

Cost of hospitalisation for non-communicable diseases in India: are we pro-poor?

J. P. Tripathy¹, B. M. Prasad², H. D. Shewade¹, A. M. V. Kumar¹, R. Zachariah³, S. Chadha², J. Tonsing¹ and A. D. Harries^{4,5}

¹ International Union Against Tuberculosis and Lung Disease, South-East Asia Regional Office, New Delhi, India

² Project Axshya, International Union Against Tuberculosis and Lung Disease, South-East Asia Regional Office, New Delhi, India

³ Brussels Operational Centre, Médecins Sans Frontières, Luxembourg City, Luxembourg

⁴ International Union Against Tuberculosis and Lung Disease, Paris, France

⁵ London School of Hygiene and Tropical Medicine, London, UK

Abstract

OBJECTIVES To estimate out-of-pocket (OOP) expenditure due to hospitalisation from NCDs and its impact on households in India.

METHODS The study analysed nationwide representative data collected by the National Sample Survey Organisation in 2014 that reported health service utilisation and healthcare-related OOP expenditure by income quintiles and by type of health facility (public or private). The recall period for inpatient hospitalisation expenditure was 365 days. Consumption expenditure was collected for a recall period of 1 month. OOP expenditure amounting to >10% of annual consumption expenditure was termed as catastrophic. Weighted analysis was performed.

RESULTS The median expenditure per episode of hospitalisation due to NCDs was USD 149 – this was ~3 times higher among the richest quintile compared to poorest quintile. There was a significantly higher prevalence of catastrophic expenditure among the poorest quintile, more so for cancers (85%), psychiatric and neurological disorders (63%) and injuries (63%). Mean private-sector OOP hospitalisation expenditure was nearly five times higher than that in the public sector. Medicines accounted for 40% and 27% of public- and private-sector OOP hospitalisation expenditure, respectively.

CONCLUSION Strengthening of public health facilities is required at community level for the prevention, control and management of NCDs. Promotion of generic medicines, better availability of essential drugs and possible subsidisation for the poorest quintile will be measures to consider to reduce OOP expenditure in public-sector facilities.

keywords non-communicable diseases, injury, cancer, out-of-pocket expenditure, catastrophic expenditure

Introduction

Non-communicable diseases (NCDs) are a major threat to general health, productivity, development and economic growth and account for 63% of annual global deaths [1]. Most of these deaths are premature and preventable. The probability of dying during the most productive years (ages 30–70) from one of the four main NCDs [cancer, cardiovascular disease, diabetes mellitus and stroke] is 26%. If urgent action is not taken, NCDs could hurt economic growth and cause an estimated economic loss of \$47 trillion during the period 2010–30 [2].

In an ageing nation like India, an increase in the prevalence of NCDs is likely to put additional burdens on households and the resource-constrained healthcare

delivery system. India runs the risk of losing about \$4.6 trillion by 2030 due to NCDs and mental health conditions. In 2010, NCDs accounted for more disability-adjusted life years (DALYs) in India than communicable diseases [2].

With a rising burden of NCDs, delivering health care in developing countries has many challenges. Even when such care is available, individuals with NCDs will continue to face significant risks of hospitalisation and the associated burden of high costs of financing care. A review of the literature shows that households spend a substantial share of their income on health care leading to catastrophic expenditure and impoverishment [3]. Each year, globally, approximately 150 million people in 44 million households face catastrophic expenditure and

about 100 million people in 25 million households are pushed into poverty because they have to pay for health care [3].

The extent of the financial burden due to NCDs in India is poorly researched [4, 5]. A gap area is the household impact of out-of-pocket (OOP) hospitalisation expenditure due to NCDs. This information would be helpful in formulating social protection strategies to increase financial risk protection for households affected with NCDs. With the rising burden of NCDs, we need to look for answers whether people have access to the services they need to prevent or control these diseases, and the extent to which they suffer financial catastrophe or impoverishment in accessing the services.

There have been a few studies in India analysing household expenditure on chronic illnesses either combined or separately for diabetes, CVD and injuries [6–11]. However, these studies were limited to a specific geographical area or a hospital with unrepresentative samples. Another study by Engelgau *et al.* explored OOP for NCD care and the risk of catastrophic payment in a nationally representative survey sample [12] more than a decade ago. Since then, there has been an unprecedented rise in the burden of NCDs [13]. The public health infrastructure in India has seen massive growth after significant investments through the National Health Mission since 2005 [14]. The private sector has also proliferated due to government apathy [15]. In the present scenario, we have limited estimates of household expenditure patterns on hospitalisation due to NCDs, both in the public and in the private sector. Availability of National Sample Survey Organisation (NSSO) data, from a nationally representative survey conducted in 2014, provided us an opportunity to study this.

Therefore, this study was undertaken to estimate the proportion of all hospitalisations in public-sector facilities due to non-communicable diseases by income quintiles, and the median out-of-pocket expenditure and prevalence of catastrophic expenditure due to hospitalisation from non-communicable disease by type of health facility and income quintiles.

Methods

This is a secondary data analysis of a nationwide survey data collected by the NSSO, India. The data source is the representative nationwide survey collected by the National Sample Survey Organisation (NSSO) in its 71st round (2014) on 'Health' and 'Education'. NSSO is a national organisation under the Ministry of Statistics, established in 1950 to regularly conduct surveys and provide useful statistics on socio-economic status of households,

demography, health, industries, agriculture, consumer expenditure, etc. Results of NSSO surveys are published in the form of NSS reports available at the website of the ministry (www.mospi.nic.in). So far, there have been 71 rounds of surveys; the last (71st round) was carried out for 6 months from January to June 2014. A stratified multi-stage sampling design was adopted. The first-stage units were the census villages in the rural sector and Urban Frame Survey (UFS) blocks in the urban sector. The ultimate-stage units were households in both sectors. A total of 4577 villages and 3720 urban blocks were surveyed, from which 36 480 and 29 452 households were sampled in rural and urban areas, respectively. In total, 333 104 persons from 65 932 households were interviewed. Detailed methods can be found in the survey report [16].

OOP expenditure for each episode of hospitalisation was recorded. Detailed expenditure was available for drugs; diagnostic tests (including ECG, X-ray and pathological tests); professional fees for doctors; payments to hospital/institution; other medical expenses (physiotherapy, personal medical appliances, blood, oxygen, attendant charges, etc.); and other indirect costs. Indirect costs included transport for patients and other accompanying persons, food-related expenses, lodging charges and others. Household consumption expenditure was recorded as well as other socio-demographic characteristics including caste, occupation, gender and education. Data were also collected on type of facility (public or private) accessed for medical care.

The recall period was 365 days for assessing inpatient hospitalisation expenditure, and 1 month for household consumption expenditure. OOP expenditure per hospitalisation episode amounting to more than 10% of annual consumption expenditure was termed as 'catastrophic' [17, 18].

Disease conditions in the household survey were self-reported. We matched the categories in the surveys to broad ICD-10 disease classifications to distinguish between major NCD categories and communicable diseases (Box 1).

Data analysis

Data were imported into SPSS version 17.0 for analysis (SPSS Inc. SPSS Statistics for Windows, Version 17.0. Chicago). The unit of analysis was an episode of hospitalisation. The study population was divided into quintile groups based on monthly per capita consumption expenditure (MPCE). The household monthly per capita consumption expenditure limits (in USD) for the five quintiles are as follows: the first quintile (2–16), second quintile (17–22), third quintile (23–30), fourth quintile (31–46) and fifth

Box 1 Classification of 2014 household survey response categories from National Sample Survey Organisation data into disease categories

Communicable diseases

- Fever with rash/eruptive lesions, loss of consciousness
- Fever due to malaria, typhoid, Diphtheria, Whooping Cough, fevers of unknown origin)
- Tuberculosis, Filariasis
- Tetanus
- HIV/AIDS and other Sexually Transmitted Diseases
- Jaundice
- Diarrhoea/dysentery/increased frequency of stools with or without blood and mucus in stools
- Worms infestation
- Skin infection (boil, abscess, itching) and other skin diseases
- Acute upper respiratory infections

Non-communicable diseases

- Cancers
- Psychiatric and Neurological disorders
- Endocrine, nutritional and metabolic disorders
- Cardiovascular disorders
- Chronic respiratory conditions (Bronchial asthma)
- Injuries

Other conditions

- Blood disorders
- Disorders of the gastrointestinal system
- Disorders of the genitourinary system
- Obstetric complications
- Disorders of eye and ear

quintile (47–538). Median values/percentages for all indicators were compared across each of the five MPCE quintiles and type of health facility (public and private). Median hospitalisation expenditure per episode was estimated for those who reported hospitalisation due to NCD. The Kruskal–Wallis test was used to evaluate the statistical significance of differences in expenditures between the quintiles. Chi-square test for trend was used to test linear trends across quintiles. As it was a multistage stratified random survey, estimates were derived by applying sampling weights given by the NSSO.

Ethical approval

The Ethics Advisory Group of International Union Against Tuberculosis and Lung Disease, Paris, France, determined that ethics clearance was not required for this study.

Results

Of a total of 57 456 hospitalisations, 25% were due to NCDs, 22% to communicable diseases and 53% to other

conditions. A total of 11 843 subjects reported 14 609 episodes of hospitalisations due to non-communicable disease in the last 365 days, of which 1.6% of episodes were removed due to missing data. Among the cases of hospitalisation due to NCDs, 31% were due to injuries; 25% to CVD; 18% to psychiatric/neurological conditions; 9% to respiratory diseases; 8% to endocrine/metabolic disorders; and 8% to cancers. 85% of respondents reported one episode of hospitalisation in the previous year; 11% reported two episodes and 4% reported more than two episodes. 26% were females. The mean age of the respondents was 49 years (SD = 16). The mean duration of hospitalisation was highest in cases of cancer (15 days), followed by injuries and psychiatric/neurological disorders (9 days), endocrine/metabolic diseases (8 days) and CVD and respiratory diseases (7 days).

Hospitalisation-related expenditure due to NCDs

Median expenditure per episode of hospitalisation due to NCDs was 149 USD. The expenditure incurred was ~3 times higher among the richest quintile than in the poorest quintile. There was a significantly higher prevalence of catastrophic expenditure among the poorest quintile, more pronounced with cancers (85%), psychiatric and neurological disorders (63%) and injuries (63%) (Table 1). Public-sector utilisation by the poorest quintile was twice as common as by the richest quintile (Table 2).

The median private-sector OOP hospitalisation expenditure was nearly 3–5 times higher than that of the public sector due to various NCDs. Private-sector hospitalisation expenditure was more than five times the public-sector hospitalisation expenses in case of cardiovascular diseases and injuries. Medicines accounted for 40% of public- and 27% of private-sector OOP hospitalisation expenditure. In 26% of hospitalisations, expenditures were sourced through borrowing or sale of assets – this was significantly higher among the poorest quintile (33%) than the richest (19%), more common when care was sought in the private sector (29%) than in the public sector (22%) and common in case of cancer. Indirect costs were more than two times higher in the public sector (24%) than in the private sector (10%) (Table 3). Nearly 4.4% of respondents were insured. Among the insured, median hospitalisation expenditure was significantly higher (USD 519) compared to the non-insured (USD 160).

NCD-related hospitalisation leading to catastrophic household expenditure

Hospitalisation due to an NCD had a three times higher odds of incurring catastrophic spending than

Table 1 Out-of-pocket hospitalisation expenditure per episode of hospitalisation due to non-communicable diseases by income quintiles in India, 2014*

Income quintiles	Cancer	Endocrine/metabolic	Psychiatric/neurological	Cardiovascular	Chronic respiratory	Injuries	Total
Median hospitalisation expenditure in USD for each episode (IQR)							
1st MPCE quintile	400 (96–957)	88 (25–191)	108 (37–226)	67 (24–218)	79 (31–138)	105 (38–268)	93 (34–231)
2nd MPCE quintile	310 (111–465)	142 (55–235)	102 (45–274)	122 (37–314)	68 (32–154)	111 (45–317)	114 (45–305)
3rd MPCE quintile	277 (140–826)	98 (47–200)	148 (57–295)	123 (52–276)	83 (33–185)	139 (42–354)	137 (47–309)
4th MPCE quintile	383 (117–769)	132 (43–300)	205 (75–527)	177 (66–457)	114 (48–240)	213 (70–579)	185 (67–499)
5th MPCE quintile	608 (282–1360)	215 (78–400)	347 (117–943)	291 (86–1320)	197 (102–431)	331 (108–885)	298 (102–873)
Overall	357 (143–864)	130 (53–272)	152 (58–398)	148 (54–412)	101 (42–200)	156 (50–447)	149 (55–406)
Out-of-pocket hospitalisation expenditure as a proportion of annual household consumption expressed in median percentage (%)							
1st MPCE quintile	56	14	14	12	13	16	15
2nd MPCE quintile	25	11	10	12	7	11	11
3rd MPCE quintile	23	7	12	9	6	9	10
4th MPCE quintile	26	7	9	8	7	13	9
5th MPCE quintile	22	8	12	9	6	9	9
Overall	25	8	12	10	8	11	11
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Proportion of hospitalisation episodes leading to catastrophic expenditure† (%)							
1st MPCE quintile	85	63	63	55	55	63	61
2nd MPCE quintile	73	50	49	55	45	52	52
3rd MPCE quintile	75	39	57	48	33	45	48
4th MPCE quintile	75	41	48	42	31	55	48
5th MPCE quintile	74	30	56	49	28	47	48
Overall	76	44	55	49	40	53	52
P-value	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Proportion of hospitalisation episodes whose expenditure was sourced from borrowings/sale of physical assets (%)							
1st MPCE quintile	38	27	39	28	22	37	33
2nd MPCE quintile	48	27	31	30	25	33	32
3rd MPCE quintile	36	23	29	20	18	26	25
4th MPCE quintile	26	16	33	26	19	19	24
5th MPCE quintile	28	21	19	19	10	19	19
Overall	36	22	30	24	19	27	26
P-value	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001

*Weighted analysis; IQR, interquartile range; MPCE, monthly per capita consumption expenditure.

†Less than 10% of annual household consumption expenditure; the household monthly per capita consumption expenditure limits (in USD) for the five quintiles are as follows: the first quintile (2–16), second quintile (17–22), third quintile (23–30), fourth quintile (31–46) and fifth quintile (47–538).

Table 2 Utilisation of public-sector facilities for hospitalisation due to non-communicable diseases by income quintiles in India, 2014*

Income quintiles	Cancer	Endocrine/metabolic	Psychiatric/neurological	Cardiovascular	Chronic respiratory	Injuries	Total
1st MPCE quintile	52	54	54	56	63	57	56
2nd MPCE quintile	46	42	48	45	61	46	47
3rd MPCE quintile	39	36	36	36	41	44	39
4th MPCE quintile	41	35	36	34	39	28	33
5th MPCE quintile	28	18	22	20	26	29	23
Overall	39	35	39	37	47	42	40
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

*Weighted analysis; MPCE, monthly per capita consumption expenditure; numbers given indicate percentage utilising public-sector facility for hospitalisation due to non-communicable disease; the household monthly per capita consumption expenditure limits (in USD) for the five quintiles are as follows: the first quintile (2–16), second quintile (17–22), third quintile (23–30), fourth quintile (31–46) and fifth quintile (47–538).

hospitalisation due to a communicable disease. For cancer, the impact was greatest with the odds of catastrophic expenditures being 12 times higher than for hospital stays due to a communicable disease (Table 4).

Discussion

The study shows that NCD-related expenditure per episode of hospitalisation in India is high and catastrophic in among the poorest quintile. Cancers, psychiatric and neurological disorders and injuries were the most expensive. Expenditure was higher when care was accessed in the private sector.

The utilisation of public facilities showed a pro-poor distribution, which is corroborated by Shankar *et al.* who also reported higher public-sector utilisation by the poor in three states of North India [18]. This is an encouraging sign considering the rising burden of NCDs. It lends support to the view that strengthening of the public health system is instrumental in providing care for the rising epidemic of NCDs [19]. However, the results of the study also showed that private care is very costly, which might be the reason why poor people make greater use of public care facilities. The proportion of hospital stays due to NCDs in the public sector has remained stagnant at around 41% since 2004 [12]. However, the use of public services has decreased sharply with the increase in wealth quintile class. Thus, people who are poor are heavily reliant on public health facilities and are therefore most affected by the unavailability of quality services in the public sector.

About half of the patients belonging to the lowest two quintiles approach the private sector for hospitalisation due to NCDs. It is possible that patients with NCDs consider their illness as serious requiring better services. So despite their poor economic status, they might prefer costlier private care. Also, there is a general scepticism

about quality of public health services [20, 21]. The full survey report states the following reasons for not availing government services: poor quality of care, long waiting times, services not available or the facility too far. Thus, the public sector needs to be strengthened in terms of quality of care, infrastructure and availability of services, providers and drugs to increase its access and utilisation. With higher health spending under the National Rural Health Mission, we may be on track.

Medicines accounted for 40% of public-sector OOP hospitalisation expenditure which is significantly higher than that in the private sector (27%). This supports a large body of evidence showing that medicines form a large component of the healthcare out-of-pocket expenditure [6, 12, 22]. This finding is to be interpreted with caution and does not mean that medicines are more expensive in the public than in the private sector. Rather, it means that as a percentage of total expenses, medicines contribute the most in the public sector, while the absolute costs remain lower than in the private sector. The lower percentage of medicine costs in the private sector is due to higher costs of other services (like diagnostic tests, procedures and room rent) which are free or subsidised in the public sector. Poor availability of essential medicines for chronic diseases in public health facilities forces patients to purchase medicines from the private sector [23]. Thus, to increase access and affordability of health care, promotion of generic medicines and improved availability of medicines and subsidisation of the poorest population quintiles in the public sector are required [24]. The Rajasthan model of a free-drug scheme has increased access to health care for the underserved, reduced in OOP and resulted in savings to the government [25]. A drug pricing policy is needed to improve the availability of affordable generics in the public sector, either by better targeting of existing public spending for medicines or by increasing the public budget on essential medicines.

Table 3 Out-of-pocket hospitalisation expenditure characteristics for each episode of hospitalisation due to non-communicable disease in the public and private sectors in India, 2014*

Level of care	Cancer	Endocrine/metabolic	Psychiatric/neurological	Cardiovascular	Chronic respiratory	Injuries	Total
Median hospitalisation expenditure (IQR)							
Public sector	169 (62–495)	46 (20–95)	59 (26–138)	45 (17–113)	48 (15–95)	55 (21–137)	55 (21–138)
Private sector	548 (277–1161)	191 (100–364)	245 (122–537)	241 (107–615)	163 (85–343)	290 (127–695)	254 (116–600)
Overall	357 (143–864)	130 (53–272)	152 (58–398)	148 (54–412)	101 (42–200)	156 (50–447)	149 (55–406)
Proportion of hospitalisation episodes sourced from borrowings/sale of personal physical assets (%)							
Public sector	30	17	28	18	17	24	22
Private sector	40	25	31	27	20	30	29
Overall	36	22	30	24	19	28	26
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Medicine cost as a percentage of total hospitalisation expenditure† (%)							
Public sector	32	40	43	43	36	36	40
Private sector	24	28	30	27	29	26	27
Overall	27	31	33	29	31	28	30
P-value	0.01	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Indirect cost as a percentage of total hospitalisation expenditure‡ (%)							
Public sector	17	25	18	21	24	25	24
Private sector	8	10	11	11	12	10	10
Overall	10	12	13	13	15	13	13
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Diagnostic cost as a percentage of total hospitalisation expenditure§ (%)							
Public sector	17	16	18	17	11	12	15
Private sector	09	10	12	12	11	09	11
Overall	10	11	13	13	11	10	12
P-value	<0.001	<0.001	<0.001	0.001	0.2	0.003	0.001

*Weighted analysis; cost estimates are given in terms of US dollars; indirect cost includes transport for patient and others, expenses on food, escort, lodging charges and others; IQR stands for interquartile range.

†Proportion of per-episode hospital expenditure spent towards medicine expressed in median percentage.

‡Proportion of per-episode hospital expenditure spent towards indirect costs expressed in median percentage.

§Proportion of per-episode hospital expenditure spent towards diagnostic tests expressed in median percentage.

Table 4 Adjusted odds ratios for catastrophic spending for patients with specific non-communicable diseases compared to those with communicable diseases, India, 2014*

Type of disease	Type of expenditure		Unadjusted OR (95% CI)	Adjusted OR (95% CI)
	Catastrophic† N (%)	Non-catastrophic N (%)		
Cancer	807 (74)	286 (26)	7.2‡ (6.2–8.2)	12.2‡ (12.0–12.4)
Endocrine/metabolic disorders	512 (42)	700 (58)	1.9‡ (1.6–2.1)	2.0‡ (1.9–2.1)
Psychiatric and neurological disorders	1410 (54)	1212 (46)	2.9‡ (2.7–3.2)	3.5‡ (3.2–3.8)
Cardiovascular diseases	1904 (53)	1720 (47)	2.8‡ (2.6–3.0)	2.8‡ (2.6–3.0)
Respiratory diseases	469 (37)	795 (63)	1.5‡ (1.3–1.7)	1.8‡ (1.6–2.0)
Injuries	2461 (55)	2044 (45)	3.0‡ (2.8–3.3)	3.2‡ (3.0–3.4)
Overall NCDs	7563 (53)	6757 (47)	2.8‡ (2.7–3.0)	3.0‡ (2.9–3.1)
Communicable disease	3459 (28)	8781 (72)	Reference§	Reference

*Weighted analysis; CI stands for confidence interval; OR stands for odds ratio.

†More than 10% of annual household consumption expenditure.

‡P-value <0.001; variables included in logit regression were age, sex, social group, education, income quintiles and type of health facility.

§Reference category includes a list of communicable diseases as given in Box 1.

Cardiovascular disease is the largest cause of mortality and accounted for more than one-fourth of all deaths in India in 2008 [26]. Our study reveals prohibitive costs of care due to CVD in the private sector, with one-fifth of hospitalisations paid for by borrowings or sale of personal assets and medicines. The private sector is also typically driven by the use of advanced medical technology, thus increasing the costs of diagnosis, care and treatment. We speculate that there may be unnecessary (irrational) overuse of such technology for increasing hospital activity and profit margins by the private health sector. This merits specific investigation. The issue of affordability is further magnified by the low penetration of health insurance in India. There is no coverage for preventive check-ups, diagnosis or any medical care. Along with poor awareness, this is a huge barrier towards lowering the burden of CVDs through preventive measures.

Nearly 40% of those insured were prevented from incurring catastrophic expenditure due to insurance payments. There is a need to mitigate this catastrophic expenditure through prepayment risk pooling mechanisms, such as social health insurance and tax-based financing of health care. In practice, it has been found that the beneficiaries of such programmes are often not actually poor. Thus, packages should be redesigned to target the poor and the disadvantaged. This study shows that even after 6 years of implementation of *Rashtriya Swasthya Bima Yojana*, a government social health insurance scheme, there is a high prevalence of catastrophic expenditure due to hospitalisation for NCDs in public-sector facilities among the poorest quintiles. Considering the long-term chronic care and repeated hospitalisations

for NCDs, separate customised insurance packages should be designed for patients with this group of morbidities. However, the median hospitalisation expenditure among the insured was more than three times higher than among the non-insured, which reflects moral hazards of insurance requiring preventive mechanisms.

Hospitalisations due to injuries lead to a high prevalence of catastrophic OOP expenditure. There was also a higher prevalence of OOP hospitalisation expenditures being paid for by borrowing/debt/sale of assets in both the public and private sectors. Other studies have also outlined the high burden of OOP healthcare expenditure associated with injuries in India [27, 28].

Apart from cancer, injury care leads to higher OOP and impoverishment of households. Similarly, other studies have also reported higher OOP for injuries compared with other diseases and ailments [29]. This might be due to the fact that injuries requiring hospitalisations are usually severe and lead to more fatalities and disabilities [29]. Furthermore, the impact of injuries is sudden and rapid requiring immediate hospitalisation, which demands sophisticated emergency trauma care services and prolonged duration of hospital stay. A review of economic evidence in LMICs suggests that the direct median medical cost of injury was US\$291, which increased 14-fold, that is US\$4085, when studies included direct medical, direct non-medical and indirect costs [30]. This clearly shows the devastating financial impact of injury on households. There is therefore a need for advocacy for effective financial protection mechanisms in India against high OOP expenditure through insurance and universal health care. Various

cost-effective injury prevention strategies are established, which include strict legislative measures to regulate vehicle safety and road safety, installation of speed bumps, motorcycle helmet and seat belt legislation, breath testing campaigns and drowning prevention programmes. Thus, in view of the high burden of injuries, high cost of injury care and availability of cost-effective preventive interventions, there is significant potential for huge cost savings through implementation of established preventive strategies [30].

There is high OOP hospitalisation expenditure related to cancer care. The prevalence of catastrophic expenditure is highest in those with cancers in all the quintiles, but especially amongst the poorest. Cancer treatment in private hospitals is expensive in India as evident from other studies [31]. The high OOP expenditure due to cancer is sourced from borrowing/sale of assets in more than one-third of patients [31]. The cost of cancer care is prohibitive due to costly medicines, sophisticated equipment and modern technology. Cancer also requires prolonged period of hospitalisation as evident in this study. Providing cancer care free of cost at all public health facilities would put an enormous financial burden on the health system, but targeting the poorest quintile seems feasible and equitable. Some state-level initiatives, such as the *Yashaswini* health insurance scheme in Karnataka and similar schemes in Andhra Pradesh and Tamil Nadu, cover cancer treatment for people living below the poverty line [31].

Current programmes that address cancer prevention, care and treatment have not been effective due to limited scale of implementation. It is imperative to strengthen cancer control activities at the community with strong prevention messages, early screening and proper management as most of the common cancers are preventable [32].

Our data confirm the important role that the private sector currently plays in the provision of health services for hospitalisations associated with NCDs. However, the median OOP hospitalisation expenditure in the private sector was 3–5 times higher than in the public sector. In the last decade, there has been a significant increase in private-sector expenditure on health care. During 2004–2014, the out-of-pocket expenditure for inpatient care per episode in the public sector diminished, whereas it grew by 3.6% per year in the private sector [33]. This is a reflection of the inability of the government to regulate the private sector. The government needs to regulate the private sector and at the same time use the private infrastructure to provide comprehensive preventive, promotive and curative care services for NCDs that are accessible and affordable.

Given that people living with NCDs face high risks of catastrophic health expenditure due to the long-term nature of their illness and OOP payments, the health system must provide universal access to quality health care, reduce health inequities and improve financial risk protection through universal health coverage (UHC). Many countries have already introduced NCD packages into UHC programmes using frameworks developed by WHO [34]. Thus, NCD prevention and control should be prioritised in UHC design and implementation.

There are some limitations in this study. Firstly, consumption expenditure in the survey does not differentiate between food and non-food expenditure. WHO recommends a 40% cut-off level for non-food expenditure [35]. In this study, we have used a threshold of 10% of annual consumption expenditure. However, this does not provide an accurate estimate of catastrophic expenditure as the expenditure on food as a proportion of total consumption expenditure is higher for poorer households. Hence, the results of the present study for catastrophic expenditure may be an underestimate for the poorer income quintiles and overestimate for higher income quintiles. Secondly, consumption expenditure as an alternative to income also might overestimate the findings. Thirdly, indirect costs do not include wage losses due to the illness, which might underestimate the impact of healthcare expenditure on the household. Lastly, the data used for the analyses are self-reported and may be subject to recall and other biases.

Conclusion

The study shows that a household with a member suffering from any NCD is exposed to significant financial risks which lead to catastrophic household expenditure. This trend is likely to worsen over time due to the rising NCD epidemic and the ageing population. We strongly advocate for publicly funded risk protection mechanisms targeting the poor. The use of NCD health services from public facilities results in lower out-of-pocket household expenses than the use of private services, which warrants strengthening of public-sector health facilities for better financial risk protection. Promotion of generic medicines and better availability and access to essential drugs will significantly reduce OOP expenditure in public-sector facilities. NCD prevention and control should be prioritised in universal healthcare design and implementation.

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J. P. Tripathy *et al.* **NCD hospitalisation costs in India**

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J. P. Tripathy *et al.* **NCD hospitalisation costs in India**

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Corresponding Author Jaya Prasad Tripathy, International Union Against Tuberculosis and Lung Disease, The Union South-East Asia Regional Office, New Delhi, India. E-mail: jtripathy@theunion.org