
Elderly (%)	7.0	7.2	10.1	10.3	7.7
Female (%)	48.4	50.6	50.1	49.4	50.2
Adult population able to read and write (%)	29.5	56.2	71.3	75.4	60.3
Scheduled tribe households (%)	62.0	33.3	3.9	0.8	9.8
Scheduled caste households (%)	31.6	54.2	11.7	2.5	34.0
Muslim households (%)	22.4	57.3	16.1	4.2	29.1
Other households (%)	8.7	49.5	30.4	11.4	27.1
Households with toilet (%)	6.23	21.09	51.75	73.10	25.3
Households with drainage (%)	11.25	24.12	49.86	68.39	27.6
Households with LPG connection (%)	0.74	4.34	23.43	43.47	8.8
Households having electricity (%)	59.96	81.06	91.44	96.20	78.2
Households purifying water before drinking (%)	4.34	6.28	15.88	29.48	8.7
Households having concrete floor (%)	11.59	27.35	55.16	71.22	30.4
Households having concrete wall (%)	9.20	21.65	47.10	66.26	25.2
Households having concrete roof (%)	5.79	16.95	42.22	62.31	20.8
Households having TV (%)	21.07	44.32	65.88	82.22	44.1
Households having phone set (%)	53.73	74.12	83.98	93.47	71.6
Households having separate kitchen (%)	11.31	20.89	41.21	58.81	23.9

Source: Birbhum Population Survey (2012).

Table 2: Prevalence of acute and non-communicable chronic ailments per 1000 population

Characteristics	Prevalence of ailment (30 days) per 1000 population		Ailment (30 days) with health care (%)		Incidence of hospitalisation (1 year) per 1000 population	
	Acute	Chronic	Acute	Chronic	Acute	Chronic
Economic class						
Poor	107	25	89	82	15	6
Lower middle	139	40	92	86	22	12
Upper middle	136	48	95	94	26	24
Rich	121	51	94	93	27	27
Gender group						
Male	116	29	93	87	21	12
Female	139	45	91	87	19	13
Age group						
0-12 years	175	7	93	90	19	4
13-39 years	96	23	95	87	18	8
40-59 years	146	76	90	85	24	22
60 years & above	118	207	90	46	31	38
Total	128	37	92	87	20	13

Source: Birbhum Population Survey 2012.

For all economic classes, age and sex groups, acute ailments receive greater attention (Table 2). The difference in treatment of acute versus chronic conditions is particularly high for the elderly population. More than half of the chronic ailments reported by the elderly do not receive any health care. The percentage of chronic ailments treated was lower than that of acute ailments for the poor

and lower middle class (Figure 2). The elderly is the most deprived group in receiving health care for chronic ailments. Only 46 per cent of chronic ailments of the elderly received treatment and this does not significantly vary across economic classes. Thus, an improvement in economic status did not seem to increase an elderly person's likelihood of receiving treatment for a chronic ailment.

Figure 1: Prevalence of ailments per 1000 population
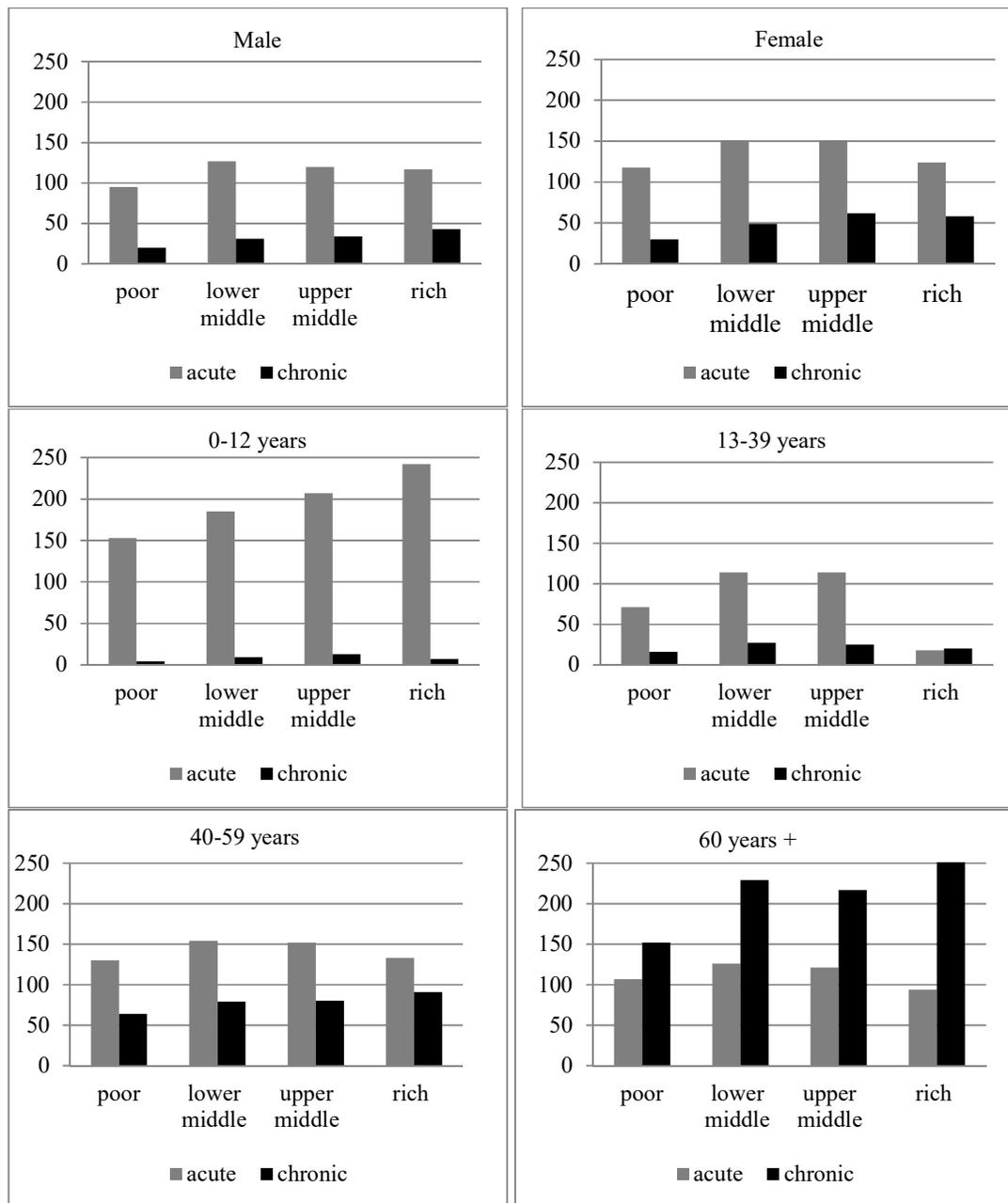
Source: Table A3.

The incidence of hospitalization (measured by average number of hospitalizations per 1000 population) exhibits a class gradient for both acute and chronic ailments though the gradient is stronger for chronic ailments (Table 2). Even though females reported chronic ailments 1.5 times more than males, they had the same rate of hospitalization as males for chronic ailments. The incidence of hospitalization also showed a sharp age-gradient which was stronger for chronic ailments. For the elderly, hospitalization due to chronic ailments was higher than for acute ailments.

Incidence of hospitalization increases with economic status for both males and females but more systematically for chronic ailments (Figure 3). For a given economic class, the hospitalization rate is higher for males than females. For the elderly, incidence of hospitalization is higher for the poorest group for acute ailments compared with chronic ailments indicating under-utilization of hospitalized care by the poor groups for chronic ailments.

Figure 2: Percentage of ailments which received healthcare
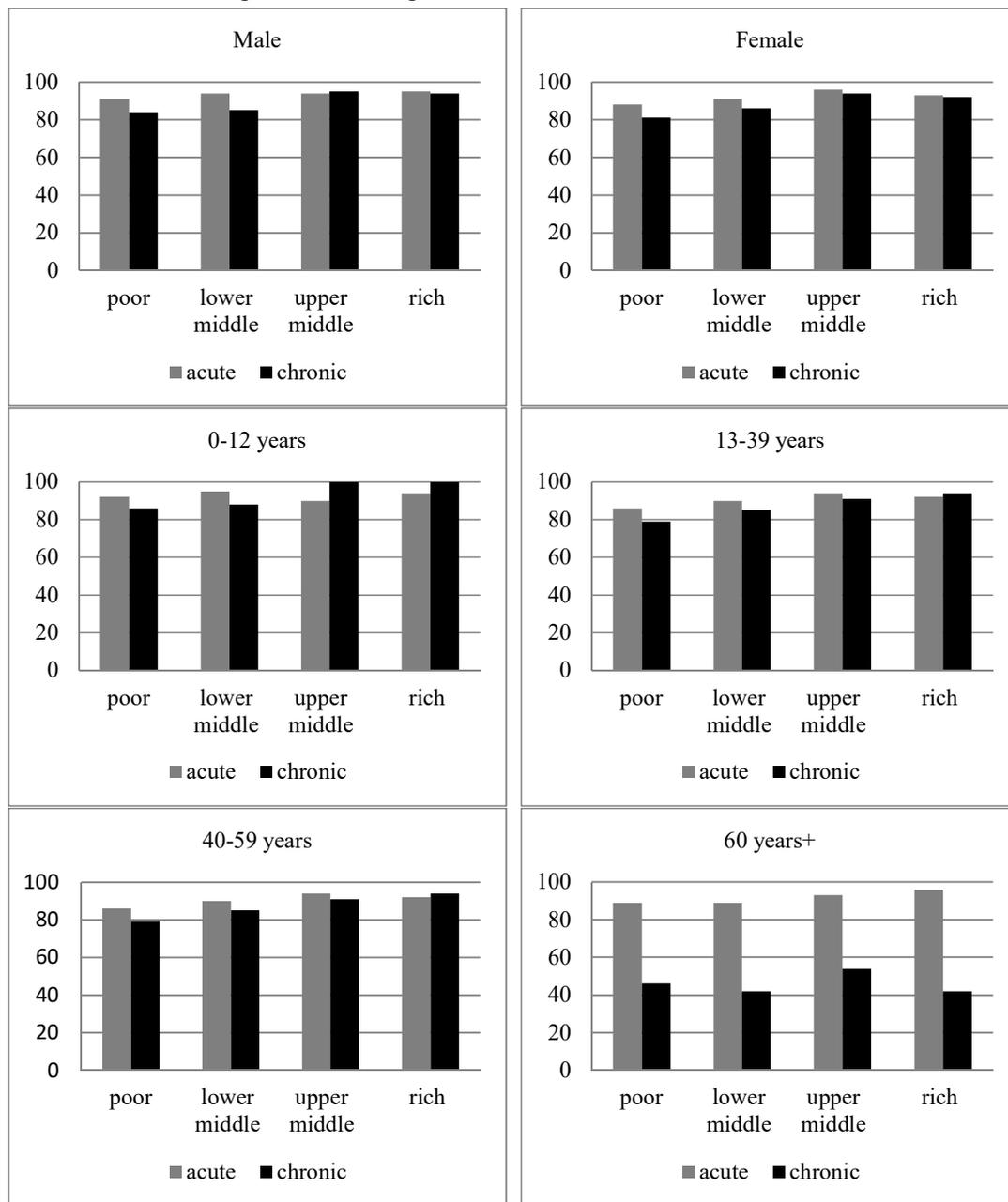
Source: Table A4.

Figure 3: Hospitalisation per 1000 population
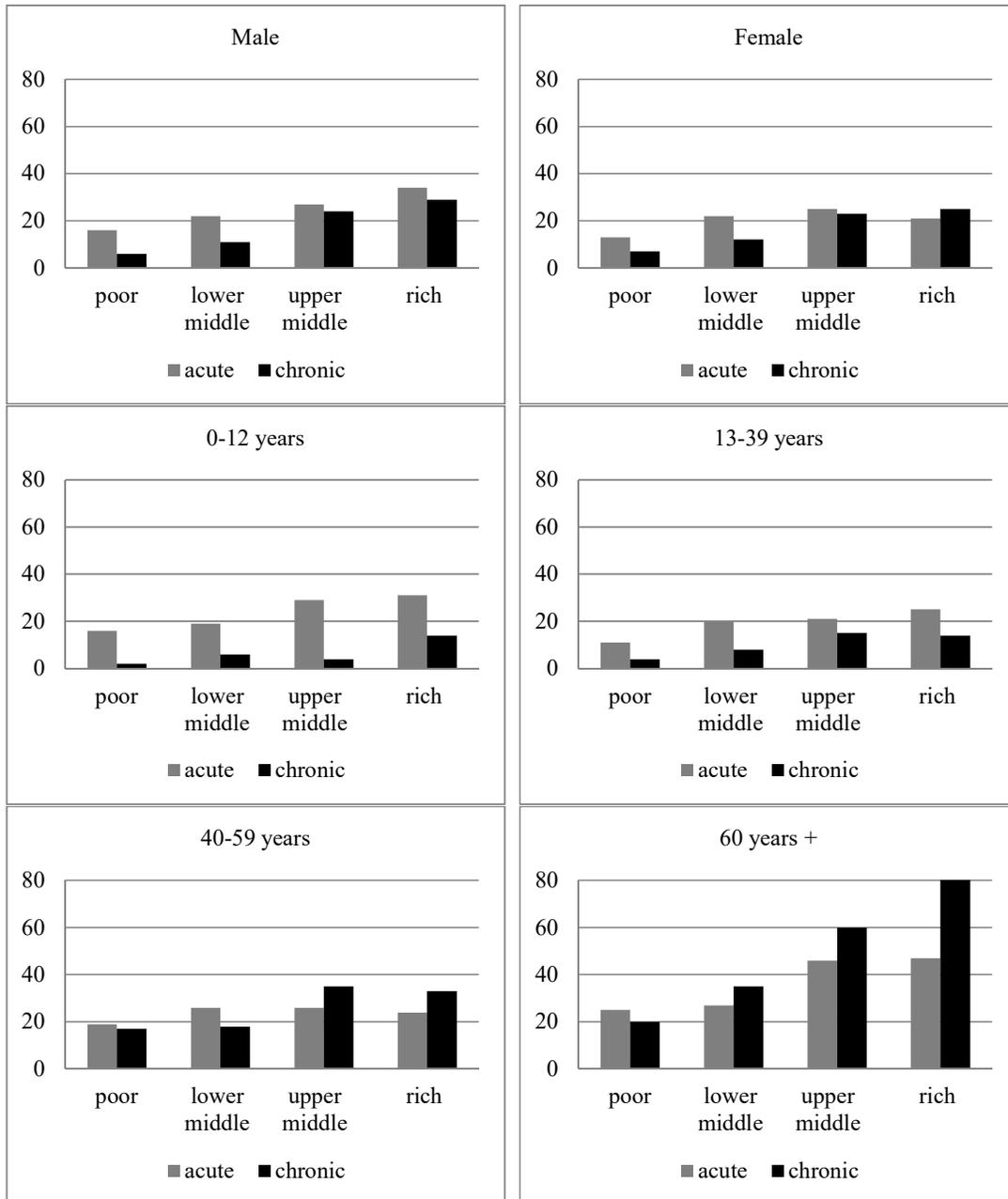
Source: Table A5.

One of the possible reasons for observing lower health care utilization for chronic ailments and class-gradient in outpatient care and hospitalization is the cost difference. Table 3 shows the mean and median costs of treatment for outpatient care and hospitalization for acute and chronic ailments for different economic classes. Treating a single episode of chronic ailment in outpatient facilities is almost twice as expensive as treating acute ailments. Cost of treatment for acute and chronic ailments gradually increases from poor to the rich classes. A significant difference between acute and chronic ailments is also observed for hospitalization. On an average, hospitalization for a chronic condition is 3.6 times more expensive than hospitalization for an acute ailment. Further, hospitalization for an acute ailment is 9-10 times more expensive than outpatient care utilization, cost of hospitalization for a chronic ailment is 13-15 times that of outpatient care costs. Like outpatient care, the hospitalization expenditure for chronic ailment is higher for richer classes.

To summarize, higher cost of treating chronic ailment either in outpatient facilities or in hospitals is a reason for lower access to health care, especially for the poor people. Higher cost of treating chronic ailments affect males and females equally but the worst sufferers are elderly group. A steep increase in rate of hospitalization for chronic ailment with economic class for the elderly only indicates that the poor are deprived of hospitalized care for their chronic ailments.

Table 3: The mean and median cost (₹) for outpatient treatment and hospitalization across classes

	Acute ailment		Chronic ailment	
	Mean	Median	Mean	Median
Outpatient care (30 days recall period)				
Poor	286	125	636	250
Lower middle	474	200	860	366
Upper middle	559	250	1379	555
Rich	766	350	1647	700
All	453	200	967	400
Hospitalization (365 days recall period)				
Poor	2064	1458	3788	2210
Lower middle	3829	2100	7346	4000
Upper middle	5650	2600	17335	11200
Rich	8897	3100	68292	12300
All	4066	200	14832	5300

Table 4 provides summary statistics of all the variables used in the statistical analysis. The sample consists of 13,217 individuals. We consider individuals who reported an ailment, whether acute or chronic. About 80 per cent of them reported an acute illness and 20 per cent a chronic illness. As many as 93 per cent received treatment from a doctor or at a health facility. Of the individuals with chronic ailments, about 10 per cent did not receive treatment. On an average, each household reported about two individuals with acute ailments. Overall, a higher amount is spent on treating acute ailments compared with chronic conditions indicating underlying prioritization.

Table 4: Summary statistics

Variable	N	Mean	Std. Dev.	Min	Max
Individual has acute illness	13217	0.796	0.402	0	1
Individual has chronic illness	13217	0.207	0.405	0	1
Health condition is treated formally	13217	0.928	0.257	0	1
Number of acute episodes reported by households	13217	2.056	1.130	1	7
Individuals treated for chronic episodes	13217	0.184	0.387	0	1
Household treatment cost (₹)	13217	748.136	3306.947	0	176300
Chronic ailment treatment cost for individuals (₹)	13217	164.680	1551.507	1	139600
Chronic ailment treatment cost for household (₹)	13217	315.322	2750.388	1	159201
Acute treatment cost for individual (₹)	13217	244.999	936.502	1	55916.67
Acute treatment cost for household (₹)	13217	475.112	1577.751	1	83966.67
Whether male member has acute condition	13217	0.362	0.480	0	1
No of males in a household in acute condition	13217	2.056	1.130	1	7
Children (=1 if 0-12 years)	13217	0.221	0.414	0	1
Youth (=1 if 13-39 years)	13217	0.398	0.489	0	1
Mid-age (=1 if 40-59 years)	13217	0.271	0.444	0	1
Senior (=1 if 60 years above)	13217	0.253	0.435	0	1
Female (=1 if female)	13217	0.558	0.496	0	1
Poor (=1 if below poverty line)	13217	0.246	0.431	0	1
Low-mid (=1 if lower-middle income class)	13217	0.527	0.499	0	1
Upper middle (upper-middle income class)	13217	0.172	0.3775	0	1
Upper (upper income class)	13217	0.053	0.224	0	1
SC (=1 if Scheduled castes)	13217	0.072	0.260	0	1
ST (=1 if Scheduled tribes)	13217	0.338	0.473	0	1
Muslim (=1 if Muslim)	13217	0.334	0.471	0	1
Others (=1 if other religions including Hindu)	13217	0.253	0.435	0	1

Empirical Model

Our first question is to test for crowding-out behaviour in seeking treatment. We estimate the likelihood of seeking care using the following model

$$h_{ijt} = \alpha + \beta Sick_{ijt} + Income\ group'_{ij}\gamma_{income\ group} + Social\ Class'_{ij}\gamma_{class} + Age'_{ij}\gamma_{age} +$$
$$+ Female_{ij}\gamma_{female} + Age'_{ij\_}Sick_{ijt}\gamma_{Int} + Female_{ij\_}Sick_{ijt}\gamma_{Int} \tag{1}$$

where h_{ijt} is seeking treatment for individual *i* in household *j* for ailment type *t*, *Sick* is the type of ailment (acute or chronic); *Income group* is a vector of constructed economic class with rich as the reference group; *Social class* is a vector of dummy indicators showing various minority groups with the majority Other group (Hindu) as the reference category; *Age* is a vector of age groups classified as children (0-12 years), middle age (40-59 years), seniors (60 years and above) with youth (13-39 years) as the reference category. *Female* is a dummy variable indicating females with males as the reference category. Interaction terms are added to examine age and gender effects. We interact *age* and *female* with *types of ailments*. A *probit* model was used to estimate the coefficients α, β and the γ's.

To further verify this crowding out behaviour, we check for household's out-of-pocket expenditures on various types of health episodes. We estimate the determinants of household expenditure on chronic ailments using the following model:

$$\log(c_{ijt}) = \alpha + \beta Sick_{jt} + Poverty'_{ij}\gamma_{poverty} + Social\ Class'_{ij}\gamma_{class} + Age'_{ij}\gamma_{age} +$$
$$+ Female_{ij}\gamma_{female} + Age'_{ij\_}Sick_{ijt}\gamma_{Int} + Female_{ij\_}Sick_{ijt}\gamma_{Int} + v_i + \varepsilon_{it} \tag{2}$$

where c_{ijt} is the household expenditure on chronic ailment of the ith individual and $Sick_{jt}$ is the presence of acute ailment at the household level. We use a log-linear model[1] for estimating this model.

To account for village level heterogeneity (in supply of medical staff or demand side variables) that could influence health seeking behaviours or expenditures, we also estimate the models with village-level fixed effects.

III. Results

Estimation results for models 1 and 2 are presented in Table 6. The first four columns report estimations using model 1 where we examine the likelihood of individuals getting treated for acute or chronic conditions. Estimates in column 1 indicate that individuals are significantly and positively likely to seek care for an acute ailment. Examining various subgroups reveal that compared with males, females are less likely to receive treatment for acute ailments. Compared with the richest households, individuals in poor and low-middle income households are less likely to receive care. SC/ST and Muslims are less likely to seek care compared with the *Others* group. Compared with youth, households are less likely to seek care for the middle aged or elderly. Adding interaction terms between getting treatment and demographic variables do not change these overall results (Column 2) although results are less robust.

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[1] There are two advantages to estimating the models as linear probability models rather than non-linear model with a binary dependent variable such as logit or probit. First, it is straightforward to interpret the marginal effects from the coefficients. This is particularly helpful in models with interaction terms as calculating marginal effects of interaction terms in non-linear models is not straight forward (Ai & Norton, 2003). Second, the linear probability model mitigates the incidental parameters problem in non-linear fixed effects. The concerns with using linear probability models are heteroskedasticity and predicting outside the interval [0, 1]. Angrist & Pischke (2009) point out that the first issue is addressed by using robust standard errors, and the second is not relevant when the objective is to test coefficients rather than predict probabilities.

Examining the likelihood of obtaining treatment for chronic ailments, we found that households are significantly less likely to treat chronic ailments for their members, more so for older age groups, females, poor, lower-middle income and SC households (column 3). Introducing interaction terms, we found that even though there is a lower likelihood of treating chronic ailments, children with chronic ailments are 3 per cent more likely than youth to be treated (column 4).

In column 5, we present estimates for the likelihood of seeking treatment for chronic ailments in the simultaneous presence of acute episodes within the household. When there are acute episodes in the household, the household is less likely to seek care for chronic ailments and these results are statistically significant. Even though older age groups as well as females are more likely to get treated for chronic diseases, the poor are less likely to get chronic care treatment. When we introduce interaction terms, results remain similar though less robust (Column 6). Only exceptions are children and elderly who seem to receive more care compared with the youth, for chronic ailments in the presence of acute episodes in the household. These results suggest that crowding out of chronic care does take place in the presence of acute episodes in the household, particularly for resource constrained households. It seems though that households prioritize the type of health care they spend on various demographic groups.

To check for household behaviour towards various groups, we examine health care expenditures by estimating the likelihood of households incurring treatment costs for chronic care in the presence of acute conditions. Results in column 7 show a positive association with household expenditure on individual chronic care with an acute episode in the household. Households spend 63 per cent more on treatment for chronic care when there is an acute episode in the household. This suggests that chronic and acute treatments may be complementary. Treatment of acute episodes might lead to the discovery and treatment of chronic ailments. Compared with the youth, expenditures on chronic care are higher for the older age groups and lower for children which is a very plausible result. Introducing interaction terms (in column 8) indicate that in the presence of acute episodes, household expenditure on chronic care treatment for children is higher than for the youth while expenditures on elderly and mid-age groups are no different from the youth. This indicates that households prioritize chronic care treatment.

Next, we investigate expenditure on individual's chronic care when the household simultaneously spends on acute episode treatment. When the household incurs expenses on acute conditions, they are 7 per cent less likely to incur expenditure for chronic treatments (Column 9). Less is spent on chronic treatment for children, poor and the SCs and STs. Introducing interaction terms in Column 10, households are 14 per cent less likely to spend on chronic conditions when faced with expenditures for acute care. While under these circumstances, households spend significantly less on the elderly, they continue to spend more on children, compared with the youth. Hence, households prioritize acute care over chronic care and when it comes to spending for chronic conditions in the presence of acute expenditures, they prioritize spending on children and cutting back on spending on the elderly.

To account for village level heterogeneity in availability of care and other socio-economic conditions, we estimate these models using village level fixed effects. Results for our village-level fixed effects models are similarly robust and consistent[2].

IV. Discussion and conclusion

In summary, rural households, particularly the poorest ones, are more likely to seek health care for acute ailments rather than chronic ailments for household members. They are less likely to spend on treatment for members suffering from chronic ailments, especially if there is a concurrent acute ailment within the household with the exception of children. Although households are less likely to spend money on chronic care treatment if there is an acute episode, the opposite is not true. Further,

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[2] Results are available on request.

age, gender and social class interactions indicate that compared with the youth, children are always prioritized. Households cut back on chronic treatment expenditures for the elderly in the face of acute care expenditures. The poor, SC and ST households seek less care and spend less for both acute and chronic ailments compared with the richest households.

While women report greater prevalence of both acute and chronic ailments compared with men, health utilization (both treatment and expenditure) is lower for then than men. This finding is consistent with existing studies from the developing world (Roy and Chaudhuri, 2012). Although the elderly report greater chronic ailments, health care utilization is higher for acute ailments and, in fact, households cut back on spending on the elderly person's chronic condition if there is a concurrent expenditure on acute treatment in the household.

Thus, the results lend credence to the hypothesis that the crowding-out behaviour exists and is stronger for certain members of the household, depending on their importance and productivity. The poor seem to seek care for acute ailments crowding out care for chronic ailments and women and elderly are negatively affected by these trade-offs made at the household level. Even though elderly members are traditionally treated with respect, in rural households that need physical labour, it is an economic decision to not spend resources on the least productive members of the household.

This study is unable to determine whether these choices made at the household level are because of household norms and preferences or because of supply side constraints. If the price of chronic care is too high and perhaps only available through expensive private or tertiary facilities, the poor will postpone seeking care for their chronic healthcare needs. The important question is that with the rise of chronic disease burden, is the supply side being able to cope with providing adequate care for the rural population. Perhaps treatment for acute ailments get a priority because of greater availability of trained personnel and appropriate facilities, and the lack of care facilities for chronic ailments in rural settings creates the underlying preference at a systemic level. This warrants further study with appropriate data. Of course, acute episodes are easier to detect and therefore warrant immediate attention. Chronic ailments are less likely to be diagnosed. Our findings suggest that if there is an underlying chronic ailment, it is more likely to be detected and treated at the time of treatment for an acute episode.

Chronic care expenditures seem to be higher for children in households that have simultaneous acute care episodes or acute treatment expenditures. This correlation does not reveal whether the presence of chronic ailments increases the likelihood of acute episodes or whether seeking health care for these acute ailments leads to the discovery of chronic ailments. For example, if a child has asthma, does that lead to respiratory infections or respiratory infections lead to discovery of asthma. The strong correlation between the two though confirms that when households end up getting care for acute ailments, likelihood of awareness of chronic ailments and related expenditures increase for the household. The poor households clearly prioritize their children but cut back on expenditure on the elderly if they are faced with a trade-off. A future study could examine if there is a gender difference within these groups.

Evidence of complementarity of morbidities has crucial policy implications. Poverty and chronic NCDs are inextricably linked mainly due to lack of education and awareness. To have an impact on the burden of chronic diseases for the rural poor, interventions must occur at three levels: population-wide policies, community activities and health services. The primary care facilities where acute conditions are treated should be seen as spaces to address chronic care needs of the rural poor. Chronic diseases can be detected and managed (or prevented) at these primary care facilities with incremental investment in the infrastructure with diagnostic testing and training of health workers. The accelerating epidemic of NCDs in India calls for a comprehensive public health response which can effectively combat and control them before they peak and inflict severe damage in terms of unaffordable health, economic and social costs for households as well as the state.

India has embarked on providing universal health care through various provisions of health insurance. However, influencing behavioural risk factors (like unhealthy diet, physical inactivity, tobacco and alcohol consumption) through policy interventions, public education or a combination of both have been demonstrated to be effective in reducing the NCD risk in population as well as individuals. Policy interventions are also effective in reducing the levels of several major biological risk factors linked to NCDs (high blood pressure, overweight and obesity; diabetes and abnormal blood cholesterol) and are best addressed to members of the entire household. Secondary prevention through medication and clinical care are also critical. Though the evidence for health promotion and primary prevention are weaker, policy interventions and secondary prevention when combined with these are likely to have a greater impact on reducing NCD burden (Singh et al., 2011) and can prevent future costly treatment. Much of the care for chronic diseases and injuries is provided in the private sector and can be very expensive. These can be prevented by making the public health infrastructure and public health services through primary care facilities in rural areas more comprehensive.

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Table 5: Estimation Results

(1) Probability of getting treated if individual has acute conditions.
(2) Probability of getting treated if individual has acute conditions (with interaction terms).
(3) Probability of getting treated if individual has chronic conditions.
(4) Probability of getting treated if individual has chronic conditions (with interaction terms).
(5) Probability of getting treated for chronic if hh has number of acute episodes.
(6) Probability of getting treated for chronic if hh has number of acute episodes (with interaction terms).
(7) Incur treatment costs for chronic care when there is acute condition.
(8) Incur treatment costs for chronic care when there is acute condition (with interaction terms).
(9) Incur treatment costs for chronic care when there is HH treatment cost for acute conditions.
(10) Incur treatment costs for chronic care when there is HH treatment cost for acute conditions (with interaction terms).

Variables	(1) treated	(2) treated	(3) treated	(4) treated	(5) treatchron	(6) treatchron	(7) lhhchrcost	(8) lhhchrcost	(9) lhhchrcost	(10) lhhchrcost
Individual has acute illness	0.0439***	0.0248								
	(0.0065)	(0.0310)								
Individual has chronic illness			-0.0395***	-0.0317						
			(0.0064)	(0.0321)						
Children (age 0-12 years)	0.0089	0.0351	0.0099	0.0079	-0.1167***	-0.1449***	-0.3899***	-0.7489***	-0.2554***	-0.6190***
	(0.0058)	(0.0188)	(0.0058)	(0.0062)	(0.0075)	(0.0150)	(0.0481)	(0.0999)	(0.0524)	(0.1376)
Mid-age (40-59 years)	-0.0257***	-0.0374**	-0.0250***	-0.0258***	0.1267***	0.1107***	0.6237***	0.6888***	0.4962***	0.9367***
	(0.0059)	(0.0122)	(0.0059)	(0.0072)	(0.0091)	(0.0185)	(0.0580)	(0.1159)	(0.0602)	(0.1168)
Elder (>60 years)	-0.0152*	-0.0101	-0.0149	-0.0259*	0.2558***	0.1965***	1.0712***	0.9772***	0.8779***	1.1933***
	(0.0084)	(0.0137)	(0.0084)	(0.0116)	(0.0148)	(0.0291)	(0.0886)	(0.1775)	(0.0909)	(0.1576)
Children*acute		-0.0350								
		(0.0315)								
Mid-age*acute		0.0115								
		(0.0108)								
Elder*acute		-0.0112								
		(0.0174)								
Female	-0.0106**	-0.0009	-0.0112**	-0.0122*	0.0246***	0.0287*	0.0612	0.0978	-0.0204	0.0081
	(0.0044)	(0.0092)	(0.0044)	(0.0051)	(0.0065)	(0.0134)	(0.0409)	(0.0891)	(0.0436)	(0.0966)
Female*acute		-0.0119								
		(0.0106)								
Poor	-0.0587***	-0.0775*	-0.0580***	-0.0488**	-0.0454***	0.0015	-0.4157**	-0.1681	-0.4426**	-0.7885**
	(0.0158)	(0.0313)	(0.0157)	(0.0179)	(0.0137)	(0.0316)	(0.1563)	(0.3362)	(0.1596)	(0.2836)
Lower-Middle income	-0.0327**	-0.0532**	-0.0323***	-0.0235	-0.0238	-0.0246	-0.1423	-0.3890	-0.1344	-0.5816*

	(0.0112)	(0.0203)	(0.0111)	(0.0132)	(0.0139)	(0.0294)	(0.1508)	(0.3282)	(0.1543)	(0.2763)
Upper-middle income	0.0099	0.0087	0.0103	0.0082	-0.0080	-0.0291	0.1018	-0.4078	0.1407	-0.4215
	(0.0115)	(0.0213)	(0.0114)	(0.0137)	(0.0145)	(0.0287)	(0.1647)	(0.3515)	(0.1707)	(0.3043)
Poor*acute		0.0200								
		(0.0216)								
Lower-Middle*acute		0.0302								
		(0.0233)								
Upper-middle*acute		0.0012								
		(0.0269)								
Scheduled castes	-0.0326***	-0.0302**	-0.0329***	-0.0306**	0.0082	0.0045	-0.2559*	-0.2927**	-0.5437***	-0.5404***
	(0.0115)	(0.0115)	(0.0116)	(0.0115)	(0.0152)	(0.0150)	(0.1050)	(0.1043)	(0.1082)	(0.1078)
Scheduled tribes	-0.0109	-0.0097	-0.0112	-0.0099	0.0052	0.0052	-0.1859*	-0.1883*	-0.1953*	-0.1929*
	(0.0064)	(0.0064)	(0.0064)	(0.0064)	(0.0090)	(0.0090)	(0.0795)	(0.0794)	(0.0841)	(0.0840)
Muslims	-0.0063	-0.0077	-0.0063	-0.0077	0.0549***	0.0541***	0.2398**	0.2285**	0.3686***	0.3597***
	(0.0063)	(0.0063)	(0.0062)	(0.0064)	(0.0092)	(0.0091)	(0.0846)	(0.0845)	(0.0889)	(0.0888)
Children*chronic					0.0309*					
					(0.0150)					
Mid-Age*chronic					-0.0018					
					(0.0120)					
Elder*chronic					0.0178					
					(0.0123)					
Female* cfhronic					0.0081					
					(0.0095)					
Poor*chronic					-0.0191					
					(0.0304)					
Low-Middle*chronic					-0.0293					
					(0.0309)					
Upper-Middle*chronic					0.0068					
					(0.0252)					
Household has acute illness					-0.0118***	-0.0166	0.6294***	0.5207**		
					(0.0030)	(0.0130)	(0.0341)	(0.1718)		
Children*acute in house					0.0206*		0.1654***			
					(0.0098)		(0.0461)			
Mid-age*acute in house					0.0064		-0.0380			
					(0.0070)		(0.0533)			
Elder*acute in house					0.0206*		0.0464			
					(0.0092)		(0.0853)			

Female*acute in house							-0.0019	-0.0174		
							(0.0060)	(0.0392)		
Poor*acute in house							-0.0255	-0.1202		
							(0.0138)	(0.1754)		
Low-middle*acute in house							0.0008	0.1231		
							(0.0126)	(0.1723)		
Upper-mid*acute in house							0.0115	0.2472		
							(0.0134)	(0.1856)		
Log (household expenditure on acute care)									-0.0732***	-0.1418*
									(0.0132)	(0.0649)
Female*acute expenditure										-0.0057
										(0.0199)
Children*acute expenditure										0.0729**
										(0.0270)
Mid-age*acute expenditure										-0.1133***
										(0.0252)
Elder*acute expenditure										-0.0866*
										(0.0366)
Poor*acute expenditure										0.0908
										(0.0652)
Low-mid*acute expenditure										0.1133
										(0.0639)
Upper-mid*acute expenditure										0.1414*
										(0.0702)
Constant							0.5464***	0.7703*	2.1864***	2.4449***
							(0.1614)	(0.3277)	(0.1643)	(0.2789)
Observations	13,217	13,217	13,217	13,217	13,217	13,217	13,217	13,217	13,217	13,217
R-squared							0.1226	0.1266	0.0517	0.0577

Robust standard errors in parentheses.

*** p<0.001, ** p<0.01, * p<0.05

Map 1: Map of the Community Development Blocks studied
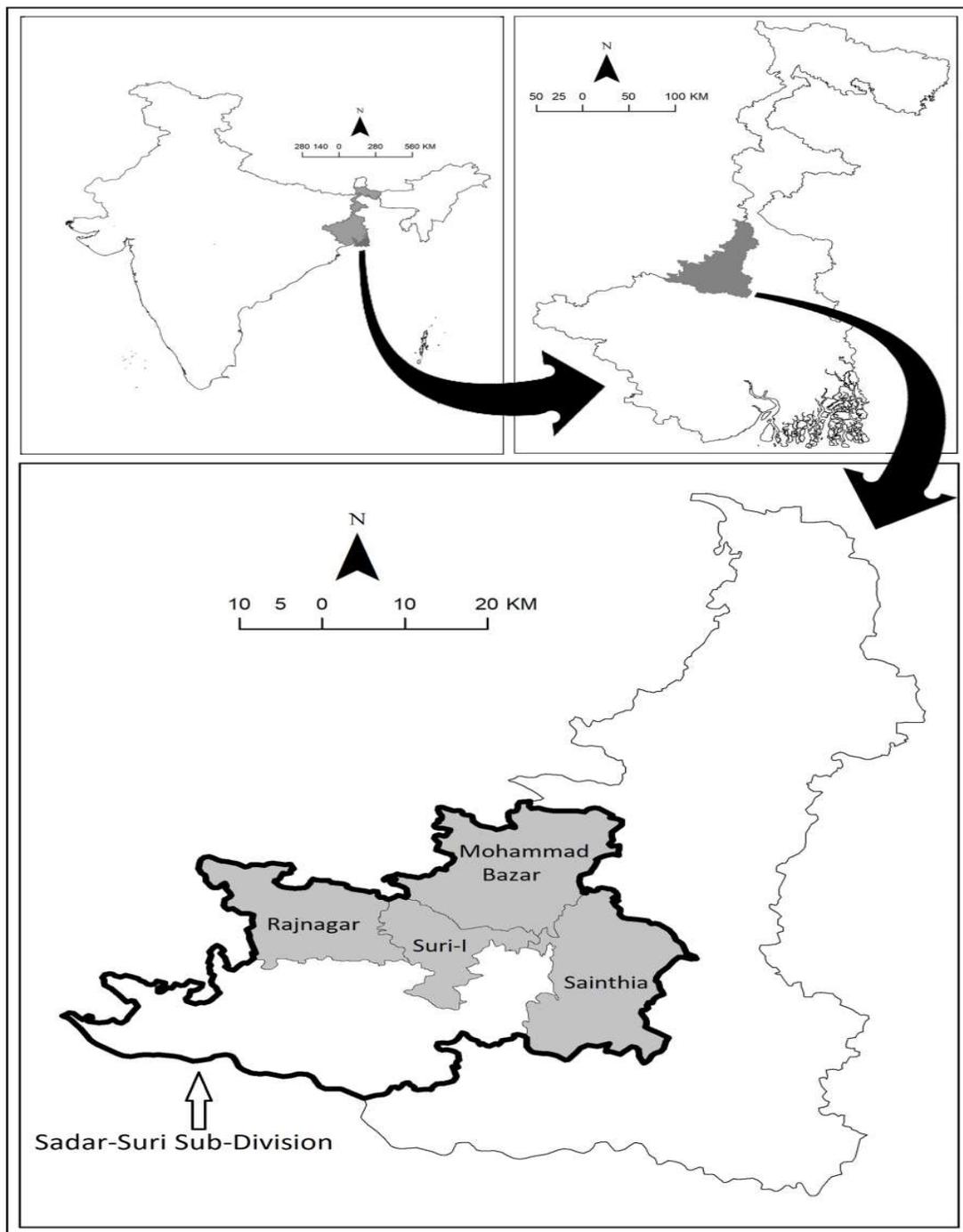
Appendix Tables

Table A1: Classification of reported ailments

Code	Reported ailments	N	Broad ailment category
1	Respiratory tract infection	3,530	Acute
2	Malaria	15	Acute
3	Filaria	32	Chronic communicable
4	Fever	807	Acute
5	typhoid	48	Acute
6	Diarrhea	428	Acute
7	Dysentery	84	Acute
8	Antrik	453	Acute
9	Hepatitis	75	Acute
10	Tuberculosis	31	Chronic communicable
11	Urinary tract infection	39	Acute
12	Sexually Transmitted Infection	7	Chronic communicable
13	Eye inf	67	Acute
14	Anemia	133	Non-chronic communicable
15	cancer	9	Non-chronic communicable
16	cerebral Stroke	17	Non-chronic communicable
17	Eye problem	88	Non-chronic communicable
18	Measles	38	Acute
19	Chicken pox	162	Acute
20	Mumps	36	Acute
21	Polio	2	Communicable chronic
22	Skin disease	388	Chronic but can have acute manifestation
23	Ear inf	90	Acute
24	Malnutrition	326	Chronic non-communicable
25	Asthma	296	Chronic but can have acute manifestation
26	Diabetes	47	Chronic non-communicable
27	Mental	110	Chronic non-communicable
28	Neuro disorder	79	Chronic non-communicable
29	Dental problem	247	Acute
30	HTN/IHD	290	Chronic non-communicable
31	Gastro	759	Chronic but can have acute manifestation
32	Kidney	45	Chronic non-communicable
33	Chronic bone	543	Chronic non-communicable
34	Geriatric	41	Chronic non-communicable
35	Abortion	8	Reproductive or child care
36	Gynae	154	Chronic but can have acute manifestation
37	Accidental	405	Injuries and accident
38	Headache	144	Chronic but can have acute manifestation
39	Abdominal	225	Acute
40	Antenatal care	73	Reproductive or child health care
41	Post-natal care	3	Reproductive or child health care
42	Child check up	1	Routine checkup
43	Immunization	1	Reproductive or child health care
44	Routine check up	14	Routine checkup
45	Others	497	Others

Table A2: Definition of economic class used in the analysis

	Per capita consumption expenditure			Household (%)	Population (%)
	Range	Mean	Median		
Poor	0-782	580	610	25.7	31.5
Lower middle	783-1564	1087	1049	51.8	49.4
Upper middle	1565-3131	2070	1559	17.3	14.5
Rich	>=3132	5468	4278	5.2	4.6

Source: Birbhum Population Survey 2012.

Table A3: Prevalence of ailment per 1000 population by gender and age groups

	Acute	Non-communicable chronic		Acute	Non-communicable chronic
Male			13-39 years		
Poor	95	20	Poor	71	16
Lower middle	127	31	Lower middle	114	27
Upper middle	120	34	Upper middle	114	25
Rich	117	43	Rich	18	20
Female			40-59 years		
Poor	118	30	Poor	130	64
Lower middle	151	49	Lower middle	154	79
Upper middle	151	62	Upper middle	152	80
Rich	124	58	Rich	133	91
0-12 years			60 years and above		
Poor	153	4	Poor	107	152
Lower middle	185	9	Lower middle	126	229
Upper middle	207	13	Upper middle	121	217
Rich	242	7	Rich	94	268

Source: Birbhum Population Survey 2012.

Table A4: Percentage of ailment which sought health care by sex group

Economic class	Acute	Non-communicable chronic	Economic class	Acute	Non-communicable chronic
Male			13-39 years		
Poor	91	84	Poor	86	79
Lower middle	94	85	Lower middle	90	85
Upper middle	94	95	Upper middle	94	91
Rich	95	94	Rich	92	94
Female			40-59 years		
Poor	88	81	Poor	86	79
Lower middle	91	86	Lower middle	90	85
Upper middle	96	94	Upper middle	94	91
Rich	93	92	Rich	92	94
0-12 years			60 years and above		
Poor	92	86	Poor	89	46
Lower middle	95	88	Lower middle	89	42
Upper middle	90	100	Upper middle	93	54
Rich	94	100	Rich	96	42

Source: Birbhum Population Survey 2012.

Table A5: Hospitalisation

Economic class	Acute	Non-communicable chronic	Economic Class	Acute	Non-communicable chronic
Male			13-39 years		
Poor	16	6	Poor	11	4
Lower middle	22	11	Lower middle	20	8
Upper middle	27	24	Upper middle	21	15
Rich	34	29	Rich	25	14
Female			40-59 years		
Poor	13	7	Poor	19	17
Lower middle	22	12	Lower middle	26	18
Upper middle	25	23	Upper middle	26	35
Rich	21	25	Rich	24	33
0-12 years			60 years and above		
Poor	16	2	Poor	25	20
Lower middle	19	6	Lower middle	27	35
Upper middle	29	4	Upper middle	46	60
Rich	31	14	Rich	47	81

Source: Birbhum Population Survey 2012.

Table A5: Sample sizes of household reporting ailment & hospitalization

No. of households with acute ailment or hospitalization for acute or both	Number of households with chronic ailment or hospitalization for chronic or both			No chronic episodes reported	Total
	Only illness	Only hospitalisation	Both ailment & hospitalisation		
Only illness	591 (4.7)	210 (1.7)	43 (0.3)	4343	5187
Only hospitalization	120 (0.9)	12 (0.1)	6 (0.05)	422	560
Both ailment & hospitalization	84	21	11	437	553
No acute episodes reported	1147	273	120	4717	6257
Total	1942	516	180	9919	12557

Source: Birbhum Population Survey 2012.