Socioeconomic inequality in healthcare utilization and expenditure in the older population of India

ANAMIKA PANDEY

Thesis submitted in accordance with the requirements for the degree of Doctor of Philosophy

University of London

August 2017

Department of Population Health

Faculty of Epidemiology and Population Health

LONDON SCHOOL OF HYGIENE & TROPICAL MEDICINE

STATEMENT OF OWN WORK

All students are required to complete the following declaration when submitting their thesis. A shortened version of the School's definition of Plagiarism and Cheating is as follows (the full definition is given in the Research Degrees Handbook):

"Plagiarism is the act of presenting the ideas or discoveries of another as one's own. To copy sentences, phrases or even striking expressions without acknowledgement in a manner which may deceive the reader as to the source is plagiarism. Where such copying or close paraphrase has occurred the mere mention of the source in a biography will not be deemed sufficient acknowledgement; in each instance, it must be referred specifically to its source. Verbatim quotations must be directly acknowledged, either in inverted commas or by indenting" (University of Kent).

Plagiarism may include collusion with another student, or the unacknowledged use of a fellow student's work with or without their knowledge and consent. Similarly, the direct copying by students of their own original writings qualifies as plagiarism if the fact that the work has been or is to be presented elsewhere is not clearly stated.

Cheating is similar to plagiarism, but more serious. Cheating means submitting another student's work, knowledge or ideas, while pretending that they are your own, for formal assessment or evaluation. Supervisors should be consulted if there are any doubts about what is permissible.

DECLARATION BY CANDIDATE

I have read and understood the School's definition of plagiarism and cheating given in the Research Degrees Handbook. I declare that this thesis is my own work, and that I have acknowledged all results and quotations from the published or unpublished work of other people.

I have read and understood the School's definition and policy on the use of third parties (either paid or unpaid) who have contributed to the preparation of this thesis by providing copy editing and, or, proof reading services. I declare that no changes to the intellectual content or substance of this thesis were made as a result of this advice, and, that I have fully acknowledged all such contributions. I have exercised reasonable care to ensure that the work is original and does not to the best of my knowledge break any UK law or infringe any third party's copyright or other intellectual property right.

08/08/2017

Signed: ………………….. Date: ....

Full Name: ANAMIKA PANDEY

Abstract

Background

Equity in access and financing healthcare is a key determinant of population health. This study examined the socioeconomic inequality in healthcare utilization and expenditure contrasting older (60 years or more) with younger (under 60 years) population in India over two decades.

Methods

National Sample Survey data from all states of India on healthcare utilization (NSS-HUS 1995–96, NSS-HUS 2004 and NSS-HUS 2014) and consumer expenditure (NSS-CES 1993–94, NSS-CES 1999–2000, NSS-CES 2004–05 and NSS-CES 2011–12) were used. Logistic, generalized linear and fractional response models were used to analyze the determinants of healthcare utilization and burden of out-of-pocket (OOP) payments. Deviations in the degree to which healthcare was utilized according to need was measured by a horizontal inequity index with 95% confidence interval (HI, 95% CI).

Findings

When compared with younger population, the older population had higher self-reported morbidity rate (4.1 times), outpatient care rate (4.3 times), hospitalization rate (3.6 times), and proportion of hospitalization for non-communicable diseases (80.5% vs 56.7%) in 2014. Amongst the older population, the hospitalization rates were comparatively lower for female, poor and rural residents. Untreated morbidity was disproportionately higher for the poor, more so for the older (HI: -0.320; 95% CI: -0.391, -0.249) than the younger (-0.176; -0.211, -0.141) population in 2014. Outpatient care in public facilities increased for the poor over time, more so for the older than the younger population. Households with older persons only had higher median per capita OOP payments (2.47-4.00 times across NSS-CES and 3.10-5.09 times across NSS-HUS) and catastrophic health expenditure (CHE) (1.01-2.99 times across NSS-CES and 1.10-1.89 times across NSS-HUS) than the other households. The odds of CHE were significantly higher in households with older persons, households headed by females and rural households. Both the vertical and horizontal inequities in OOP payments for hospitalization by the older population increased between 1995 and 2014.

Conclusion

These findings can be used for developing an equitable health policy that can more effectively provide healthcare protection to the increasing older population in India.

Table of contents

List of tables

List of figures

Acronyms and Abbreviations

- AOR – Adjusted Odds Ratio
- ATP – Ability to Pay
- BPL – Below Poverty Line
- BRICS – Brazil, Russia, India, China and South Africa
- CC – Concentration Curve
- CD – Communicable Diseases and Nutritional Disorders
- CES – Consumer Expenditure Survey
- CHE – Catastrophic Health Expenditure
- CI – Confidence Intervals
- CTP – Capacity to Pay
- FSU – First Stage Units
- GDP – Gross Domestic Product
- GP – General Practitioner
- HI – Horizontal Inequity Index
- HUS – Healthcare Utilization Survey
- IGNOAPS – Indira Gandhi National Old Age Pension Scheme
- IGNWPS – Indira Gandhi National Widow Pension Scheme
- INR – Indian Rupee
- IOR – Inter Quartile Range
- KI – Kakwani Index
- LMIC – Low- and Middle-Income Countries
- MOSJE – Ministry of Social Justice and Empowerment
- MPCE – Monthly Per Capita Consumption Expenditure
- NCD – Non-Communicable Diseases and Injuries
- NPHCE – National Policy for the Health care of the Elderly
- NPOP – National Policy for Older Persons
- NPSC – National Policy for Senior Citizens
- NRHM – National Rural Health Mission
- NSS – National Sample Survey
- NSSO – National Sample Survey Organization
- OOP – Out-of-Pocket
- OR – Odds Ratio

- PHFI – Public Health Foundation of India
- RR – Rate Ratio
- RSBY – Rashtriya Swasthya Bima Yojana
- SAGE – Study on Global AGEing and Adult Health
- SC – Schedules Caste
- SD – Standard Deviation
- SDG – Sustainable Development Goals
- SE – Standard Error
- SRH – Self-Rated Health
- SRM – Self-Reported Morbidity
- ST – Schedules Tribe
- UFS – Urban Frame Survey
- UHC – Universal Health Coverage
- UK – United Kingdom
- US – United States
- USU – Ultimate Stage Units
- UT – Union Territories
- WHA – World Health Assembly
- WHO – World Health Organization

Relevant publications and conference presentations

<u>Published research paper</u>

- Pandey A, Ploubidis GB, Clarke L, Dandona L. Horizontal inequity in outpatient care use and untreated morbidity: evidence from nationwide surveys in India between 1995 and 2014. *Health Policy and Planning.* 2017; 32 (7): 969-979.

<u>Accepted research paper</u>

- Pandey A, Ploubidis GB, Clarke L, Dandona L. Hospitalization trends in India from serial cross-sectional nationwide surveys: 1995 to 2014. *BMJ Open.* 2017; 0:e014188. doi:10.1136/bmjopen-2016-014188 [in press].

<u>Research papers under peer review</u>

- Pandey A, Ploubidis GB, Clarke L, Dandona L. Trends in catastrophic health expenditure in India from serial nationwide surveys: 1993 to 2014. *Bulletin of the World Health Organization.*
- Pandey A, Clarke L, Dandona L, Ploubidis GB. Has the inequity in out-of-pocket payments for hospitalization increased in India? Evidence form national sample surveys 1995 to 2014. *Social Science and Medicine*.

<u>Oral presentation of research papers</u>

- Pandey A, Ploubidis GB, Clarke L, Dandona L. Hospitalization trends in India from serial nationwide surveys: 1995 to 2014. Paper presented at: 6th Annual PHFI Research Symposium. 2016 March 16–18; India Habitat Centre, New Delhi, India.
- Pandey A, Ploubidis GB, Clarke L, Dandona L. What has contributed to the increase in hospitalization of older adults in India over two decades? Paper presented at: 3rd Asian Population Association International. 2015 July 27–30; Kuala Lumpur, Malaysia.

Chapter 1: Thesis background

1.1 Introduction

One of the widely accepted origins of the public health movement is that the prosperity of nations is partly dependent on the health of their populations.[1, 2] The positive relationship between health and economic growth has increased the interests of researchers, governments, decision makers and international organizations in inequities in health and how to address them.[3-6] This awareness received a new stimulus from the publication in 2001 of the report of the World Health Organization (WHO) Commission on Macroeconomics and Health, which demonstrated that health improvement can be seen as a key strategy for income growth and poverty reduction in low- and middle-income countries.[7] The report of the WHO's Commission on Macroeconomics and Health (2001) stated:

> *"Improving the health and longevity of the poor is an end in itself, a fundamental goal of economic development. But it is also a means to achieving the other development goals relating to poverty reduction. The linkages of health to poverty reduction and to long-term economic growth are powerful, much stronger than is generally understood. The burden of disease in some low-income regions stands as a stark barrier to economic growth and therefore must be addressed frontally and centrally in any comprehensive development strategy."*

The demographic transition, as witnessed by most populations, has implications for both health and economic growth.[8, 9] Demographic transition encompasses a broad set of changes that includes a decline from high to low fertility, a steady increase in life expectancy at birth and at older ages, and a shift in the leading causes of death and illness from infectious and parasitic diseases to noncommunicable diseases and chronic conditions. The dramatic increase in average life expectancy during the 20th century ranks as one of society's greatest achievements. The health of the population worldwide has improved substantially however, different subgroups have not witnessed them equally. Health inequalities are one of the main challenges for public health, and there is a great potential for improving average population health by eliminating or reducing the health disadvantage of lower socioeconomic groups.[2]

Healthcare systems have been recognized worldwide as a vital determinant of health. Access to and utilization of healthcare is vital to good and equitable health. The healthcare system is itself a social determinant of health, influenced by and influencing the effect of other social determinants.[10] Yet, with the exception of rich industrialized countries, health systems are frequently persistently under-resourced, and are ubiquitously inequitable.[11] Healthcare is inequitably distributed around the world. The pattern of inequity in utilization is more pronounced in low- and middle-income countries, but inequity is prevalent in high-income settings too. Universal access to high quality care and a focus on equitable outcomes is central to challenging health inequities. In the words of current WHO Director-General Margret Chan:[12]

> *"No one should be denied access to life-saving or health promoting interventions for unfair reasons, including those with economic or social causes. These are some of the issues being addressed by the Commission on Social Determinants of Health ... When health is concerned; equity really is a matter of life and death."*

Increasing access to healthcare and transforming the healthcare delivery system are important means for improving population health and achieving health equity.[10] Access to adequate health services that are of acceptable quality is also regarded important in the move towards universal health coverage.[13] Increasing the availability of health services is critical to improve health in low- and middle-income countries, but this approach could potentially raise the proportion of households facing catastrophic health expenditure (CHE)[1] because the health expenditure in these countries is predominantly out-of-pocket (OOP)[2]. The risk protection policy assumes greater importance in the societies which rely on high OOP payments for healthcare.

Many countries across the globe rely heavily on OOP payments to finance health services which often represent a barrier to access to health services, especially for the poor. In addition, for those who do use the services, OOP payments are often a substantial

---

[1] Catastrophic health expenditure refers to the case when out-of-pocket payments exceed a certain threshold share of either total or non-food/subsistence expenditure of households. The choice of the threshold is somewhat arbitrary but most commonly used thresholds are 10-25% of total consumption expenditure or 25-40% of non-food or subsistence expenditure.

[2] Out-of-pocket payments are defined as direct payments made by individuals to healthcare providers at the time of service use. This excludes any prepayment for health services, for example in the form of taxes or specific insurance premiums or contributions and, where possible, net of any reimbursements to the individual who made the payments.

financial burden on them and their families and may even cause financial catastrophe. Globally, about 150 million individuals in 44 million households suffer financial catastrophe annually, and about 100 million individuals in 25 million households are pushed below the poverty line.[14] In some countries, up to 11% of the population suffers severe financial hardship each year, and up to 5% is forced into poverty.[15] It is ironic that, at a time when the international community are supporting health as a key driver of economic progress and a route to poverty reduction, the costs of healthcare are themselves a cause of poverty for many millions of people worldwide.[16]

Shifting from OOP payments alone towards mandatory prepayment with pooling of funds is an important move towards improving access and providing financial risk protection. The World Health Report 2000 identified financial protection against the costs of ill health as a fundamental objective of health systems, on the premise that a fair health system ensures households make healthcare payments according to their ability to pay rather than the risk of illness.[17] Financial protection from direct payments in order to access healthcare is also a key element of universal health coverage (UHC).[15] This goal is especially salient in developing countries whose populations tend to rely heavily on OOP payments to finance their healthcare.[17, 18] One of the three priority areas identified to achieve universal health coverage is that the countries must advance to reduce OOP payments.[19]

In India, neither the economic growth seems to have produced tangible improvements in health of the nation, nor has the recognition that the improvement in health contributes to accelerated economic growth led to adequate investment in or improved efficiency of healthcare.[20] Equity in access and financing healthcare has been a key policy concern in India, as suggested in multiple policy documents, including most recently a policy report of an expert group on universal health coverage.[21-23] In spite of the government's concern to ensure equity in healthcare, the people of India are exposed to huge variation in healthcare services. On one hand, the best possible care is available to a small proportion of people who can afford to pay for the services, and on the other hand even basic healthcare services are lacking for a large proportion of Indian people who are poor.

Increasing access to healthcare and providing financial protection against high OOP payments assumes even greater importance in the context of ongoing population aging and a shifting disease burden from communicable to non-communicable diseases. Some

argue that gains in longevity leads to higher expenditure on health because the old age is associated with higher burden of diseases and disabilities.[24-26] Others argue that the health expenditure does not rise with age per se, but the people close to death who are older on average tend to have more health expenditure than those at the same age who survive.[27-29] Therefore, the older population spend more on average on healthcare not only because their morbidity rates are higher, but also because their mortality rates are higher than non-older persons. Reducing the socioeconomic inequality in healthcare utilization and expenditure among the older population is a key to healthy aging. The evidence on the socioeconomic groups that are most disadvantaged in terms of access to healthcare and bear higher burden of health expenditure will be a useful policy input for prioritizing the focus of health policy. Additionally, highlighting the difference in demand for healthcare, OOP payments, and its financial burden between older and younger population will guide the allocation of nation's scarce healthcare resources to provide healthcare to all.

1.2 Aims and objectives

The overall aim of this thesis is to assess the changes in socioeconomic inequalities in healthcare utilization and expenditure in the older population of India over two decades. This thesis also compares the healthcare utilization and expenditure pattern of the older population (60 years or more) with the younger population (under 60 years) to provide both the within and between-group, as well as over time changes in socioeconomic inequality. By examining inpatient and outpatient care utilization, this thesis provides a more complete picture of the demand for healthcare. It benefits from having serial cross-sectional nationwide surveys on healthcare utilization and household consumer expenditure to study the differentials over twenty years.

The main aim is accomplished through the following four objectives:

1) Examine the hospitalization trends in India over two decades comparing the older population with the younger population and quantify the factors contributing to the change in hospitalization among the older population.

2) Estimate the change in horizontal inequities in outpatient care and untreated morbidity in India between 1995 and 2014 comparing the older population with the younger population.

3) Compare the trends in out-of-pocket payments and catastrophic health expenditure between the households with and without older persons in India between 1993 and 2014.

4) Study the change in horizontal and vertical inequities in out-of-pocket payments for hospitalization in India over two decades contrasting the older population with the younger population.

1.3 Thesis structure

This thesis follows the research paper style, with 4 research papers addressing the objectives. At the time of submission of this thesis, one research paper has been published in Health Policy and Planning, one has been accepted for publication in BMJ Open, while other two are under review in peer-reviewed journals. Within each chapter the article is prefaced by a research paper cover sheet which provides information about the publication (either already published or planned for publication) including copyright information, author details, journal information, and outlines my role in a multi-authored paper. To facilitate the reading of the thesis as a whole, the exact journal formatting has not been used (e.g. tables and figures are included in the text, and references have been included in the main reference list at the end of the thesis) but the text of the articles has not been altered. Additional analyses and details which could not be included due to the journals' restrictions on length are given as appendices.

The initial chapter comprised the background to the study, thesis aims and objectives, including the candidate's role in the research, structure of the thesis, ethical clearances and funding. It begins by highlighting the importance of health to the prosperity of a nation and discusses how healthcare systems and fairness in financing is a means to achieve the goal of equity in health. The importance of studying socioeconomic inequality in utilization and expenditure in low- and middle-income countries like India is introduced followed by the thesis aims and objectives, and a brief description of each chapter.

Chapter 2 comprises a comprehensive review of literature on the socioeconomic inequality in healthcare use and expenditure in international and national studies, with special focus on the older population. The first part of the review begins by providing evidence on the association of morbidity with healthcare use, followed by socioeconomic

inequality in healthcare utilization in the general population both from India and overseas. Studies focusing on the older population and comparison of the older population with the other age groups in investigating the role of socioeconomic status in healthcare utilization are reviewed both in national and international settings. The second part of the review pertains to the role of morbidity and health insurance in incurring health expenditure. This is followed by the evidence on OOP payments for healthcare and its burden across socioeconomic groups in the national and international studies with special focus on the older population.

I then provide an overview of the research setting in chapter 3 focusing on the demographic and the epidemiological transition currently underway in India. In the first part of this chapter, I briefly describe the global aging trends followed by a detailed description of the aging scenario in India. I then discuss the important socioeconomic and health implications of population aging in India and document the various policies undertaken to provide social support and promote wellbeing of the older population in India along with their coverage. The second part provides an overview of the global and Indian scenario of epidemiological transition. This chapter concludes by providing a summary of the study context highlighting the importance of a comparative study of socioeconomic inequality in utilization and expenditure among the older population as compared to the younger population in India.

Chapter 4 provides details of the data and methods used to complement the (word length-restricted) methods section in each research paper. It provides a comprehensive overview of the organization of the National Sample Surveys in India, and the evolution of healthcare utilization and consumer expenditure surveys. This is followed by the description of healthcare utilization surveys and consumer expenditure surveys that is used in this thesis. A detailed description of the sampling design of the National Sample Surveys is followed by the definition of various terms and variables used in the analytical papers. It also provides the study's conceptual framework and discusses briefly the advantages and disadvantages of secondary data analyses.

Chapter 5 is an analytical research paper looking at the levels and trends of hospitalization among the older population in India comparing it with the population under 60 years using three rounds of National Sample Surveys on healthcare utilization conducted in 1995–96, 2004 and 2014. Bivariate and multivariable analyses were used to

study the differentials in healthcare utilization by various socioeconomic groups and the determinants of hospitalization. This paper also quantifies the factors contributing to the change in hospitalization among the older population in India between 1995–96 and 2014 using a regression based decomposition technique.

The second research paper included in chapter 6 examines the changing inequity in outpatient care and untreated morbidity among the older population in India over two decades contrasting it with the population under 60 years. For this paper, I used the healthcare utilization surveys conducted by the National Sample Survey Organization (NSSO) in 1995–96 and 2014. A horizontal inequity index (HI) was used to quantify the inequality in the use of healthcare by consumption expenditure after standardizing for the differences in need for healthcare in relation to consumption expenditure. To graphically present the inequity in healthcare utilization, concentration curves were plotted for the healthcare utilization that were standardized for differences in need.

Chapter 7 estimates and compares the trends in out-of-pocket payments for healthcare and catastrophic health expenditure in households with and without an older person in India between 1990 and 2014. I used National Sample Survey data from various healthcare utilization surveys (NSS-HUS 1995–96, NSS-HUS 2004 and NSS-HUS 2014) and consumer expenditure surveys (NSS-CES 1993–94, NSS-CES 1999–2000, NSS-CES 2004–05 and NSS-CES 2011-12) to study the trends in out-of-pocket payments and its consequent financial burden using two definitions of catastrophic health expenditure which has widely been used in the literature. Given that the thresholds for defining catastrophic health expenditure are arbitrary, I explore how catastrophic health expenditure varies between various cut-offs for the two definitions. A multivariable logistic regression analysis is used to study the determinants of catastrophic health expenditure.

Chapter 8 examines the trend in horizontal and vertical inequities in the out-of-pocket payment for the hospitalization of the older population in India over two decades comparing it with the younger population to highlight the differences between the two age groups. Data from the three healthcare utilization surveys of NSSO conducted in 1995–96, 2004 and 2014 are used. Generalized linear and fractional response models are used to study the determinants of out-of-pocket payments and its burden.

Chapter 9 consists of one section and presents an overall discussion. This includes an overview of the study findings and the discussion of their implications, listing the strengths and limitations of the analyses, and highlighting the scope for future research and policy. This is followed by a brief conclusion to the thesis.

All references have been listed in Vancouver style in one chapter after the last chapter on discussion. A series of appendices highlights additional material relevant to this work including ethical approvals have been incorporated in the end of the thesis.

1.4 Role of the candidate

The candidate conceptualized this research and designed the study with input from supervisors. She managed to procure data from the Ministry of Statistics and Programme Implementation, Government of India, and obtained the exemption from ethics review by the Research Ethics Committee of the London School of Hygiene and Tropical Medicine, United Kingdom (UK) and the Public Health Foundation of India (PHFI), India. She was responsible for decoding the raw NSSO data and data management. She carried out all the statistical analyses with technical inputs from her supervisors. With regard to the papers for publication included in the body of this thesis, the candidate wrote the initial draft of all of them and then incorporated the critical comments from co-authors on the manuscript for intellectual content in an iterative process. The role of the candidate in the multi-authored research paper is presented in detail in the research paper cover sheet attached before each research paper included in the thesis.

1.5 Ethical clearance

The study is based on secondary data from the National Sample Surveys with no identifiable information on the survey participants. Exemption from ethics approval for analysis of the National Sample Surveys data was obtained from the institutional ethics committees of the Public Health Foundation of India (PHFI), India (Appendix A-1), and the London School of Hygiene and Tropical Medicine (LSHTM), UK (Appendix A-2).

1.6 Funding

This work was supported by a Wellcome Trust Capacity Strengthening Strategic Award to the Public Health Foundation of India and a consortium of UK universities.

Chapter 2. Literature Review

2.1 Healthcare utilization

Of all the consequences of population aging, the increasing demand for healthcare is of utmost priority. Increased longevity is the triumph for public health, and the result of social and economic development. However, population aging is likely to present challenges to the healthcare system, given the fact that many health conditions and associated disability become more common with age, and that older people are higher users of health services. This is particularly relevant for the developing countries like India where the health system is not prepared to deal with the increasing burden of chronic diseases and disabilities. This section will provide a review of the literature on the healthcare utilization for all age groups with special focus on the older population in national and international studies. The utilization of both preventive and curative healthcare in different socioeconomic and demographic groups will be covered to synthesize the available evidence on differentials in treatment seeking behaviour and utilization pattern.

2.1.1 Morbidity and healthcare use

It is a common belief that health status should be taken into account when analyzing socioeconomic differences in healthcare utilization. The analysis of adult participants (>18 years) in six middle-income countries (China, Ghana, India, Mexico, Russia and South Africa) using data from the WHO Study on Global AGEing and Adult Health (SAGE) Wave 1 found that the number of visits to doctors in primary and secondary care increased substantially for persons with increasing numbers of co-existing non-communicable diseases. Multimorbidity was associated with more outpatient visits in China (coefficient for number of non-communicable diseases: 0.56; 95% confidence interval (CI): 0.46, 0.66), and a higher likelihood of being hospitalized in India (adjusted odds ratio (AOR): 1.59; 95% CI: 1.45, 1.75).[30] In a population based cross-sectional study of individuals aged 30–87 years in Norway showed that self-rated health was a dominant predictor of healthcare utilization.[31] Health-related variables were the major contributors to income-related inequality in the use of ambulatory care in the non-older adult sample from the 1998 to 2001 United States National Health Interview Survey data.[32] Health need, as measured by perceived health status and number of health problems, was found to be consistently associated with increased physician utilization, for both primary and specialist visits in a study using Canadian National Population Health Survey.[33] Another

study from Sweden found that the income differentials in the number of visits to doctors were in favour of lower-income groups among people aged 25–64 years when controlling only for age, however, after controlling for health status income differentials in favour of higher-income groups were observed among men (all ages) and among women aged 65+ years, with higher-income groups having 11-49% more visits than the lowest income group.[34]

The relationship between poor health and utilization assumes greater importance in the case of the older population. The health status of the older population can be measured by a variety of health indicators and different health profiles may exert an effect on health service utilization. While comparing with a relative healthy group of the older population in Taiwan, the high comorbidity group tended to utilize more services in ambulatory care, while the functional impairment group and the frail group had higher likelihood of hospitalization.[35] A study of the older population (50 years or more) in six low- and middle-income countries (China, Ghana, India, Mexico, the Russian Federation, and South Africa) using the WHO SAGE Wave 1 data showed that the older adults with two or more chronic conditions were almost three times as likely to use inpatient services and twice as likely to use outpatient services compared with respondents with no reported chronic conditions.[36] Another study in urban older adults of north-western China found that the perception of poor health and chronic disease was associated with more frequent doctor visits, hospitalizations, and non-hospitalizations.[37] Poor health, whether subjectively or objectively determined, was a significant predictor of service use among older adults in north Carolina.[38] Taking the heterogeneity in terms of health status of older people into account can help provide a better understanding of the patterns of healthcare needs and healthcare use by the older population.[39]

2.1.2 Socioeconomic inequality in healthcare use in general population: evidence from international studies

Contrary to the belief that healthcare should depend on health system functions, such as health insurance and health facilities, healthcare is often associated with factors such as economic status which are beyond the scope of health authorities.[40] Evidence from eight developing countries and countries in transition (Burkino Faso, Guatemala, Kazakhstan, Kyrgyzstan, Paraguay, South Africa, Thailand and Zambia) found that people in the wealthier consumption quintiles were more likely to be seen by a doctor and receive medicines than those in the poor quintiles.[41] In the population aged 15 years or more in

Iran, higher household economic index was associated with higher use of specialists (concentration index: 0.115; 95% CI: 0.01-0.13) and general practitioner care (concentration index: 0.11; 95% CI 0.09-0.12), while people with lower household economic index used more health worker care (concentration index: -0.065; 95% CI: -0.08 to -0.05).[42] A study of urban Nepal found a significant pro-rich distribution of general healthcare utilization in all service providers (concentration index: 0.062, P-value < 0.001; horizontal inequity index (HI): 0.029, P-value < 0.05) and private service providers (concentration index: 0.070, P-value < 0.001; HI: 0.030, P-value < 0.05) and majority of this inequality was attributable to the household economic status (67.8%).[43]

Inequity in use of physician services has been detected even within healthcare systems of developed countries. Analyses of non-older adult samples from the 1998 to 2001 US National Health Interview Survey data showed that the ambulatory care use was disproportionately concentrated in the poor because of their greater healthcare need. However, when need was accounted for ambulatory care, use was actually found to be distributed favouring high income groups.[32] Least advantaged people with regard to income consumed a bigger share of the services than the most advantaged in Denmark but after the indirect standardization of need there was no significant inequity in healthcare utilization.[44] Another study comparing horizontal equity (defined as the equal treatment for equal need) in healthcare utilization in 10 European countries and US found that in all study countries, the lower income groups were more intensive users of the healthcare system. But after indirect standardization for need differences, there was little or no evidence of significant inequity in the delivery of healthcare overall, though in half of the countries, significant pro-rich inequity emerged for physician contacts.[45] Access to healthcare was inequitable and in favour of the better-off in Italy with the exception of inpatient care.[46]

Household economic index contributed the most to the inequity in healthcare utilization and was the only indicator that was related to inequity in all types of healthcare; namely general physician, specialist and health worker in Iran.[47] Another study in Korea found that the non-need variables, such as income, education, and private insurance, were more important and contributed to pro-rich inequality in healthcare over the period between 2005 and 2010.[48] Evidence from China using 2008 National Health Services Survey also found pro-rich inequity in both inpatient and outpatient care utilization and income made largest contribution to this inequity.[49]

Inequality in health services amongst adult noncommunicable disease patients in China was largely determined by the patient's financial capability. Despite a greater need for health services amongst those of lower socioeconomic status, 1.6 times gap in outpatient service utilization and a 3.8 times gap in inpatient service utilization between the lowest income quintile and the highest income quintile of people after adjustment due to health need was found.[50] With the same needs for healthcare, rich rural residents in China utilized more inpatient and outpatient care than poor rural residents over the years and inpatient services were more inequitable than the outpatient care.[51] Another study using the Chinese National Health Services Surveys conducted in 2003 and 2008 found that in rural China, even with the same need for inpatient care, the wealthier individuals utilized more inpatient care than the poor and income was the principal determinant of pro-rich inequity in hospitalizations.[52]

Several studies suggest that utilization of general practitioner (GP) and hospital services, after adjusting for healthcare need, is equitable or pro-poor, whereas specialist care tends to favour the better off. In Chile, emergency room visits and hospitalizations were found to be concentrated among lower-income quintiles and the pro-poor inequity increased over time whereas, inequity in the utilization of specialized care, general practitioners and all physician visits was pro-rich which declined between 2000 and 2009.[53] A study of change in income related inequality among the population aged 18 years or more in Mongolia between 2007–08 and 2012 found that the degree of inequality in healthcare utilization had increased over time. Both the inequality and inequity in overall inpatient care, tertiary and private hospital outpatient visit favoured the rich. Only in terms of family group physicians/*soum* hospitals' outpatient care, a pro-poor inequity in 2007–08 was observed to have risen by 2012.[54]

Not distinguishing between public and private services leads to inappropriate analyses of inequity in healthcare. Persons in the lowest socioeconomic position were 61-88% more likely to visit public GP and 39-57% more likely to use public hospitals than those in the highest socioeconomic position in Spain. In contrast to this private GP and specialist services and hospitalization in private favoured the rich.[55] Pro-poor use of public primary facility has implications for ensuring equity in overall healthcare utilization and ensuring universal health coverage. A study using 2010 Zambian Living Conditions Monitoring Survey found pro-rich distribution of higher-level facilities like public hospitals, while

significant horizontal equity in visits to lower level public facilities favoured the poor and needy.[56] Utilization of both private medical specialists and hospital outpatient care had pro-rich or pro-educated socioeconomic gradient when adjusted for the need for healthcare in a population based survey of population aged 20 years or more in Norway.[57] Despite the provision of free services by public healthcare providers, no evidence of the poor making more use of public health services was found in urban Nepal (concentration index: 0.041; P-value = 0.094).[43]

2.1.3 Socioeconomic inequality in healthcare use in the general population: evidence from India

Economic status measured in terms of household monthly per capita consumption expenditure was more strongly associated with hospitalizations than educational attainment in West Bengal, India.[58] Patients from the highest quintile of monthly percapita consumption expenditure (MPCE) had higher chances of being hospitalized and also of choosing the costly private healthcare sector in India in 2004.[59] A study using national sample data on healthcare utilization found that the inequality in inpatient care utilization declined in rural India between 1995–96 and 2004 (concentration index: 0.36 in 1995-96 vs concentration index: 0.22 in 2004). This might seem to be a desirable change as far as equity in the distribution of health sector output is concerned. However, authors argued that by ignoring other associated changes that took place within the same time frame there is a risk of drawing incorrect inferences. They put forward the argument that the decline in inequality may not necessarily result in more equitable situation particularly for the poor if there is a sharp rise in overall increase in hospitalization, a decline in dependence on public hospitals, and a high rise in cost of inpatient care over the same time period.[60] Hospitalization had a pro-rich distribution in the three states of India, namely Haryana (concentration index: 0.132; 95% CI: 0.066, 0.240), Punjab (concentration index: 0.125; 95% CI: 0.078, 0.280) and Chandigarh (concentration index: 0.078; 95% CI: 0.004, 0.140).[61]

Hospital services were found to be inequitably utilized as they were used more by the rich in India as evidenced by the national sample survey on healthcare utilization of 2004. The public sector was equitable (used more by the poor) and the private sector was inequitable (used more by the rich).[62] A study in Kerala state of India found that the use of public hospitals was concentrated among the poorer patients while private hospitals were used more by the richer patients.[63] A multilevel analysis of individual and urban characteristics

associated with utilization and source of outpatient care, conducted using data from a 1995–96 survey by the NSSO on healthcare in urban Kerala, India, found higher utilization of private outpatient care and suggested problem of access for the poorest. Among all users of outpatient care in urban Kerala, as high as 77% resorted to a private source. However, very poor individuals in urban Kerala were 87% (95% CI: 0.03- 0.51) less likely to use outpatient care from a private provider.[64]. In the West Bengal state of India, the rate of utilization of public hospitals was found to be quite high; however, the other complementary services like medicine, doctor and diagnostic tests were mostly purchased from the private market resulting in high out-of-pocket expenditure. Benefit Incidence Analysis revealed that the public subsidies were mostly enjoyed by the relatively better placed patients, both socially and economically.[65]

A study using NSSO healthcare utilization surveys in India found an increase in untreated morbidity among the poor and rural respondents between 1995–96 and 2004 (14 vs 16%) which resulted into higher odds of not seeking treatment in 2004 than in 1995–96 (Adjusted odds ratio (AOR): 1.12; 95% CI: 1.07-1.17). Also financial inability was cited as the predominant reason for not seeking care and the situation worsened between 1995–96 and 2004 for the poor and rural population in India.[66] In another study, for lower expenditure groups, financial reasons played an important role in the lack of demand for healthcare in India.[67]

2.1.4 Socioeconomic inequality in healthcare use in the older population: evidence from international studies

A common perception is that the decision to seek healthcare depends on how serious the illness is. However, socioeconomic status assumes greater importance in guiding the treatment seeking behaviour when the cost of healthcare is high. Using data from a representative household panel survey of 800 households in Nouna health district of Burkina Faso, during 2000–01 it was reported that illness was not the only factor involved in demand for healthcare. This study found that low priority was associated to the healthcare of unproductive household members.[68] A descriptive cross-sectional study undertaken in Dagoretti Division in Nairobi province showed that low socioeconomic status had a negative impact on the health seeking behaviour of the population aged 65 years or more.[69]

Socioeconomic status was found to be the single most important determinant of health seeking behaviour among the older population in Nigeria.[70] However, the association of socioeconomic status varied greatly with types of healthcare among older population. No inequity in general healthcare utilization (doctor consultations or hospital admissions) was found in the older population (50 years or more) in one of the China's richest provinces, but there was pro-rich inequity in treatment of three major chronic conditions (hypertension, hyperglycaemia and dyslipidaemia), indicating that wealthier people used these treatments more often than would be expected given their level of need, compared with poorer people.[71] Another study in north western China found significant inequality in the access to healthcare services among urban seniors: older adults from higher income families compared to those from lower income families were 55% and 40% significantly more likely to use outpatient and inpatient services, respectively.[37] For the middle-aged and older adults, there was a strong pro-rich inequality in both inpatient and outpatient acre utilization in the two study provinces of China. Income emerged as the most important factor in outpatient care in both provinces, but access to inpatient care was driven by a mix of income, need and non-need factors that significantly differed across and within the two provinces.[72] Education was also found to be associated with healthcare use. A study of older population (50 years or more) in 12 European countries using Survey of Health, Aging and Retirement in Europe showed pro-educated gradient for specialists and dentist visits, whereas no evidence of educational disparities was found for GP use. On the other hand, less clear results emerged regarding hospitalizations.[73]

Gender differentials in the utilization of healthcare among older adults are important given that they are socioeconomically more disadvantaged than the older men. Data from the 1993–1995 study on the Asset of Health Dynamics among the Oldest Old (70 years or more) were used to investigate differences in the 2-year use of health services by gender and among non-Hispanic White versus minority (Hispanic and African American) ethnic/racial groups. This study found that after adjusting for predisposing factors, health needs and access factors (education, income, asset and health insurance), the likelihood of hospitalization was significantly lower among female white (AOR: 0.75; P-value <0.01), female African American (AOR: 0.64; P-value <0.01) and female Hispanic (AOR: 0.46; P-value <0.01) as compared with male White.[74] When compared to men, a higher percentage of women aged 60 years or more visited medical practitioners (crude odds ratio (OR): 1.24; 95% CI: 1.07-1.44), received home medical visits (crude OR: 1.67; 95% CI: 1.34-2.10), and used more than 3 medications (crude OR: 1.54; 95% CI: 1.34-1.79) in

Spain. The factors that best explained the greater utilization of healthcare by older women than men were the number of chronic diseases and health related quality of life. No gender differential was found in crude hospital admission, however after adjusting for number of chronic conditions and health related quality of life, older women were found to be significantly less likely to be hospitalized (AOR: 0.68; 95% CI: 0.56-0.84).[75]. Another study also found that the older American women were less likely to have hospital stays (AOR: 0.79; 95% CI: 0.71-0.88) and had fewer physician visits (3.07 vs. 3.30 median visits within 2 years) than men when controlled for demographic factors, social factors, health needs and economic access factors (education, income, wealth and health insurance).[76]

Cost of care was a significant and persistent barrier among rural older population in North Carolina, despite medicare coverage.[38] Seeking healthcare from a formally qualified doctor was avoided due to high costs by older adults in a qualitative study of rural Bangladesh.[77] Even universal health coverage may not always ensure equitable access to healthcare for the older population. A Higher proportion of older adults (65 years or more) in the low income group had had no health check-ups in the past and had a higher likelihood to postpone or stop receiving the healthcare in spite of their unfavourable heath status, particularly due to the high cost of healthcare in Japan.[78] Even with Medicare and Medicaid coverage and controlling for demographic and health status, cost emerged out to be a significant and persistent barrier in utilization of healthcare services for rural older population in comparison to their urban counterparts in North California. This clearly pointed out to the fact that above all it is the cost of healthcare that remained an issue for older population.[79] A major deterring factor which provided hindrance in seeking healthcare for older adults residing in a poor urban community of Karachi in Pakistan was financial constraint.[80] Policies aimed at expanding health insurance and providing subsidy for the health sector in order to decrease financial barriers resulted into pro-poor inequity in the utilization of outpatient care by the older population in Iran.[81]

Sometimes need maybe the only factor determining the use of healthcare. A cross-sectional study based on the Spanish population aged 50 years or more using the Survey of Health, Aging and Retirement in Europe for 2006–07 found the presence of pro-poor inequality in both the access and the frequency of use for GP services, which was mainly explained by unequal distribution of need factors.[82]

2.1.5 Socioeconomic status and healthcare use in the older population: evidence from India

Socioeconomic status and education was positively associated with health seeking behaviour of older adults in a community based study of a rural district in Assam, India. It was found that 28.6% of the older adults did not seek treatment for their chronic illness and out of these 63.2 % cited financial reasons for this. Most of the treatment were sought from government hospitals (51.5%) and allopathic treatment was nearly universal in this sample of older population.[83] Nationally representative data from NSSO 2004 healthcare utilization survey, revealed that in spite of the pro-poor distribution of need for healthcare, huge socioeconomic inequalities in healthcare utilization (measured by at least one visit to the doctor for the reported illness in 15 days reference period) favoured the rich and the advantaged sections of the older population in India.[84] Among older persons not seeking treatment for their medical condition in north India, most considered these morbidities as an age-related phenomenon.[85]

Few studies in India have compared the less and more developed states in terms of healthcare utilization of older adults. Comparison of hospitalizations for disability among the older population was higher in Kerala than in Uttar Pradesh indicating differentials across the more and less developed states of India in healthcare utilization.[86] In another study the utilization of healthcare services among older adults who reported diseases were lower by almost 20% points in Uttar Pradesh compared with Maharashtra.[87]

In India older women report worse self-rated health (SRH), have higher prevalence of disabilities, marginally lower chronic conditions, and lower healthcare utilization than men.[88] A strong positive relation was observed between monthly per capita expenditure quintiles and healthcare utilization among older widows in India. Using nationally representative data from the healthcare utilization survey of NSSO 2004, it was found that the older widows in the richest quintile were 2.9 times (P-value <0.001) more likely to seek treatment for reported morbidities compared with older widows of poorest quintile.[89]

Living arrangements also emerged as a plausible factor for the treatment seeking behaviour among the older population. In Uttar Pradesh, older adults living with their spouses and others had a greater likelihood of seeking treatment for reported diseases compared with those older adults living alone. In Maharashtra, living arrangement among older persons was not statistically related to the utilization of health care services. Such

incongruity may arise due to differences in developmental progress between the two states.[87] Older widows living with children and other relatives had 49% (P-value <0.001) greater likelihood of seeking treatment for reported diseases compared with those living alone in India in 2004.[89]

2.1.6 Socioeconomic inequality in healthcare use: comparison across age groups

Few studies have done comparative analysis of healthcare utilization across age groups to study the differential demand for healthcare. Comparison of the probability and number of GP and specialist contacts in the older population (65 years or more) and the younger population in Belgium showed that the utilization was determined by sociodemographic and health status variables in both age groups, although a certain degree of inequity existed. Income was found to exert a minor impact on the probability of GP contact among older persons, whereas this was not the case among the population under 65 years.[90] The older population in Mexico was more likely to be hospitalized than the other age groups but no significant difference was found in case of ambulatory care.[91]

A study using National Sample Survey data on healthcare utilization of 2004 found that the older adults belonging to rich or middle monthly per capita consumption expenditure quintiles were more likely to utilize outpatient care in comparison to the rich non-older adults, however such a pattern was not observed for the poor older adults in the Kerala state of India.[92] Another study in Kerala using the same data set found that the demand for inpatient care among older persons was heavily dependent on economic status, although the differences in utilization between the older and non-older population in each income group was not significant.[93]

2.1.7 Health insurance and utilization

Health insurance coverage improves financial accessibility but may not necessarily reduce the differentials in healthcare utilization across socioeconomic groups. The government policies aimed at increasing access, especially to primary care made the healthcare utilization in Brazil fairer over time. Between 1998 and 2008, the pro-rich inequity in Brazil declined by 79.8% for doctor visit, 738.2% for the utilization of usual source of care and 57.3% for any healthcare service use.[94] Another study found that the health system reforms in Brazil resulted into no evidence of inequality for both receipt of inpatient care and length of stay in hospital by income per capita among the older adults; however, in India there was a pro-rich bias in the receipt of care, although once care was

received there was no difference by consumption per capita for the length of stay.[95] A study investigating the effects of National Health Insurance Scheme affiliation on health service utilization among adult women (18 years or more) in Ghana found that individuals enrolled in the insurance scheme were significantly more likely to obtain prescriptions, visit clinics and seek formal healthcare when sick.[96] Improved patient-doctor stability as well as better GP accessibility facilitated by the introduction of patient lists in Norway reduced the pro-rich inequity in the probability of seeing a private outpatient specialist.[97]

The use of health insurance and its benefits may not be equally distributed across socioeconomic groups. Certain groups were less likely to use insurance, including for example subjects with no education, living in rural area, living in the central and western regions, and with lower income among middle aged and older persons in China.[98] In Burkino Faso, those enrolled in the community based health insurance scheme had 40% higher chance of using outpatient care when ill; however, the benefit of insurance was not equally enjoyed by all socioeconomic strata.[99] The health reforms introduced with the objective of reducing the socioeconomic gaps in the access to healthcare in Chile increased the average use of healthcare but failed to improve the socioeconomic distribution of healthcare utilization.[100] Again, the regime of Explicit Health Guarantees initiated in Chile in 2005 improved the utilization of healthcare but was ineffective in reducing the pro-rich inequity in healthcare.[101] Another study found that the mandatory insurance scheme for civil servants had a strong positive impact on access to public outpatient care, while a mandatory insurance scheme for private employees had a positive impact on access to both public and private outpatient care but neither of them had a positive impact on equity in an Indonesian population.[102] Even in a publicly-funded healthcare system with uniform access to hospital and physician care, high educational attainment was associated with a higher likelihood of a specialist or paramedical practitioner visit and a greater understanding of the importance of preventative care and appropriate screening tests.[103] A narrowing income gap between the rich and poor accompanied by the increased health insurance coverage was found to effectively reduce the inequity in inpatient utilization in spite of increasing inpatient prices in rural China between 2003 and 2008.[52]

The type of health insurance also has an impact on healthcare utilization. In south Korea, the medical aid beneficiaries had an increased number of outpatient visits (1.43 times; P-

value <0.0001), hospitalizations (1.60 times; P-value <0.0001), days spent in hospitals (1.28 times; P-value <0.268), and had 0.87 times (95% CI: 0.66-1.16) lower frequency of having an unmet needs due to economic barriers compared with health insurance beneficiaries who have relatively lower medical service coverage.[104] Public and private supplementary health insurance was associated with differing patterns of medical care utilization among American older Medicare enrolees.[105]

Even in countries which have long achieved a fairly universal and comprehensive degree of health insurance coverage, some differential utilization may remain. Higher income individuals in Europe were more likely to receive specialist services, while lower income groups were more inclined to use general practitioner care.[106] Despite the existence of universal healthcare, Canadians with lower incomes and fewer years of schooling visit specialists at a lower rate than those with moderate or high incomes and higher levels of education attained.[33] Also, in Italy which has a universal and egalitarian public healthcare system, significant degree of socioeconomic status related horizontal inequity in health services utilization exists. A study of population aged 18 years or more in Italy found that the use of outpatient specialist care, basic medical tests, and diagnostic services were inequitable in favour of the well-off.[107] Vietnam is another country with evidence of inequities in public healthcare utilization that benefit better-off people in spite of the government policies to support the poor and near-poor population and promote the implementation of health insurance for all people.[108]

2.2 Healthcare expenditure and its burden

Heavy reliance on OOP financing of healthcare in most developing countries leaves households exposed to the risk of unforeseen medical expenditures. Illness often brings a difficult choice between diverting resources towards medical care and foregoing treatment with the risk of long-term deterioration in health and earnings capacity. The poor are less likely to receive care and more likely to face financial hardship in most countries. This assumes high importance for the older population with a generally greater need for healthcare and less financial resources at their disposal for making OOP healthcare payments. In this section I present the available evidence on OOP payments for healthcare and its burden on the households with special focus on the older population both in international and national studies.

2.2.1 Out-of-pocket payments and morbidity

Illness due to chronic and non-communicable diseases is generally associated with higher OOP payments for healthcare than that for communicable disease. A study in India found that the odds of catastrophic spending and impoverishment were higher for those hospitalized with non-communicable diseases than for those hospitalized with communicable conditions. Hospitalizations with cardiovascular diseases resulted in 12% higher odds of incurring catastrophic spending and 37% greater odds of falling into poverty; for cancer, the impact was greatest with the odds of catastrophic expenditures 170% higher than the odds of incurring catastrophic spending than when hospital stays were due to a communicable condition, and a 133% likelihood of falling into poverty was found.[109] Another study conducted in Bangalore, India found that the OOP payments for chronic conditions, even for outpatient care, pushes people into poverty. The OOP spending on chronic conditions doubled the number of people living below the poverty line in one month, with further deepening of their poverty.[110]

The analysis of adult participants (18 years or more) in six middle-income countries (China, Ghana, India, Mexico, Russia and South Africa) using data from the WHO SAGE 2007–2010 showed that multimorbidity was associated with higher OOP payments for outpatient visits in India and China, and higher expenditure for hospital visits in Russia.[30] A study evaluating the nature and correlates of OOP health expenditures among adult (aged 18–59 years) and older participants (aged 60 years or more) in the United Republic of Tanzania found that increasing age, female gender, obesity and functional disability increased the adults' OOP health expenditures significantly, while functional disability and visits to traditional healers increased the OOP health expenditures in older participants.[111]

Across all ages, persons with disabilities had greater total health expenditures, OOP payments and OPP burden compared to adults without disability, suggesting there are additional healthcare costs associated with disability. Although expenditure on health, OOP payments and OOP burden increased over time, after controlling for demographic, socioeconomic, and health status, these three healthcare costs were not found to change disproportionately for individuals with disability.[112] In Nepal, the risk of CHE varied by the type of illness and the economic quintile to which the household belonged. Major non-communicable diseases significantly increased the risk of CHE in the poorest

quintile: diabetes (Rate Ratio (RR): 2.37; 95% CI: 1.16-4.83), asthma (RR: 2.09; 95% CI: 1.28-3.42) or heart disease (RR: 2.24; 95% confidence interval: 1.29-3.88). More than one in every seven of the households in urban areas of Kathmandu valley reported catastrophic expenditure on health (defined as 10% of household expenditure) in the previous 30 days.[113]

Chronic diseases among older adults are usually associated with higher burden of health expenditure. Evidence from China Health and Retirement Longitudinal Study shows that the CHE incidence and intensity of catastrophic health expenditure were relatively high among households with older persons (45 years or more) suffering from chronic disease.[114] Another study from Korea found that one in 10 older people taking drugs for chronic conditions spent more than 10% of their income on medication.[115] Assessment of CHE for older adults (50 years or more) with chronic illness in six middle income countries (China, Ghana, India, Mexico, the Russian Federation and South Africa) using WHO SAGE data found that the financial hardship affected all income groups but was more common among the poor. The proportion with CHE for the last outpatient visit for the chronic condition ranged from 14.5% (95% CI: 12.7-16.4) in China and 54.8% (95% CI: 49.1 to 60.4) in Ghana while the proportion of households that faced CHE in the last reported year varied between 23.5% (95% CI: 19.3 to 28.3) in South Africa and 65.5% (95% CI: 60.6-69.8) in Ghana.[116]

The Survey of Health, Aging and Retirement in Europe conducted in 2010–2012 was used to examine the levels of catastrophic health expenditure imposed by private OOP payments among older people (50 years or more) diagnosed with diabetes mellitus, cardiovascular diseases and cancer in 15 European countries. Results showed that being diagnosed with diabetes mellitus and cardiovascular diseases was associated with catastrophic health expenditure among older people even in comparatively wealthy countries with developed risk-pooling mechanisms. When compared to the Netherlands (the country with the lowest share of out-of-pocket payments as a percentage of total health expenditure in this study), older people diagnosed with diabetes mellitus or cardiovascular diseases in Portugal, Poland, Denmark, Italy, Switzerland, Belgium, the Czech Republic and Hungary were more likely to experience catastrophic health expenditure.[117]

2.2.2 Who pays for healthcare? evidence from international studies

The distribution of OOP payments depends on the level of development of an economy. In high-income economies with widespread insurance coverage, OOP payments absorb a larger fraction of the resources of low-income households whereas, in poor economies, it is the better off that can afford to spend relatively more OOP payments. A study using data from 15 territories of Asia, found that the high-income households contributed more than low-income households to the financing of healthcare. The better-off contributed more as a proportion of ability to pay in low and lower middle income territories because poor simply cannot afford to pay for healthcare. The disproportionality was in the opposite direction in three high/middle income territories operating universal social insurance.[118] A heavily subsidised public sector and a user charged private sector often results in a progressive health financing[3]. Malaysia's predominantly tax-financed system was found to be slightly progressive with a Kakwani's progressivity index of 0.186. The net progressive effect was produced by four progressive finance sources (in the decreasing order of direct taxes, private insurance premiums, OOP payments, contributions to Employee Provident Fund and Social Security Organization), and a regressive finance source (indirect taxes).[119]

Based on the analysis of 10 countries, it was concluded that the tax-financed systems (such as those operating in Denmark, Ireland, Portugal and the United Kingdom (UK)) tend to be proportional or mildly progressive, social insurance systems (such as those operating in France, the Netherlands and Spain) are regressive and predominantly private systems (such as the American and Swiss systems) are even more regressive. Out-of-pocket payments were in most countries an especially regressive means of raising healthcare revenues. The regressive-ness of out-of-pocket payments emerges in part from the higher rates of sickness and medical consumption of the worse-off.[120] The Kakwani index (KI) of progressivity estimated using three national household surveys in Colombia showed a constant trend towards more regressivity (-0.126 in 1984 to -0.3498 in 1997) when income was used to build the index.[121] In another study conducted in four cities of Africa in 1998–99, the direct payment to finance healthcare was found to be regressive.[122]

Using data on household expenditure from the Household Budget Survey carried out by the Central Statistical Office of Hungary authors found that OOP payments on healthcare

---

[3] Progressive health financing means that the healthcare payments account for an increasing proportion of ability to pay as the latter rises.

were highly regressive with a KI of -0.22. In particular, households from the lowest income quintile spend an about three times larger share of their income on out-of-pocket payments (6-7%) compared to households in the highest income quintile (2%).[123] The regressive nature of OOP payments (KI: -0.31) was the chief contributor to the regressive healthcare financing in Kenya since all other payments were proportional to ability to pay.[124] Also in Austria OOP payments were found to have regressive effects on income distribution. These regressive effects were especially pronounced for the OOP payments category prescription fees and over-the-counter pharmaceuticals.[125]

The poor were spending a greater portion of their capacity to pay on inpatient healthcare costs in comparison to the rich in Tehran. This showed that the healthcare system was unable to adequately finance and protect the poor population from negative health shocks.[126] In contrast, the burden of OOP health expenditure did not vary substantially according to variation in income in Srilanka indicating that the poor were facing more hardships and financial impoverishment due to high healthcare.[127] A regressive system was dominant in financing healthcare in Iran indicating that the poor spends huge proportion of their capacity to pay (CTP) for inpatient, outpatient health care and prepayments compared to the rich.[128]

Empirical data from 8 developing countries and countries in transition showed that the richer households spend more on healthcare in absolute terms but could not find any consistent pattern concerning the percentage of total household consumption spent on health. In Guatemala and South Africa, richer groups were spending a higher proportion of their consumption on healthcare than did the poorer; however, in Burkino Faso, Paraguay, and Thailand, there was a clear trend that wealthier quintiles spend less of their consumption expenditure than the poorer quintiles.[129] Secondary data from the Ghana Living Standard Survey 2005–06 showed that the OOP payments, which accounted for 45% of funding, were regressive form of health payment to households in Ghana.[130]

In Vietnam, the income share of OOP payments fell between 1993 and 1998 because income rose faster than OOP payments. OOP payments were regressive on pre-payment income in 1993, but were close to proportional in 1998. Inequality in pre-payment income fell very slightly between 1993 and 1998, but inequality in OOP payments rose.[131] In another study conducted in Vietnam, the predicted absolute OOP payments increased with ability to pay (ATP) at all the three time points (1992–93, 1997–98 and 2002), while

the predicted share of health payments declined with increasing ATP in 1992–93 and 1997–98. The latter finding indicated that a regressive system existed until 1998 however, the health payments become progressive by 2002. It should be noted that the progressive nature of healthcare expenditure cannot be positive indicator if the poor are using less care despite a greater burden of illness.[132]

2.2.3 Who pays for healthcare? evidence from India

A study conducted in India using the NSSO 52nd round (1995–96) concluded that the OOP expenditure on hospitalization as a share of household consumption expenditure increased with increasing ability to pay. Comparisons across groups indicated horizontal inequities including differences in both degrees of progressivity and the redistributive effects.[133] The progressive OOP expenditure on health evident in India should be interpreted with caution as it might indicate that the poor people simply forgo treatment because they cannot bear the high cost involved.

The healthcare payment structure in India was regressive for inpatient care (KI: -0.14 for rural and -0.19 for urban) and more so for outpatient care (KI: -0.24 in rural and -0.23 in urban) in 2004. High out-of-pocket payments resulted in 34% of poor households losing all their past savings, 30% of households borrowing with interest and 2% of households selling their assets.[134] Another study in India using three rounds of National Sample Survey data on consumer expenditure data (NSS-CES 1999–2000, NSS-CES 2004–05 and NSS-CES 2011–12) found that the financial burden of OOP spending increased faster for the poorest; 20% relative to their more advantaged counterparts (richest 20%). Although the poorest 20% saw a relative decline in OOP spending on inpatient care as a share of household spending, this was likely the result of foregoing inpatient care than of accessing benefits from the recent expansion of cashless publicly financed insurance schemes for inpatient care.[135]. On average, percapita household health spending among the richest consumption quintile was at least eight times higher than that of the poorest consumption quintile in India in NSS-CES 1993–94, NSS-CES 2004–05 and NSS-CES 2011–12, linking household health spending to ability to pay. However, the relative share of household consumption expenditure among the richest MPCE quintile was just 2 times higher than that of the poorest households.[136]

2.2.4 Burden of out-of-pocket payments: evidence from international studies

Out-of-pocket payments for healthcare are the most regressive source of healthcare financing and often leads to financial catastrophic or more severely to impoverishment. Data from household surveys in 59 countries were used to explore the variation across countries in catastrophic health expenditure, defined as 40% of income remaining after subsistence needs have been met. The proportion of households facing catastrophic payments from out-of-pocket health expenses varied widely between countries, from less than 0·01% in Czech Republic and Slovakia to 10·5% in Vietnam. Two groups of countries had high rates of catastrophic spending: first, countries in transition, such as Azerbaijan, Ukraine, Vietnam, and Cambodia, although several other countries in transition did not have substantial catastrophic health spending; second, countries in Latin America (Argentina, Brazil, Colombia, Paraguay, and Peru) but not all countries in Latin America suffered from high levels of catastrophic spending. In addition to these countries, Lebanon also had high levels of catastrophic spending.[137]

A study done in six Asian countries found that a higher level of total expenditure was associated with a higher probability of incurring catastrophic payments for healthcare. The percentage of households incurring CHE (defined as more than 10% of household consumption) varied from 3-3.5% in Sri Lanka and Thailand, to almost 6% in Hong Kong, 11% in India and more than 15% in Bangladesh and Vietnam.[138] Evidence from 14 low- and middle-income countries of Asia, showed that the better off were more likely to spend a larger fraction of total household resources on healthcare; Bangladesh, China, India, Nepal and Vietnam were found to rely most heavily on OOP financing and had the highest incidence of catastrophic payments. Sri Lanka, Thailand and Malaysia stood out as low to middle income countries that had constrained both the OOP share of health financing and the catastrophic impact of direct payments.[139] The lower the household income, the higher was the incidence of households with CHE after paying OOP for healthcare at all thresholds (10%, 20%, 30% and 40%) in South Korea. During 2007–2009, the average incidence of CHE (defined as 40% of capacity to pay (CTP)) was 5.7%, 1.67%, 0.72%, 0.33% and 0.27% in quintiles I (the poorest quintile), II, III, IV and V (the richest quintile), respectively. Also, approximately 1.51% (95% CI: 1.35-1.68) of total households was pushed below the poverty line during the same period.[140]

Out-of-pocket health payments also exacerbate poverty. A study in Vietnam found that the poverty impact of out-of-pocket payments was primarily due to poor people becoming

even poorer rather than the non-poor being made poor. Also the expenses associated with non-hospital care increased poverty rather than hospital expenditures.[141] Assessing measures of poverty in 11 low-to-middle income countries in Asia, by calculating total household resources both with and without OOP payments for healthcare, found that the overall prevalence of absolute poverty was 14% higher than the conventional estimate that do not take account of out-of-pocket payments for healthcare. An additional 2·7% of the population under study (78 million people) ended up with less than $1 per day after they had paid for healthcare. In Bangladesh, China, India, Nepal, and Vietnam, where more than 60% of healthcare costs are paid out-of-pocket by households, the estimates of poverty were much higher than conventional figures, ranging from an additional 1·2% of the population in Vietnam to 3·8% in Bangladesh.[142]

Some studies also assessed the trends in CHE and impoverishment over time. The data drawn from the National Household Health Service Surveys of Shaanxi Province conducted in the years 2008 and 2013 found that the overall proportion of households incurring catastrophic health expenditure dropped from 17.2% to 15.8%, while conversely, the inequality in facing catastrophic health expenditure strongly increased. The majority of observed inequalities in CHE were explained by household economic status (48.8%) and having an older person in the household was also important contributor to inequality in CHE (6.2%).[143] The prevalence of CHE increased by 25.0% from 2002–2003 to 2008–2009 when the cut-off point of 20.0% relating to the total consumption was considered and by 100% when 40.0% or more of the capacity to pay was applied as the cut-off point. Also, the socioeconomic inequalities in the catastrophic health expenditure in Brazil between 2002–2003 and 2008–2009 increased significantly, becoming 5.20 times higher among the poorest and 4.17 times higher among the least educated compared to their counterparts.[144]

Underprivileged families in Thailand (families with household heads who lacked health benefit cover, or who were low-income-card holders) spent OOP as much as 5-6% of their household income on healthcare whereas other groups spent 1-2%.[145] Though richer households reported higher illness and received treatment more often than poor households, the percentage of households with CHE was higher in the lower income groups at all threshold level in the low income society of Burkino Faso. For instance, when CHE was defined as 20%, 30%, 40% and 60% of non-food expenditure, the

incidence of CHE in the lowest quintile ranged from 14.6% to 29.7% while that for the richest quintile varied between 4.7% and 13.5%.[146]

Better off households (coefficient: 1.662; standard error (SE): 0.354), households with a greater proportion of older persons in the household (coefficient: 2.836; SE: 0.539), having a member with chronic illness (coefficient: 0.813; SE: 0.353) and having a member who experienced hospitalization (coefficient: 1.877; SE: 0.288) were found to be more at the risk of incurring CHE in Thailand in 2006.[147] In Western and Central Rural China, households with low per capita income, having older adults, hospitalized or chronically ill members, and whose head was unemployed were more likely to incur financial catastrophe (defined as 40% of household's CTP) and impoverishment due to health expenditure in 2008.[148] In the low-income society of Iran, households in the poorest and poor quintiles were 5.03 times (95% CI: 1.82-13.87) and 4.19 times (95% CI: 1.13-13.76) more likely to incur CHE in 2008. As high as 83% of the observed inequality was contributed by household's economic status.[149] Household with higher need for healthcare had higher likelihood of incurring CHE: households with one or more older persons (AOR: 1.90; 95% CI: 1.77-2.04), household with one or more members with chronic illness (AOR: 2.82; 95% CI: 2.65-3.01) and household with one or more members hospitalized (AOR: 4.80; 95% CI: 4.46-5.16) were significantly more likely to incur CHE in China in 2008.[150]

The burden of health expenditures varies by place of residence as well. While proximity to health services may raise utilization of healthcare in urban areas, travel costs will raise expenditures in rural areas although such expenses are often not recorded in the data. Lack of health services in rural areas increases reliance on medicines, which usually must be paid for. Location also reflects living conditions that impact on medical expenditures through health.[138] Rural households typically have more limited choice of local qualified providers and face higher travel and daily living costs, including food and lodging for the escorts of the ailing household member. Access issues may also result in delaying care seeking behaviour for conditions which then become more disabling and expensive to treat.[151] Comparison of rural and urban households in Iran using various definitions of and cut-off points found that catastrophic health expenditure head count ratio varied from 0.5% to 14.4% and from 0.48% to 13.27% for rural and urban households, respectively. Also, the overshoot of CHE varied from 9.62% to 18.72% and from 8.8% to 17.74% for rural and urban households, respectively.[152]

2.2.5 Burden of out-of-pocket payments: evidence from India

Several studies in India have investigated OOP payments for healthcare and its burden on individuals and households in India. Investigation of the incidence, intensity, and correlates of CHE in India in 2004–05 found that the health payments accounted for 4.6% of total household expenditure and 9.7% of household non-food expenditure. The poverty headcount prior to healthcare payments was 27.5% which increased by 3.5 percentage points to 31.0% after paying for healthcare translating into 39.5 million people falling below the poverty line due to health payments.[153] CHE defined as10% of household consumption expenditure was borne by 57 and 60% of the households in poorest quintile in Haryana and Punjab respectively, while a lower prevalence of CHE was found in the higher income groups based on the national sample survey data on healthcare utilization from 2004.[61] Another study using the nationally representative consumption expenditure survey data of national sample survey organization showed that 3.5% of the population fell below the poverty line and 5% households suffered from CHE in India in 2004–05. Removing out-of-pocket payments for inpatient care led to a negligible fall in the poverty headcount ratio and poverty gap.[154]

In India, the poverty impact of the out-of-pocket payments has been increasing both in terms of the proportion and absolute number of poor. Between 1995–96 and 2004, the additional proportion of population pushed below the poverty line increased from less than 3% to more than 3.6% and the absolute number of the additional poor population increased from approximately 26 million to 39 million.[155] A study using data from NSS-CES 1999–2000, found that approximately 32.5 million persons were pulled below the poverty line due to OOP payments, implying that the overall poverty increase after accounting for OOP expenditure was 3.2%.[156] Another study found that paying for healthcare pushed 60 million Indians below the poverty line in 2010.[157]

A small scale study done in Koderma district of Jharkhand, India found that even smaller OOP health expenditure can prove to be catastrophic for families from lower socioeconomic segments.[158] Between 2004 and 2014, the expenditure for outpatient care increased more than 100% and that for inpatient care increase by 300%, and 80% of the expenditure was out-of-pocket in India.[159] The median expenditure per episode of hospitalization for non-communicable diseases based on national sample survey data on healthcare utilization from 2014 was highest for the richest quintile compared with the

poorest quintile, however the prevalence of catastrophic expenditure was significantly higher for the poorest in India.[160] In addition to economic differentials, gender differential in healthcare expenditure was a common phenomenon in India. Data from two rounds of the human development survey (2004–05 and 2011–12) showed that the healthcare expenditure for females was significantly lower than males even after controlling demographic and socioeconomic factors (such as age, marital status, place of residence, caste, education and wealth quintile) (β= -0.148; 95% CI: 0.206, -0.091). Also, both in terms of major and short term morbidity, a female disadvantage in health expenditure increased between 2004–05 and 2011–12.[161]

The OOP payment and the burden of CHE differ greatly by type of care sought. Using nationally representative data on healthcare utilization in 2004, evidence from India suggested that around 1.3% (1.3% in rural and 1.2% in urban) of the total households fell below poverty line as a result of expenditure on inpatient care, while 4.9% (5.3% in rural areas and 3.8% in urban areas) of households fell below poverty line due to outpatient care.[162] In contrast to this finding, the impact of catastrophic expenditure on hospitalization was found to be twice that for outpatient care in West Bengal, India, possibly indicating that the need for inpatient care, and the associated expenditure, may arise relatively suddenly, not allowing time to arrange funding from sources that would have less impact on household well-being.[151] Another recent study in India showed that OOP expenditure on inpatient care increased the odds of incurring catastrophic expenditure more than the outpatient care. Catastrophic health expenditure and the impoverishment of households with members hospitalized were higher than the households with no expenditure incurred for inpatient care. Whereas, 10.5% (95% CI: 8.5-13.0) households receiving inpatient care fell below poverty line in India compared with 7.6% (95% CI: 6.8-8.5) among the household without inpatient care received member.[163]

2.2.6 Burden of out-of-pocket payments: older vs younger

Several studies have shown that older age is associated with a higher cost of healthcare. A population-based prospective cohort study of the German older population (57–84 years) found significant positive association between income and OOP payments for healthcare; but the wealthiest quintile had a significantly smaller financial burden than the poorest one.[164] Households with older persons aged more than 65 years (11% marginal effect) were significantly more likely to incur CHE defined as 40% of capacity to pay in Iran.[165]

Households with a main income earner older than 55 years were at least 1.56 times more likely to experience CHE in Kenya slums.[166]

A study comparing the OOP expenditure for the poor and older population in nine countries (United States, Japan, Australia, Poland, Israel, Russia, and Switzerland, France and Slovenia) found that in all except two counties (France and Slovenia), one-quarter or more of the poor citizens devoted at least 5% of their income to out-of-pocket expenses; and in all nine countries, at least one-in-ten poor citizens did. One-in-four older citizen had higher OOP expenditures in Switzerland, Russia, Poland and Israel, while more than 15% did in Australia, Slovenia, Japan and the United States.[167] Another study from Srilanka showed that number of older members in the household increased the probability and financial burden of encountering out-of-pocket health expenditure.[127] Also in India, the percapita household health spending increased sharply with older adults in the household.[136] Using data from three nationally representative household surveys from 2004, 2009 and 2014, authors assessed the key indicators of financial access to healthcare for households with older people (aged 60 years or more), and compared these with households without older members in Cambodia. In 2014, older people spent 50% more per month on healthcare than younger people. Rural households with older people were considerably more likely to suffer financial hardship due to health-related expenses than their urban equivalents.[168]

Evidence from both developed and developing countries suggests that the older population have higher health expenditure than all other age groups. Using data from the United States Consumer Expenditure Survey Interview tapes for 1986–1988, authors revealed that OOP health expenditures encompassed a much higher share of total expenditures for the older population with lower incomes than those with higher incomes (13.6% compared with 7.7%). This differential was much less for the non-older persons (4.8% compared with 3.6%).[169] The mean monthly OOP health expenditure was nearly 2 times higher for the older population (65 years or more) compared to all other ages in Korea.[170] Again in United States both in the case of one person or multi person households, those aged 65 years or older spent far more on healthcare than younger adults, but their incomes were substantially lower. Among households with two or more people, median percapita expenditures in 2003 were nearly five times higher for seniors ($2,308) than for others ($514). Older individuals, on average, spent over 12% of income, compared to only 2% for younger individuals.[171]

A study conducted in six states of India using the World Health Survey 2002–03 data found that the households with older adults spend a higher proportion of their total household budget on healthcare.[172] Irrespective of economic status, the average cost of treatment per episode of outpatient visit was higher for the older adults compared with the other non-older adults in Kerala, India in 2004. However, the difference in average medical costs between the two age groups was much larger for the rich compared with the poor implying that older adults living in poor households received fewer healthcare than what they ought to receive.[92]

Using consumption expenditure data from the National Sample Survey, 2009–10, a paper tested the hypothesis that the monthly per capita health spending of households with older persons was significantly higher than households without older persons in India. The monthly percapita health spending of households with older population was 3.8 times higher than the households without older persons. While health spending accounted for 13% of total consumption expenditure for households with older population, it was 7% among households with older and non-older members, and 5% among households with non-older persons only.[173]

A study conducted in Korea found that 1 in 10 older people (65 years or more) taking drugs for chronic conditions spent more than 10% of their income on medication, and the probability of having an expenditure burden among older persons was 3.8 times as high as that among the non-older persons. Annual expenditure on medication amounting to $200 or more and $400 or more was 2 times and 2.6 times, respectively higher for the older persons compared with the non-older counterparts.[115] Analyzing data from a nationally representative, multistage sample of people aged 65 years or older from the WHO SAGE in India found that the prevalence of catastrophic health expenditure among older people in India was 7% (95% CI: 6% to 8%) corresponding to 4.9 million older individuals.[174] In urban Nigeria, the proportion of poorly insured elderly households with CHE was 9.6% in 2010. Also, richer households were less likely to incur CHE compared with poorer households (P-value< 0.001).[175]

2.2.7 Health insurance and burden of out-of-pocket payments

Increased insurance coverage may protect households from large health expenditures without increasing public expenditure on health. A study in 6 states of India found that

the probability of OOP expenditure was reduced by 10% if the head of the household had medical insurance. Health insurance also reduced the extent of total budget allocated towards OOP health expenditure in urban areas.[172] Another study examining the impact of health policy changes on equity of financing among households, using four successive rounds of national sample survey data on consumer expenditure in India conducted in 1993–94, 2004–05, 2009–10 and 2011–12, found that the poor people were paying a lower share in 2011–12 than earlier compared with the higher income groups. This implies that the government funded healthcare services had higher impact on low income group and produced higher equity in out-of-pocket spending. This study concluded that the health policy changes made by government of India especially 2005 onwards had a positive impact on equity in out-of-pocket payment and income inequality.[176]

Some studies suggested that even health insurance may not provide complete protection against high OOP payments for healthcare. Although China has greatly expanded health insurance coverage, financial protection remains insufficient. Data derived from the Fourth National Health Service Survey in China found that the rate of catastrophic health expenditure was 13.0%; that of impoverishment was 7.5%. Rates of catastrophic health expenditure were higher among households having members who were hospitalized, older persons, or chronically ill, as well as in households in rural or poorer regions.[177] Despite the removal of user fees at primary health care level, CHE for outpatient care was high among the poorest sections of the population. This study also showed that cost of transportation was mainly responsible for limiting the protective effectiveness of user fee removal on CHE among particularly poorest households.[178]

2.3 Overview of findings

This section provides a brief overview of the findings from the review of literature pertaining to the socioeconomic differentials in utilization of healthcare and expenditure in both national and international studies focusing on all age groups and specifically on the older population and their comparison with other age groups.

Findings suggest that household's economic status contributed most to the inequity in healthcare utilization and was the only indicator that was related to inequity in all types of healthcare, namely general physician visits, specialist visits, hospitalizations and health worker visits. In developed countries, the healthcare utilization was higher among the economically disadvantaged people because of their greater need for healthcare.

However, after accounting for the differences in need for healthcare, some studies found no significant inequity in healthcare use between the rich and poor, while others found that the healthcare use was inequitable in the favour of better-off. Evidence from the low- and middle- income countries also found that one of the most important determinants of healthcare was the economic status of the household measured in terms of income, consumption expenditure or wealth. In these settings, despite a greater need for health services amongst those of lower socioeconomic status, the people in wealthier group used greater healthcare because they had better access to healthcare and resources to pay for them. Several studies showed that the persons in lower socioeconomic group used more public hospitals while rich were more inclined to use better quality expensive private healthcare services.

Apart from economic status, health of the population was also an important determinant of the healthcare utilization and out-of-pocket expenditure. Poor self-rated health, chronic conditions, multimorbidity was associated with higher physician visit, inpatient care and specialist visit both for the older and younger population. Chronic non-communicable diseases and disability, hospitalization and having an older person in the household were associated with higher OOP payments, greater incidence of CHE and higher risk of impoverishment. All income groups faced the burden of OOP payments; however, in high income countries incidence of CHE and impoverishment was more for the poor, and in developing countries like India it was more common among the rich because poor avoided treatment to escape the burden of OOP payments. Evidence suggests that OOP expenditure for healthcare was the most regressive means of financing healthcare, particularly in the developing countries. Even the progressive OOP payments for healthcare found in developing countries including India was not a positive indicator of healthcare financing because the poor people avoided treatment because of their lack of ability to afford the high cost involved. Insurance was found to improve the accessibility to health services but failed to provide complete protection against the high healthcare cost. In addition to this, the use of health insurance and its benefits also varied across socioeconomic groups.

Low priority was generally associated with the health of older persons in the households. In addition to this, older people themselves avoided seeking treatment for their morbidities because they considered their illness to be an age-related phenomenon. Among the older population, the differentials in healthcare utilization by economic status

and gender emerged in various studies. High cost of healthcare coupled with the lack of economic resources at older ages was a significant and persistent barrier both to the access and the frequency of the use of health services, particularly among the poor and female older population. In the Indian context, living arrangement was also relevant for the treatment seeking behaviour of the older population; presence of family members and spouse was conducive for the healthcare utilization of the older population. Accounting for the heterogeneity in the health status of the older population emerged as a key to understand the type of healthcare services required by the older population.

Few studies compared the healthcare utilization and OOP expenditure of the older population with the younger population. In all income settings, the older persons had higher healthcare utilization rates, incurred higher OOP payments for healthcare and faced greater financial burden measured both in terms of CHE and impoverishment than all other ages. Moreover, income was more strongly associated with the healthcare utilization of older population compared with non-older persons.

The review suggests that there are very few studies in Indian context that provides assessment of the healthcare use and expenditure contrasting the older population with the younger population. Moreover, none of the study so far compared the trends in utilization (both inpatient and outpatient) and the burden of health expenditure for the older and younger population. Given that the older population have higher morbidity and lower access to economic resources; it is of policy relevance to study the changes in socioeconomic inequality in healthcare utilization and expenditure over time among the older population in India. Moreover, the comparison of older population and younger population in the context of population aging will provide evidence on the differential healthcare needs and burden of expenditure for the two age groups for the planning of health services for all in India.

Chapter 3. Study context

This section provides an overview of the shifting age structure and the epidemiological transition both at a global and national level. For India, we discuss in detail the socio-economic and health implications of population aging, shifting disease burden, and the healthcare policies for the older population and their coverage in India. It concludes by highlighting that India provides an excellent context for analyzing socioeconomic inequality in healthcare utilization and expenditure among the older population in relation to other age groups.

3.1 Demographic transition and population aging

The transition from a near stable population with high and fluctuating mortality, and high fertility to a stable population with low mortality and low fertility is termed as demographic transition. This theory was first proposed by the American demographer Warren Thompson in 1929, and the term was coined by another American demographer Frank W. Notestein in the mid-twentieth century.[179, 180] An inevitable consequence of the declining fertility and the increasing life expectancy is the evolution in the age structure of the world population. Population aging, defined as the process whereby older individuals become a proportionately larger share of the total population, is one of the most significant trends of the 21st century. The United Nations uses 60 years or older to refer to older people. However, in many developed countries, the age of 65 years plus is used as a reference point for older persons as this is often the age at which persons become eligible for old-age social security benefits. So, there is no exact definition of "old" as this concept has different meanings in different settings. Many societies in more developed regions have already completed their demographic transition, while the developing countries are in the midst of demographic transition; experiencing rapid shifts in the relative number of children (0–14 years), working age persons (15–59 years), and older persons (60 years or more).

3.1.1 Population aging: global trends

Globally, the number of older persons is growing faster than the number of people in any other age group, resulting in the increasing share of older persons in the total population virtually everywhere.[181] Population aging is a global phenomenon, but countries are at very different stages of the process, and the pace of change differs greatly. In 2015, there were 901 million people aged 60 years or over, comprising 12% of the global population.[182] Europe had the greatest percentage of its population aged 60 years or over

(24% in 2015), but rapid aging is projected to occur in other parts of the world as well, so that, by 2050, all major areas of the world except Africa will have nearly a quarter or more of their populations aged 60 years or over. Between 2015 and 2030, the number of older people in the world is projected to grow by 56% to 1.4 billion, and by 2050, the global population of older persons is projected to more than double its size in 2015, reaching nearly 2.1 billion. Sixty-six percent of the increase in world's older population between 2015 and 2050 will occur in Asia, 13% in Africa, 11% in Latin America and the Caribbean, and the remaining 10% in other areas.[182] In addition to this, the number of people aged 80 years or over, the "oldest-old" persons, is growing even faster than the number of older persons overall. In 2000, there were 71 million people aged 80 or over worldwide which grew by 77% to 125 million in 2015 and by 2050 the oldest-old will number 434 million globally, having more than tripled in number since 2015.[181]

3.1.2 Population aging in India

India, officially the Republic of India, is a country in south Asia. Lying entirely in the northern hemisphere, the country extends between 8° 4' and 37° 6' latitudes north of the Equator, and 68° 7' and 97° 25' longitudes east of it. India shares its political borders with Pakistan and Afghanistan on the west and Bangladesh and Myanmar on the east. The northern boundary is made up of the Sinkiang province of China, Tibet, Nepal and Bhutan. India is separated from Sri Lanka by a narrow channel of sea formed by the Palk Strait and Gulf of Mannar. India is the seventh largest country by area and the second most populous country in the world, with 1.31 billion people in 2015.[182] India is a federal union comprising of 29 states and 7 union territories (UTs) which are divided into districts and further to smaller administrative units. India has a literacy rate of 74% and 31% of the population reside in urban areas as per the Indian census of 2011.[183]

The health sector in India is the responsibility of the state, local and also central government. However, providing healthcare in terms of service delivery is predominantly the responsibility of the state governments in India. Each state has developed its own system of healthcare delivery independent of the central government and is largely independent in matters relating to organizing and delivering healthcare to its people. However, there are various central government sponsored health programmes that are implemented at the state level through central government aids. For instance, 75% of the funds for implementing the National Program for the Health-Care of the Elderly in India are released to the state governments by the central government through the state health

society and the remaining 25% was contributed by the state government.[184] In general, the central government is responsible for health services in UTs without a legislature and plays an important role with respect to international treaties, medical education, prevention of food adulteration, quality control in drug manufacturing, national disease control, and family planning programs. It also carries out a stewardship role with respect to policymaking, developing the regulatory framework, and supporting the work of the states. At the local level, a decentralized system of local governance formalized in 1992 (Panchayati Raj Institutions) and their elected representatives participate in the functioning of district and sub-district institutions through various committees. The public expenditure in India is financed by the central government through the Ministry of Health & Family Welfare and other central ministries, and by the state governments thorough State Departments of Health & Family Welfare and other ministries. Around 80% of the public expenditure on health in India is raised and paid by the state governments.[185] As per the recent estimate the central government share of the total government expenditure on health was 34% (0.4% of gross domestic product (GDP)), while the share of state/UTs and local government together was 66% (0.75% of GDP).[186] The central government spends on heath through the centrally sponsored health programmes that not only provides increased finances to states for the existing programmes but also aids in funding new health programmes.[187] Health service delivery in India is characterized by a three-tier system; primary health centres is the first point of contact with a doctor, followed by community health centres which provide secondary care, and sub-divisional hospitals and district hospitals dealing with all aspects of healthcare.

India like many developing countries is also experiencing a demographic transition. The steady decline in fertility and consequent improvement in life expectancy is resulting in a gradual increase in the population of person over 60 years (older population) both in absolute and relative terms (Figure 3.1). For instance, the proportion of older population increased form 43 million in 1981 Indian Census to 77 million in 2001, and has crossed the 100 million mark in 2011 accounting for 8.6% of India's population.[183] From 2001 to 2011, the growth rate of the older population was nearly twice the growth rate of the overall population (3.1 vs 1.6%). The share of India's population over 60 years is projected to climb to 19.4% by the mid-century (2050) accounting for 330 million older adults, a number greater than the total United States population in 2015. India's population will increase by 30% between 2015 and 2050, but the older population will shoot up by 180%.[182] The shape of the population pyramid is gradually changing from a
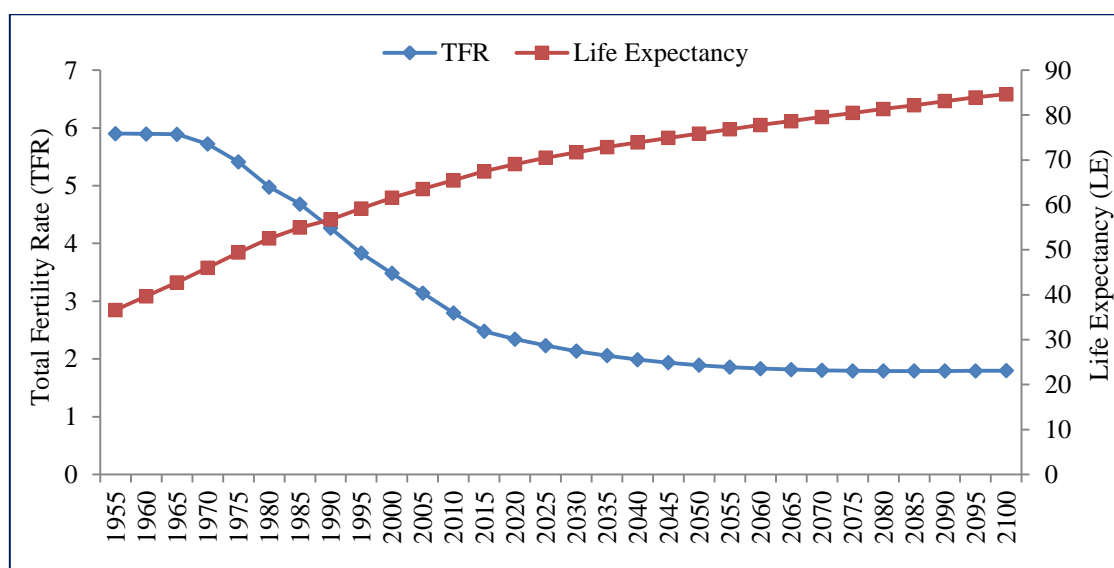
Figure 3.1 Trends in estimated and projected total fertility rate and life expectancy in India between 1955 and 2100

wide-based and narrow topped form to a barrel-shaped form and is projected to become an inverted pyramid with narrow base and wide top by 2100 indicating an aging population with very low birth rate (Appendix C-1).

The rapid increase and absolute size of the older age cohorts in India sets this emerging nation apart. Figure 3.2 presents the comparative picture of the growth of the children, adult and older populations in India from 1980 to 2100. The proportion of the older population is increasing over the years and is projected to surpass the child population after 2050. There is also marked variation in aging across states in India. States with a longer history of fertility decline have a higher proportion of older persons than those that show moderate to high fertility.[188] Currently, the proportion of the older population in states of India varies from 4.6% in Arunachal Pradesh to 12.6% in Kerala.[183]

Aging in India is different from that of developed nations in several respects. First, it took more than 100 years for the aged population to double in most of the developed countries in the world (example, Sweden and France), but in India it has doubled in just 20 years.[189] This indicates that in India the rapid age structure transition is compressed into shorter duration, and thus the country will have less time to adapt to the challenges of aging. The speed of population aging will have profound implications for government policies such as pension schemes as well as other policies targeting healthcare and economic growth.
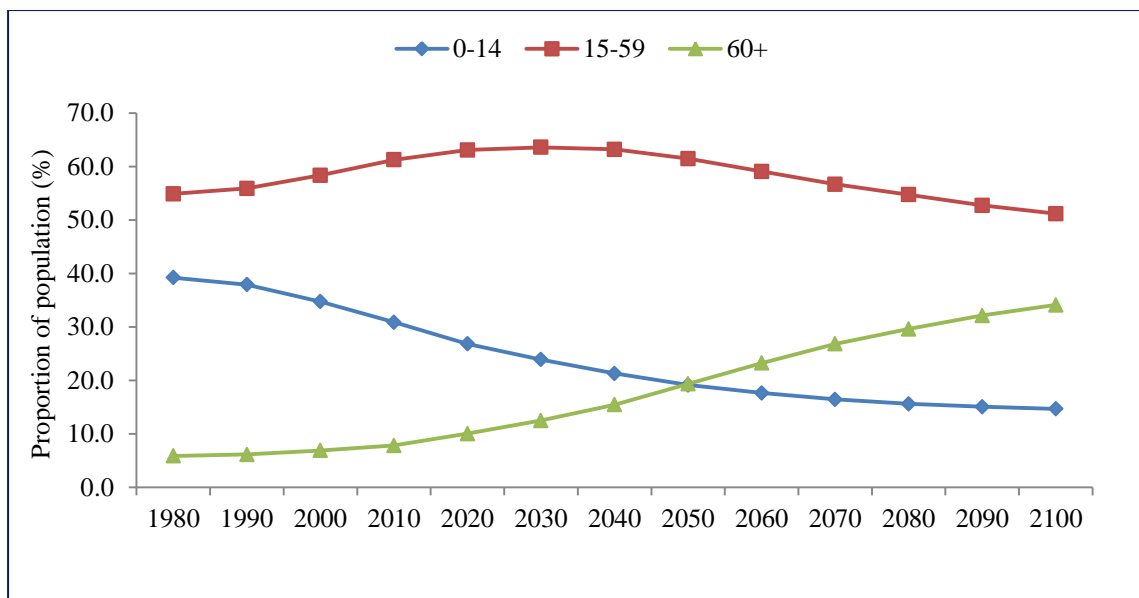
Figure 3.2 Trends in estimated and projected population of children, adult and older population in India between 1980 and 2100 by United Nations

Second, India is getting older before getting rich. Contrary to the developed nations, the demographic transition is occurring in India at low levels of socioeconomic development creating unique challenges for the nation. Third, the profound shift in population structure occurring in the midst of weakening family support system and limited income support in old age is giving rise to serious social, economic and healthcare policy issues in India.[190-193] Fourth, the phenomenon of aging is not uniform across states in India. Nine states in India have below replacement level fertility and they have older population higher than even Scandinavian and European countries like Sweden, Norway, Ireland and Netherlands. This calls for separate policies to address the specific needs of the states which are at very different stages of demographic transition.

3.1.3 Socioeconomic and demographic profile of the older population in India

The older population is as diverse as any other age group in terms of age, sex, education, income and health. The phenomenon of feminization, ruralization, aging of the already aged population, and poverty characterizes aging in India. Higher life expectancy for females than males implies that more and more females will survive to older ages leading to feminization of aging. In 2015 the life expectancy at birth for females in India was three years more than males (69.9 vs 66.9 years).[194] The latest Indian Census of 2011 showed that the proportion of older females was higher than that of older males (8.4 vs 7.7%).[183] Also in 16 out of 20 large states in India the proportion of older females was found to be higher than the older males. The proportion of women and men in the older

population has important implications for policymakers, as they have different experiences and problems. In India, women are more likely than men to be widowed, illiterate, out of paid employment, and economically dependent. Hence the problems of old age will be exacerbated among older women owing to public policy failures with respect to access to social and material resources. However, older men may also become vulnerable, particularly after retirement because of a lacking social security system.

Another important feature of population aging is that the older population itself is aging. The proportion of older population aged 80 years or more (oldest old) is the fastest growing population among the older population. According to the demographic profile, the overall population of India will grow by 30% between 2015 and 2050, whereas the population of people aged 60 years or more will grow by 182%, and those in age group of 80+ by 323%. In 2015 there were 11 million oldest old people in India, and this number is expected to rise to 48 million by 2050.[182] The oldest old are most vulnerable on account of suffering from disabilities, diseases, terminal illness, dementia and depression, accidents and falls, nutritional deficiencies, and loneliness.[195] This will require provision for special health and family care.

A majority (71.0%) of the older population in India lives in rural areas which has lower provision of healthcare than the urban areas. Making provisions for the service delivery to the older population in rural areas should be a priority. Nearly 30% of the older population is below poverty line, 56.5% is illiterate and 72% are economically dependent which makes them economically vulnerable.[183, 196] A majority of India's workforce (90%) is employed in the unorganized sector and is therefore, excluded from formal pension provision and other welfare schemes. The global ranking of the countries based on the Global AgeWatch Index- a summary measure of older person's wellbeing including key dimensions such as older person's income status, health status, education and employment, and enabling environment, ranked India 73rd out of 91 countries.[197] The report of Global AgeWatch Index 2013 highlighted that India's strong economic growth has not resulted in widespread income security and access to healthcare in old age. Additionally, India's position in terms of employment and education of older population has been relatively low. India with the second largest number of older population in the world next only to China is amongst the poorest of nations to grow old. These demographic observations and trends make the older population an increasingly important segment of the population pyramid.

3.1.4 Societal implications on aging

In India, traditionally, the family has been the key institution that provided psychological, social and economic support to the older persons. A strong cultural pressure influenced families to take care of the older persons. Economic development and changing social norms is raising questions about the feasibility of the family model of care. There is some evidence on the changing family size and structure in India. Between 2001 and 2011 the growth rate of the households has been higher than the growth of population (28.0% vs 17.6%).[198] The average household size has declined from 5.3 in 2001 to 4.9 in 2011. The households with 1 to 4 members have increased from 41.9% in 2001 to 49.7% in 2011, whereas the households with five or more members have declined from 39.4% to 31.5% during the same decade.

More than four in five older Indians live in multigenerational households with their children.[193] But the surveys find that the share of older Indians living with only spouse or alone has increased by 30.0% (from 14.6 to 18.9%) between 1995 and 2014.[196, 199] A number of trends may explain these changes in living arrangements including, urbanization and migration, the break-up of the extended family system, growing individualism, and increased employment of women in the formal sector. This is likely to affect the position of older persons in the family as well as result in a decline in the capacity of family to meet the financial, social, psychological, medical, recreational and welfare needs of the older persons. Evidence suggests that the ongoing socio-cultural transition resulting into the erosion of the traditional system for the care and support is raising serious concerns about the economic vulnerability of the older population.[190, 192, 200, 201]

3.1.5 Economic implications of aging

The success story of increasing longevity in India is now creating a new challenge for ensuring the well-being of the enormous number of older people. There are many profound economic implications of aging; such as income support for the extended retirement period, consumption, production, structure of labour market, and expenditure on health. Population aging will require more investments in social sectors like health and social security. This section discusses the two direct economic implications of aging related to social security and healthcare.

While the developed world became rich before its people started living longer, in developing countries, by definition, people are getting older before the countries are rich.[202] In the context of India this is amply true and makes the issue of aging very critical. Population aging is occurring at the same time as dramatic economic and social developments are transforming much of the country.[203] As India is entering prematurely into an aging society, it will be difficult to divert scarce resources towards meeting the health and social security needs of the older population.

Figure 3.3 shows that the child dependency ratio has declined from 71.5% in 1980 to 50.4% in 2010 which is further projected to decline to 31.1% in 2050. At the same time the old age dependency is showing a steady rise form 10.7% in 1980 to 12.7% in 2010 and is projected to be equal to the child dependency ratio by 2050. As high as 71.0% of the older population in India are economically dependent on their family members for meeting their day to day expenses.[196] The average number of working adults of ages 15–59 years has declined from 2.9 in 2004–05 to 2.5 in 2011–12.[188] The decline in workers per household coupled with declining coresidence suggests a need to rethink reliance on the extended family for economic and social support of the older population. The larger older generation needs to be supported by a smaller younger generation which will have significant economic impacts.

The aging of the population has serious problems regarding adequate income for later life. The majority of the population in India are employed in the unorganized sector and have no retirement benefits or other means of old age security schemes such as public assistance and safety net programmes, health or life insurance schemes, labour market participation and investment arrangements. India does not have a universal social security system. As the number of older persons increases in India, there is a pressing need for the government to invest in strengthening the social security system in India.

The provision of long term care is another profound impact of population aging in India as the increased longevity is accompanied by expansion of morbidity. Data from the global burden of disease study suggest that of the total disease burden measured as disability-adjusted life years (DALYs)[4] lost in India in 1990 that among the older population was 11.8%, which increased to 22.3% of the total disease burden in 2013.[204]

---

[4] Disability adjusted life years (DALYs) is a measure of overall disease burden, expressed as the number of years lost due to ill-health, disability or early death. It was developed in the 1990s as a way of comparing the overall health and life expectancy of different countries.

Additionally, the older population has twice the burden of non-communicable diseases compared to their younger counterparts. India's population suffer from higher burden of diseases at older ages, particularly chronic diseases and disabilities.[87, 205-212] The aging population will continue to be one of the major determinants of the change in disease burden over the next two decades.[207] These diseases create demand for intensive diagnostic tests, long term hospitalization, and specialized treatment as well as social and clinical therapy which require lot of investment. The focus of the health policy and programmes in India has largely been on providing health services related to maternal and child health, family planning, and communicable disease control.[213] However, with the changing age structure from young to older population it is necessary to invest relatively more for older peoples' geriatric health and primary care. The extent of inadequacy in the investment in the health of the older population in India needs to be understood in relation to the overall budget for health expenditure which has stagnated at around 1.0% of GDP. The economic transition in India will have crucial implications for healthcare financing for the older adults. Privatization of health services, weak regulation mechanisms and a squeeze on public expenditure in health limits the capacity of the state to invest in the healthcare of the older population.[214]
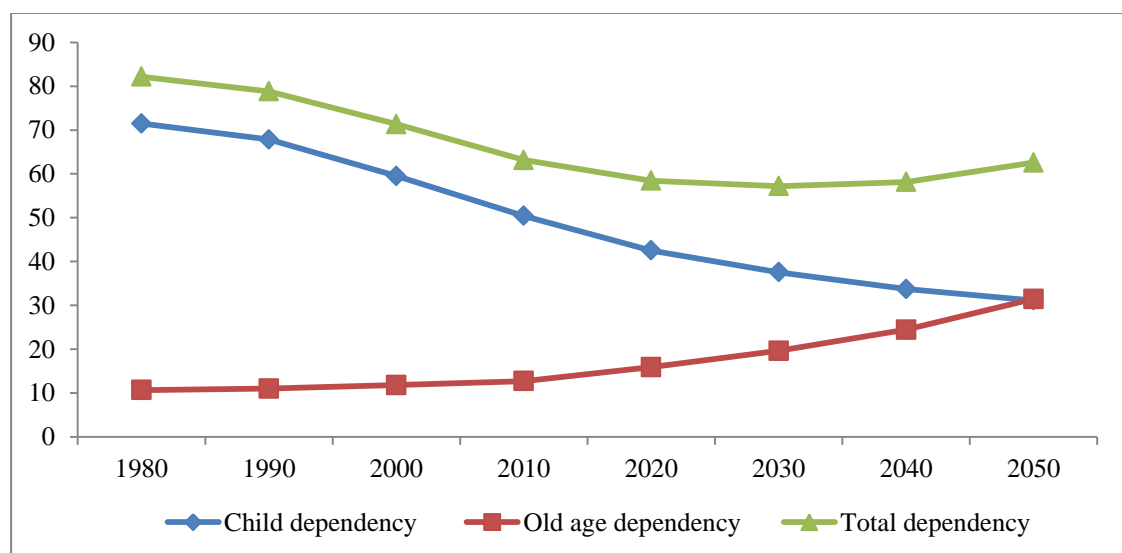
Figure 3.3 Trends in dependency ratios in India between 1980 and 2050

India's total expenditure on healthcare, public and private, is less than 5.0% of GDP, which is much less compared with the 10-12% of GDP spent on healthcare by Organization for Economic Co-operation and Development *countries*.[215] The out-of-pocket payments by households has remained persistently high in India and was estimated to account for 62.0% of the total health expenditure in 2014.[216] Huge increase in

healthcare costs burden and out-of-pocket payments for healthcare is one of the leading causes of direct debt and poverty in India.[217] The 12th five year plan (2012–17) in India had set the target to increase the public spending on health to 2.0% and 3.0% of GDP by 2017 and 2022, respectively.[22] In spite of the commitment to increase the government spending on health, it currently stands at1.2% of GDP. This is much less than the WHO recommendation of 2.5 to 5.0% of GDP on health. In spite of the initiatives, the progress in achieving the goal of equity in health and health entitlements of people has been sluggish and the healthcare is far from equitable and affordable.[20, 218]

3.2 Policies for older population in India

The well-being of older persons has been mandated in the Constitution of India. Article 41, a Directive Principle of State Policy, has directed that the State shall, within the limits of its economic capacity and development, make effective provision for securing the right of public assistance in cases of old age. There are other provisions too which direct the State to improve the quality of life of its citizens. The right to equality has been guaranteed by the Constitution as a fundamental right. These provisions apply equally to older persons. Social security has been made the concurrent responsibility of the central and state governments.

In India, the central government's concern for the old and the aging of the population as a priority began with India's participation in the World Assembly Conference in Vienna in 1982, where India adopted the United Nations International Plan of Action on Aging. This plan focused on the government's role in adopting programs aimed at providing care and protection to the old, while synchronizing these with the changing socio-economic conditions of the society. Following participation at the World Conference, the Government, by way of stressing its intentions for the welfare of the old, began to recognize the old as a social category that needs specialized attention.

Time and again India has taken various initiatives to take care of its aging population. The initiatives started even when the older population in India was less than 7%. In 1995 the social assistance programme that was launched had the provision of providing social security to older population along with widows and persons with disability in the form of social pensions. The schemes for the older population below the poverty line currently covered under this programme are Indira Gandhi National Old Age Pension Scheme

(IGNOAPS), Indira Gandhi National Widow Pension Scheme (IGNWPS), and the Annapurna Scheme.

India launched the first formal policy for the older population in 1999. The formulation of the National Policy for Older Persons (NPOP) was in response to the increasing number and proportion of older persons and their disadvantaged status in terms of social, economic and physical well-being.[219] The NPOP had the primary objective of encouraging individuals to make provision for their own as well as their spouse's old age; encouraging families to take care of their older family members; and creating in the older persons an awareness of the need to develop themselves into independent citizens. The policy also aimed at enabling and supporting non-governmental organizations to supplement the care provided by the family, providing care and support to vulnerable older persons, strengthening the provision of primary health services, training geriatric care givers, and promoting research and training. The Ministry of Social Justice and Empowerment (MOSJE) coordinated the implementation of NPOP while many elements of the policy were under the mandates of several other ministries. The policy was no doubt very comprehensive but had limited financial, organizational and management resources, lacked time-bound targets and accountability, and had no well-defined ways to harmonize resources from different ministries to produce expected results. This policy did recognize the problems of the older population but did not succeed in tackling them adequately.[220]

After about a decade of implementation of NPOP, the MOSJE set up a committee of experts to review implementation experience, and suggest ways and means for improving the policy content and its implementation. The expert committee prepared a revised National Policy for Senior Citizens (NPSC) that recognized that (a) older women need special attention, (b) rural poor need special attention and (c) the need to factor in the advancements in medical technology and assistive into the revised policy.[221] This policy had 43 specific areas of intervention under 9 categories namely, income security, healthcare, safety and security, housing, productive aging, welfare, multigenerational bonding, media and protection during natural disasters. Separate committees were appointed at central and state level to implement the policy and monitor its coverage.

Keeping in view the international and national commitments of the government envisaged under the United Nations Convention on the Rights of the Persons with Disabilities, the

recommendations made in the NPOP as well as the state's obligation under the Maintenance & Welfare of Parents & Senior Citizens Act 2007, the Ministry of Health and Family Welfare launched the National Policy for the Health care of the Elderly (NPHCE) to address various health related problems of older population.[184] The NPHCE was launched in 2010 with an outlay of INR 288 crore. The vision of the programme was (1) to provide accessible, affordable, and high-quality long-term, comprehensive and dedicated care services to an aging population; (2) create a new "architecture" for aging; (3) to build a framework to create an enabling environment for "a society for all ages;" (4) to promote the concept of active and healthy aging. The programme aimed to address the issues of the older population by introducing a comprehensive healthcare, set up completely dedicated and tuned in to the needs of older population with interventions designated to capture the promotional, preventive, curative and rehabilitative aspects through interventions at all levels of the present public health system. The implementation and monitoring of NPHCE was assigned to the non-communicable disease cells constituted at the centre, state and district level. The non-communicable disease cells were earlier constituted at the centre for planning, monitoring and implementation of the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular disease and Stroke.

3.3 Coverage of the social assistance programmes

The annual report 2013–14 of the Ministry of Rural Development highlights the coverage of 208.36 lakhs beneficiaries under the IGNOAPS and 48.79 lakhs under the IGNWPS.[222] These programmes mainly target below poverty line (BPL) families in rural and urban areas so the older adults not belonging to BPL families but requiring support/security are left out from such support. Even the coverage of the target group is not universal. Lack of information, problem in implementation, and malpractices in the schemes are resulting in older persons living in insecurity even if they are targeted. The social assistance programmes are limited mainly in terms of its improper implementation such as wrong targeting, limited coverage, and irregular payment of pension.

A survey conducted by the United Nations Population Fund India in 2012 observed the problem of wrong targeting.[220] While investigating the utilization of IGNOAPS, it was found that some non-BPL older population were also availing themselves of the scheme. It was also observed that there was low awareness of this scheme among potential beneficiaries, thus raising the need for effective steps to be taken by the government to

promote the scheme. The survey found that around 18.0% of older population belonging to BPL households were beneficiaries of IGNOAPS, while only 3.5% utilized the Annapurna scheme, and a quarter of older widowed women utilized the IGNWPS. The utilization of these schemes was comparatively higher among the older population residing in rural areas than their counterparts in urban areas. The coverage of health insurance schemes was less than 2.0%.

The role of public transfers in older person households has grown sharply in recent years. The Indian Human Development Survey (2011–12) showed that 42.0% of older adult households received any government benefits such as old age pension, widowhood pension, disability pension, etc., up from 17.0% in 2004–05. IGNOAPS played an important role with the proportion of the older population receiving income from the scheme increasing from 7.0% in 2004–05 to 18.0% in 2011–12.[188]

3.4 Epidemiological transition: global and national trends

The process by which the pattern of mortality and disease is transformed from one of high mortality among infants and children and episodic famine and epidemic affecting all age groups to one of degenerative and man-made diseases affecting principally the older population is termed as epidemiological transition. The theory of epidemiological transition was formulated by A. R. Omran in 1971 to account for the extraordinary advances in healthcare made in industrialised countries since the 18th century.[223] According to his theory, all societies experience three phases of epidemiological transition as they progress through modernisation: the "age of pestilence and famine", during which mortality is high and fluctuating, with an average life expectancy under 30 years; the "age of receding pandemics", during with life expectancy rises considerably, from under 30 to over 50; and the "age of degenerative and man-made diseases", during which mortality continues to decline and eventually approaches stability at a relatively low level, the elimination of infectious diseases makes way for chronic degenerative and man-made diseases. In 1986, Olshansky and Ault proposed a fourth stage of the epidemiologic transition to be appended to Omran's model- the "age of delayed degenerative diseases" characterized by continued improvements in life expectancy, producing a shift in non-communicable disease mortality to progressively older ages.[224]

Epidemiological transition prior to the 20th century (i.e., those in today's industrialised countries) was associated with the socioeconomic progress leading to improvement in

standard of living, nutrition and sanitation. Whereas, in developing countries it is guided relatively more by the organized healthcare and disease control programs, and the development of medical technologies.[225, 226] A recent study found that the increasing sociodemographic status does bring structured changes in disease burden but there are tremendous variations in burden of disease that are not associated with sociodemographic status; measured as a summary metric based on measures of income percapita, average years of schooling, and total fertility rate.[227]

Evidence suggests that globally the number of DALYs lost caused by communicable, maternal, neonatal, and nutritional disorders has declined steadily from 1·2 billion in 1990 to 741.6 million in 2015, whereas DALYs due to non-communicable diseases have increased steadily, rising from 1·1 billion to 1·5 billion during the same period.[228] Also, the contribution of NCDs to total DALYs in 2015 was higher for NCDs and injuries compared to the communicable, maternal, neonatal, and nutritional disorders (69.8 vs 30·1%). Global mortality trends showed a 16·4% increase in total deaths between 1990 and 2015, whereas age-standardized rates of mortality fell by 28·5% during this time.[229] Between 2005 and 2015, deaths due to communicable, maternal, neonatal, and nutritional disorders reduced for both total deaths (-19·7%) and age-standardised rates (- 29·6%). For NCDs, total deaths rose by 14·3% between 2005 and 2015, an increase of 5·0 million deaths, but age-standardized rates decreased from 719·1 deaths per 100,000 in 2005 to 624·7 deaths per 100,000 in 2015 (-13·1%). Non-communicable diseases are rapidly increasing in low- and middle-income countries, largely due to demographic and lifestyle changes. Non-communicable diseases are often associated with older age groups, but evidence shows that 16 million of all deaths attributed to NCDs occur before the age of 70 years. Of these premature deaths, 82% occurred in low- and middle-income countries.[230]

India embarked on the epidemiological transition only in 1970, moving into top gear after 1995, sooner than expected because of rapid urbanization, industrialization and fast-paced socioeconomic development.[208] India's current stage of epidemiological transition can be characterized by low mortality, high morbidity, and by the double burden of communicable diseases and non-communicable diseases. Between 1990 and 2015, the female and male life expectancy in India improved by 11.3 years (58.2 vs 69.5 years) and 8.0 years (57.3 vs 65.2 years), respectively.[227, 228] Recent estimates from GBD 2015 study showed that the proportion of DALYs due to CDs has declined from 60.4% in 1990 to

37.2% in 2015, whereas the contribution of NCDs and injuries has almost doubled (39.6 vs 62.8%) in the same time frame.[204] Out of 10.3 million deaths in 2015, 71.2% (7.3 million) were attributed to NCDs and injuries. Of the total deaths due to NCDs and injuries, 57.9% (4.2 million) occurred before the age of 70. This indicates that premature deaths due to NCDs and injuries account for relatively higher deaths in India. Also, the deaths due to NCDs and injuries for the population 70 years or more have doubled from 1.5 million in 1990 to 3.1 million in 2015.

3.5 Summary of context

India is a vast country undergoing demographic and epidemiological transition. Although India will be the youngest country in the world by 2020 with a median age of 29 years, the number of older people is gradually increasing and is likely to increase significantly after 2020. The proportion of older population in the total population is projected to climb from 8.9% in 2015 to 19.4% in 2050.[182] The sociocultural transitions underway in India are raising issues pertaining to the care of the older population. The migration of the youth due to economic reasons, urbanization and declining joint family system is resulting in fewer family members left to care for the growing older population. The declining family support system in not accompanied by the adequate public mechanism in place to look after the health and wellbeing of the older population in India. The public spending on health in India is dismal. The scarce resources need to be judiciously allocated to cater to the healthcare needs of all ages.

Additionally, the transitions are not uniform across India. States in India are at various stages of the transitions and the pace of change also differs greatly. Kerala, the demographically most developed state of India has health indicators comparable to middle income countries, while other states like Uttar Pradesh, Madhya Pradesh, Bihar and Orissa are at the lower end levels with health indicators comparable to sub-Saharan Africa. The ubiquitously low public spending on health is also not equitably distributed. There is vast interstate differential in public spending on health and infrastructure with level of public spending in Bihar being less than half of the level in Kerala and Tamil Nadu- the two states with highest health expenditure in India. The less developed states with relatively low per capita Gross State Domestic Product has lower state expenditure on health, weak health infrastructure and low public health indicators.[231] The welfare spending in India suffers from misallocation. Most poor districts are the ones that suffer from the greatest shortfall of funds in social programs. The districts accounting for the

poorest 40% receive 29% of the total funding.[232] The BRICS country with the second highest economic growth, India, has had the least improvement in public funding for health. Present shortages of skilled personnel, paramedics, medical supplies, and equipment seriously undermine India's efforts to deliver UHC.[233]

Shifting disease burden from communicable to non-communicable diseases will put pressure on the scarce resources for healthcare. India provides an excellent context for studying the socioeconomic inequality in the healthcare utilization and expenditure among the older population which is becoming an important segment of the population pyramid in relation to other age groups which accounts for the majority of India's population. Having most updated trends in the demand for healthcare and the associated cost especially in the background of the ongoing age-structure transition, expansion of morbidity and changing disease burden in India will be useful for policy formulation.

Chapter 4. Methods

This thesis comprises four research papers using nationwide cross-sectional data from various surveys on social consumption- health and household consumer expenditure - carried out in India. Specific details of the methodology employed in this thesis are provided in each analytical paper, but the data are only briefly summarized in these papers. Therefore, the current chapter provides an overview of the data sources used, and introduces certain concepts and definitions that have been used throughout this study. In addition to this I also describe the healthcare utilization model used in the analyses. This chapter also discusses the suitability of the secondary data to fulfil the study objectives and a few more general issues relating to secondary data analyses.

4.1 National Sample Survey Organization

The National Sample Survey Organization (NSSO) is an organization under the Ministry of Statistics and Programme Implementation, Government of India headed by the Director General and Chief Executive Officer. The NSSO was setup in 1950 as a permanent survey organization to collect data on various facets of the Indian economy through the nationwide sample surveys in order to assist in socioeconomic planning, policy formulation, programme implementation, programme evaluation, research and public debate, and economic and administrative decisions for national development. The NSSO covers different subjects, such as, social consumption (health, education, etc.), morbidity and disability, consumer expenditure, employment and unemployment, migration, unorganized manufacturing, unorganized services, debt and investment, land and livestock holdings etc. through household surveys. The National Sample Survey (NSS) is a continuous survey carried out in the form of successive "rounds", each round usually of one-year duration covering several topics of current interest in a specific survey period. The survey programme conforms to a cycle over a period of ten years, some topics being repeated once in ten years, and some being repeated once in five years. Other subjects of special importance are also accommodated in the intervening years or covered along with regular repeated surveys. The Survey Design and Research Division of NSSO is responsible for development of survey methodology as well as drafting of the report. The fieldwork for the survey is handled by the Field Operations Division of NSSO. While the data processing and tabulation work is handled by the Data Processing

Division of NSSO, the Coordination and Publication Division of NSSO coordinates various activities pertaining to the survey.

The NSSO functions under the overall guidance of the National Statistical Commission and the working groups constituted by it for each round of socioeconomic surveys. The work relating to finalisation of sampling design, schedules of enquiries, writing of instructions, training of field staff, processing of data and writing of reports are all entrusted to the National Statistical Commission. Results of NSSO surveys are brought out in the form of NSS reports available at the website of the Ministry (**www.mospi.nic.in**). So far, 574 reports have been brought out. Validated unit level data relating to various surveys of NSSO are available on magnetic media (CD-ROM) for sale at nominal prices. NSSO provides data in the form of *.dat* files which has to be decoded and extracted in SPSS or STATA for any analysis.

4.2 National Sample Survey on Social Consumption – Health

The NSSO carried out the first all-India survey on social consumption in its 35th round (July 1980–June 1981). The items covered were the public distribution system, health services including mass immunization and family welfare programmes, and educational services. The results of the survey could not be brought out owing to some unavoidable reasons. The second survey on social consumption was carried out in the 42nd round (July 1986–June 1987) with some modifications in the coverage of subjects. Topics like Problems of Aged Persons were included in this round. The third Survey on Social Consumption was carried out in the 52nd round (July 1995–June 1996). Two topics, viz. utilization of the public distribution system and utilization of family planning services, were dropped, as these were covered in the NSS 50th round and in a nationwide survey by the Ministry of Health and Family Welfare, respectively. After a gap of about nine years, the Governing Council decided to take up a survey on 'Morbidity and Health care' at the request of Ministry of Health and Family Welfare, during the period January to June, 2004. Since then there has been no NSSO survey on health till the 71st round during January to June 2014.

These decennial surveys on NSSO social consumption relating to health are the primary source of data on basic quantitative information on morbidity, hospitalization, extent of receipt of pre-natal and post-natal care by women, and expenditure incurred on treatment received in public and private sectors. These are used for planning, policy formulation,

decision support and as an input for further analytical studies by various government organizations, academicians, researchers and scholars.

4.3 National Sample Survey on Consumer Expenditure

Beginning from the first round (1950–51) of the NSS, data on household consumer expenditure were collected in every round up to the 28th (1973–74). After the 26th round of the survey, the Governing Council of NSSO decided that the surveys on consumer expenditure and employment-unemployment situation might be undertaken together on a large scale once in every five years. Accordingly, "quinquennial" surveys on consumer expenditure and employment-unemployment surveys were conducted in the 27th (October 1972–September 1973), 32nd (July 1977–June 1978), 38th (January–December 1983), 43rd (July 1987–June 1988), 50th (July 1993–June 1994), 55th (July 1999–June 2000), 61st (July 2004–June 2005), 66th (July 2009–June 2010) and 68th rounds (July 2011–June 2012) of NSS, at roughly 5-year intervals. Apart from these quinquennial surveys, the NSSO collects information on consumer expenditure from a smaller sample of households since 42nd round (July 1986–June 1987). Nowadays every round of NSS includes a consumer expenditure survey (CES), giving rise to an annual series of consumption data.

The NSS-CES aims at generating estimates of average household monthly per capita consumer expenditure (MPCE), its distribution over households and persons, and its break-up by commodity group, at national and state/UTs level, and for different socio-economic groups. These indicators are amongst the most important measures of the level of living of the respective domains of the population, and are used extensively for the study of poverty and inequality. Other uses of the CES include the use of budget shares as revealed by the NSS-CES to prepare the weighting diagram for official compilation of consumer price indices, and the measurement of elasticity or responsiveness of demand to change in total expenditure. The data on quantities of consumption of different food items are used to study the level of nutrition of populations of different regions and disparities therein, and trends in nutritional intake over time.

4.4 NSSO data used for this study

Data from various healthcare utilization and consumer expenditure surveys were used for the four analytical papers included in this thesis. The following sections discuss these surveys in detail: sample sizes, definitions, variables used including the similarities and dissimilarities.

4.4.1 Healthcare utilization survey

This PhD work used National Sample Survey data from three healthcare utilization surveys: NSS-HUS 1995–96 (52nd round), NSS-HUS 2004 (60th round), and NSS-HUS 2014 (71st round). Details of the sampling design, survey instruments, and findings can be found in the national reports.[196, 199, 234] These surveys collected comprehensive data on morbidity pattern and utilization of healthcare provided by public and private sector along with the expenditure on medical treatment. Information was collected on the following:

1. All spells of ailment suffered by each member of the sample household during the 15 days preceding the date of enquiry and their treatment status.
2. All events of hospitalization of a member in the sample household, whether living or deceased at the time of survey, during the 1 year preceding the date of enquiry.
3. Utilization of public and private facilities for the inpatient and outpatient care use.
4. Expenditure (both medical and non-medical) incurred for the inpatient and outpatient care. The detail of the inpatient and outpatient care expenditure items for the three surveys has been reported in Appendix G-2.
5. Household's socioeconomic and demographic characteristics.
6. Various aspects of the older population (60 year or more) pertaining to whether economically active, state of economic independence, person supporting, amount of loans withstanding, living arrangements, physical mobility status, current state of health, and relative state of health, etc.

The data were collected from a sample of households by the interview method. As far as possible, efforts were made to collect the required information from members of each sample household, personally. But, in spite of the best efforts, some other person of the household might have provided the information, especially for the children and the aged persons in the household. Table 4.1 gives the sample of households and individuals surveyed in NSS-HUS along with the episodes of hospitalization, and spells of ailment reported by the household members in the specified reference period. Although the sample sizes differed, essentially a two-stage stratified sampling design was adopted uniformly across NSS-HUS which facilitates the comparison of estimates obtained from these surveys. The detailed sampling design has been discussed later in this chapter.

Table 4.1 Sample sizes in NSS-HUS 1995–96, NSS-HUS 2004 and NSS-HUS 2014, India

Survey	sample size					
	Households	Individuals	Deceased individuals	Older individuals	Episodes of hospitalization	Spells of ailment
NSS-HUS 1995–96	120,942	629,888	3,250	33,990	26,526	36,172
NSS-HUS 2004	73,868	383,338	1,717	34,831	32,665	38,803
NSS-HUS 2014	65,932	333,104	2,395	27,245	57,456	37,282

4.4.2 Consumer expenditure surveys

For the analyses of the third paper of this thesis, along with NSS-HUS, nationwide data from four household consumer expenditure surveys were used: NSS-CES 1993–94 (50th round), NSS-CES 1999–2000 (55th round), NSS-CES 2004–05 (61st round), and NSS-CES 2011–12 (68th round). The sampled households were 115,354 in NSS-CES 1993–94, 120,309 in NSS-CES 1999-2000, 124,644 in NSS-CES 2004–05, and 101,602 in NSS-CES 2011–12. Details of the sampling design, survey instruments, and findings can be found in the national reports.[235-238]

A special feature of the NSS-CES was the provision for simultaneous collection of data on consumption for a month and a year for certain items whose consumption at the household level was not likely to be regular, e.g. durable goods, clothing, and footwear. NSS-CES collected information on value of household consumption on food and non-food items using a very detailed item classification to minimise recall error. These surveys also collected information on institutional and non-institutional medical expenditure incurred by the household. Expenses incurred on medical treatment as an inpatient of a medical institution was considered as institutional medical expenditure, or otherwise (non-institutional). Medical institution covers private as well as government institutions such as hospitals and nursing homes. The detail of the items that was used for calculating institutional and non-institutional medical expenses for this study is given in Appendix G-1. In contrast to NSS-HUS, brief health and detailed consumption expenditure data on food and non-food items were collected in NSS-CES (Table 4.2).

In NSS-CES 2011–12, two types of schedules of enquiry were used. The two types had the same item-breakup but differed in the reference period used for the collection of

Table 4.2 Reference period and number of items used in NSSO household surveys to capture household expenditure on healthcare, food and other items, India

Survey	Outpatient care expenditure		Inpatient care expenditure		Food expenditure		Other expenditure[a]	
	No. of items	Reference period	No. of items	Reference period	No. of items	Reference period	No. of items	Reference period
NSS-HUS 1995–96	4	15 days	5	1 year	0[b]	-	0[b]	-
NSS-HUS 2004	15	15 days	16	1 year	0[b]	-	0[b]	-
	4	1 year	-	-				
NSS-HUS 2014	7	15 days	8	1 year	0[b]	-	0[b]	-
	2	1 year	-	-				
NSS-CES 1993–94	7	30 days	7	1 year	190	30 days	111	30 days
	5	1 year					93	1 year
NSS-CES 1999–2000	6	30 days	5	1 year	142	30 days	102	30 days
	2	1 year					81	1 year
NSS-CES 2004–05	6	30 days	5	1 year	142	30 days	102	30 days
	2	1 year					84	1 year
NSS-CES 2011–12[c]	6	30 days	5	1 year	134	30 days	104	30 days
	2	1 year					96	1 year

[a] This category includes all household expenditure other than out-of-pocket healthcare payments and food expenditure; [b] Only total household expenditure in the most recent month was documented; [c] Schedule type I.

expenditure data. Schedule Type I, as far as reference periods were concerned, was a repeat of the schedule used in most quinquennial rounds and hence has been used for this study. For certain categories of relatively infrequently purchased items, including clothing and consumer durables, it collected information on consumption during the last 30 days and the last 1 year. For other categories, including all food and fuel and consumer services, it used a 30 days reference period. Schedule Type II used 'last 1 year' (only) for the infrequently purchased categories, 'last 7 days' for some categories of food items, as well as pan, tobacco and intoxicants, and 'last 30 days' for other food items, fuel, and the rest. This was in line with the recommendations of an Expert Group that had been formed for the purpose of suggesting the most suitable reference period for each item of consumption.

4.4.3 Coverage and sampling design of NSS-HUS and NSS-CES

The NSSO surveys covered the whole of the Indian Union with the exception of some interior areas of Nagaland and Andaman & Nicobar Islands, and Leh (Ladakh) and Kargil districts of Jammu & Kashmir. In general, a stratified multi-stage sample design was adopted in all rounds of NSSO surveys. The first stage units (FSU) were the census villages (Panchayat wards in case of Kerala) in the rural sector and NSSO Urban Frame Survey (UFS) blocks in the urban sector. The ultimate stage units (USU) were households in both rural and urban sectors. In case of large FSU,

hamlet-groups in rural areas and sub-blocks in urban areas formed the intermediate stage units. The detail of the sampling procedure is discussed below:

Sampling frame for FSUs: For the rural sector, the list of Census villages constituted the sampling frame and for the urban sector, the latest updated list of UFS blocks were considered as sampling frame.

Stratification and sub-stratification: Stratum was formed at district level. Within each district of states/ UTs, two basic strata were formed: (i) a rural stratum comprising all rural areas of the district and (ii) an urban stratum comprising all urban areas of the district. This was followed by sub-stratification of rural and urban sector.

Allocation of total sample to states/UTs: The total number of sample FSU was allocated to the States and UTs in proportion to population as per Census, subject to a minimum sample allocation to each State/UT.

Allocation of state/UTs level sample to rural and urban sectors: State/UTs level sample size was allocated between two sectors in proportion to population as per Census with 1.5 to 2.0 weightage to urban sector subject to the restriction that urban sample size for bigger states like Maharashtra, Tamil Nadu etc. did not exceed the rural sample size. A minimum of 16 FSUs (minimum 8 each for rural and urban sector separately) were allocated to each state/UTs.

Allocation to strata and sub-strata: Within each sector of state/UTs, the respective sample size was allocated to the different strata/sub-strata in proportion to the population as per Census. Stratum level allocation was adjusted to multiples of 2 with a minimum sample size of 2 for the NSS-HUS, and to multiples of 4 with a minimum sample size of 4 in NSS-CES. For special strata in the rural areas of Nagaland and Andaman & Nicobar Islands, 4 FSUs were allocated to each in NSS-HUS. Allocation of each sub-stratum was 2 in both rural and urban sectors for NSS-HUS and 4 in NSS-CES.

Selection of FSUs: Selection procedure depends much on the availability of the sampling frame, availability of auxiliary information for each unit and the subject of

enquiry. Three basic sampling schemes, viz., simple random sampling, systematic sampling and sampling with probability proportional to size have been used in NSS for selection of sample villages and blocks. Sampling schemes broadly followed in different rounds have been summarised in Table 4.3. Both rural and urban samples were drawn in the form of two independent sub-samples and equal number of samples was allocated among the two sub-rounds.

Table 4.3 Sampling scheme for the selection of first stage units in various NSS-HUS and NSS-CES since 1993, India

| Sampling scheme | Surveys | |
	Rural	Urban
Circular systematic selection with equal probability	NSS-HUS 1995–96	NSS-HUS 1995–96, NSS-CES 1993–94, NSS-CES 1999–2000
Circular systematic selection with probability proportional to size	NSS-CES 1993–94, NSS-CES 1999-2000	
Probability proportional to size with replacement	NSS-HUS 2004, NSS-HUS 2014, NSS-CES 2004, NSS-HUS 2011–12	NSS-HUS 2014
Simple random sampling without replacement		NSS-HUS 2004, NSS-CES 2004 NSS-HUS 2011–12

Formation and selection of hamlet-groups/sub-blocks: If the population of the FSU was 1200 or more (600 or more in the rural areas of selected states), it was further divided into number of hamlet-groups in the rural sector and sub-blocks in the urban sector. Once the large FSU has been divided into sub-FSUs (hamlet-groups or sub-blocks), specific selection procedure was used to select hamlet-groups/sub-blocks to form the frame for sampling of households. Different selection procedure used in various NSS-HUS and NSS-CES are shown in Table 4.4.

Formation of second stage units and selection of households: The second stage units (i.e. households) were stratified in accordance with the requirement of a specific survey, and the same varied in different surveys of NSSO. From each second stage stratum, the sample households were selected by either circular systematic sampling or simple random sampling without replacement depending in the sampling scheme of NSS-HUS and NSS-CES.

Table 4.4 Selection of hamlet-group and sub-block in various NSS-HUS and NSS-CES since 1993, India

Surveys	Selection of hamlet-group and sub-block
NSS-HUS 1995–96	2 hamlet-group and 1 sub-block by simple random sampling
NSS-HUS 2004	2 hamlet-group/sub-block by simple random sampling without replacement
NSS-HUS 2014	1 hamlet-group/sub-block with maximum proportion of population and from the remaining, 1 hamlet-group/sub-block by simple random sampling
NSS-CES 1993–94	2 hamlet-groups circular systematically and 1 sub-block by simple random sampling
NSS-CES 1999–2000	1 hamlet-group/sub-block having maximum concentration of non-agriculture enterprise and from the remaining, 2 hamlet-group/sub-block selected by circular systematic selection
NSS-CES 2004	2 hamlet-group/sub-block with maximum share of population and from the remaining, 1 hamlet-group/sub-block by simple random sampling
NSS-CES 2011–12	1 hamlet-group/sub-block having maximum proportion of population and from the remaining, 1 hamlet-group/sub-block by simple random sampling

Calculation of multipliers: In NSS survey design there is a concept of interpenetrating sub-samples. In every round, two independent samples are drawn as per the sampling strategy from rural and urban areas. The samples within a sub-sample are drawn independently and separate estimates can be obtained from each of the sub-samples. These sub-sample wise estimates are combined together to arrive at the final estimates. The final multiplier values are computed in a manner so that simple aggregation can generate the estimates. The multiplier values are calculated as per the sampling design of NSSO surveys and are posted in the unit level data. These are used to generate the estimates at national and state levels taking into account the sampling design of NSSO surveys.

4.4.4 Concepts and definitions

The various concepts and definitions of the terms used in this thesis are discussed here.

Older population: All those aged 60 years or more were categorized as older population. This is in accordance to the official definition for older persons used by the Indian government and United Nations definition for an older person in the developing world, as adopted at the World Assembly on Aging convened in Vienna in 1982.[219, 239]

Ailment – illness or injury: Ailment, i.e. illness or injury, meant any deviation from the state of physical and mental well-being. Whether a person suffered an ailment during a particular period was judged by some deviation from physical or mental well-being as felt by the person during the period. For ascertaining whether an individual had suffered from any ailment during the reference period a set of probing questions were put to the respondent. The identification of ailments in NSS-HUS is necessarily subjective as it depends on the feeling or perception of the person concerned. In NSS-HUS 1995–96 information on nature of ailment was available in 58 categories and in NSS-HUS 2004 it was available in 42 categories. A more detailed and updated code list for ailments was adopted in the most recent NSS-HUS as per the requirements of the Ministry of Health and Family Welfare (61 categories). Childbirths were given a dummy ailment code in NSS-HUS 2014 so that the details of treatment and expenditure of childbirth could be recorded. In addition, more emphasis was laid on identification of chronic ailments and information was collected in such a way as to enable separate estimation of the incidence of chronic ailments. The global burden of disease 2013 classification was used to categorize the ailments into non-communicable diseases and injuries (NCDs) and communicable diseases and nutritional disorders (CDs) for this study.[240] The diseases included in the two broad categories are listed in Appendix E-1.

Spell of ailment: A continuous period of sickness owing to a specific ailment was treated as a spell of ailment. A spell was generally identified with a specific cause of ailment. If a person was reported to have suffered from two or more causes of ailment during the reference period, it was recorded as two different cases of ailment. Morbidity rate was defined as the number of spells of ailment reported in the 15 days reference period per 1000 of the population exposed to the risk. This is in accordance with the definition recommended by the Expert Committee on Health Statistics of the WHO. The spells of ailment of deceased persons were included in the numerator and the deceased persons were included in the total population as denominator.

Disability: A person with restrictions or lack of abilities to perform an activity in the manner or within the range considered normal for a human being was treated as having disability. It excluded illness/injury of recent origin (morbidity) resulting into temporary loss of ability to see, hear, speak or move.

Hospitalization: Admission for treatment of ailment and discharge thereof from the hospital was considered as a case of hospitalization irrespective of the duration of stay in the hospital. Hospital here refers to any medical institution having provision for admission of sick as inpatients for treatment and covered public hospitals, community health centres and primary health centres (if provided with beds), Employees' state insurance hospitals, private hospitals, nursing homes, etc. In this study, annual hospitalization rate was defined as the number of episodes of hospitalization at any time during the 1 year reference period per 1000 of the population exposed to the risk. This is in accordance with the definition recommended by the Expert Committee on Health Statistics of the World Health Organization. Hospitalization for childbirth was excluded from the calculation of hospitalization rates in NSS-HUS 2014 to produce estimates comparable with earlier NSS-HUS. The hospitalization episodes of deceased persons were included in the numerator and the deceased person was included in the total population as denominator.

Medical treatment: In NSS-HUS 1995–96 and NSS-HUS 2004, a person was considered to have received medical treatment only if he/she had consulted a doctor anywhere and obtained medical advice on his/her ailment. Self-medication or acting on the advice of a non-medical person like friends, relatives and pharmacist, etc., was not considered medical treatment and ailments for which only such medication was taken were considered as untreated ailments. However, in the NSS-HUS 2014, all such treatment was considered as medical treatment. But for each ailment treated, it was ascertained whether the treatment was taken on medical advice or not. Using this information, a variable for medical treatment with definition similar to the earlier NSS-HUS was constructed for comparison in this thesis.

Outpatient care: Treatment of ailment on medical advice in the 15 days reference period but not as an inpatient of hospital was classified as outpatient care. Outpatient care rate was defined as the number of spells of ailment treated on medical advice but not as an inpatient of the hospital in the 15 days reference period per 1000 of the population exposed to the risk. This is in accordance with the definition recommended by the Expert Committee on Health Statistics of the WHO. The hospitalization episodes of deceased persons were included in the numerator and the

deceased person was included in the total population as denominator. In NSS-HUS 2004 it was not possible to distinguish cases of outpatient care from inpatient care in the total treated spells of ailment in last 15 days. Hence this survey was not used for the analyses of inequity in outpatient care.

Number of days within the reference period: confined to bed: A day of confinement to bed referred to a day on which the ailing person was required or compelled to mostly stay in bed at his/her residence/home on account of the ailment. The number of days in a hospital within the reference period was also counted as being confined to bed. Only the confinement to bed which occurred because of the ailment was considered here. For a person normally confined to bed even when not suffering from the ailment was not considered as confined to bed.

Number of days within the reference period: ill: This is the number of days of illness suffered due to the particular spell of ailment during the reference period. Days with illness meant the duration for which the member felt sick.

Presence of any pre-existing disease condition: If the spell of ailment reported in 15 days reference period had started more than 15 days ago, and was continuing on the date of survey, it was defined as a pre-existing disease condition.

State of economic independence: An aged person was considered economically dependent on others if he/she is required to take financial help from others in order to lead his/her day-to-day normal life.

Physical mobility status: All those aged persons who were a) unable to go to the lavatory/latrine on their own, b) able to go to the lavatory/latrine and also able to move within the house but unable to move outside the house, and c) those able to move outside the house but only in wheelchairs were defined as physically immobile.

Monthly per capita consumption expenditure: The level of living is highly related with the general health of the household members as well as to the extent of medical care received by them. Thus, as the background information, the distribution of households and population by income level is necessary for a correlative study on

morbidity and healthcare. As it is difficult to collect income data, the NSSO collects consumption data in its surveys. Since MPCE was a supplementary classificatory variable for correlative study of the main theme of the NSS-HUS, data was collected on broad heads of consumption expenditure. This procedure is known to underestimate the level of MPCE in comparison to the detailed schedule but provides a reasonable proxy for relative ranking of the households according to level of living. In contrast to this, in NSS-CES a detailed listing of consumption items was used because the household consumption expenditure was the main theme. In this thesis, the proxy for economic status used was MPCE adjusted to household size and household composition to account for the differentials in demographic structure of households. The equivalence scale used was $e_h = (A_h + 0.5K_h)^{0.75}$, where A_h was the number of adults in household, and K_h was the number of children 0–14 years old. Parameters were set on the basis of estimates summarized by Deaton.[241] The adult equivalent MPCE was divided into quintiles for this study. In addition to this, the state-specific adult equivalent mean MPCE was used as a cut-off to categorize households into poor and non-poor.

Out-of-pocket payments for healthcare: In NSS-HUS, the OOP payments for healthcare was defined as the direct payments for healthcare made by the household after deducting any payments that were later reimbursed. In NSS-CES data was collected on direct expenditure for any health service, whether or not the household paid for the service. The expenditure data thus collected was considered an approximation of OOP payments, since most private payments for healthcare in India are made out-of-pocket.

Classification of states: The states in India were grouped as less and more developed state. The less developed state includes the 18 states that has weak public health indicators and weak health infrastructure, namely 8 empowered action group states (Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Uttaranchal, Odisha and Rajasthan, 8 north-eastern states (Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim, Tripura), Himachal Pradesh and Jammu and Kashmir. These states have been identified by the government of India for special focus while implementing health programmes.[23] State wise analysis was done for the 19 large states of India with population more than 10 million in 2011 census accounting for 97% of India's total population because the sample sizes for

small states and union territories may not be adequate for getting sufficiently reliable estimates- at least for measuring the change or interstate comparison. To aid the comparability over time Bihar, Madhya Pradesh, Uttar Pradesh, and Andhra Pradesh were considered as undivided states for all NSSO surveys.

Equity: This thesis assessed the horizontal inequity in healthcare utilization and both horizontal and vertical inequity in OOP payments for healthcare. Horizontal equity in healthcare utilization was defined as the equal treatment for equal medical need, irrespective of consumption expenditure. To measure inequity, inequality in utilization of healthcare was standardized for differences in need. After standardization, any residual inequality in utilization by consumption quintiles was interpreted as horizontal inequity. Deviations in the degree to which healthcare was used according to need were measured by horizontal inequity index (HI). Horizontal equity in OOP payments for healthcare was defined as the similar OOP payments by households of equal ability to pay measured in terms of MPCE quintiles. Vertical equity in OOP payments for healthcare was defined as dissimilar OOP payments by households with unequal ability to pay measured by MPCE quintiles.

4.5 Advantages and disadvantages of the secondary data analyses

The work presented in the thesis is based on the analyses of serial cross-sectional nationwide surveys conducted in India since 1993. The use of already available secondary data was preferred because the aim was to look at the trends in socioeconomic inequality in two domains namely, healthcare utilization and expenditure at the national and sub-national level over two decades. The use of data from the most recent NSSO surveys would provide the updated evidence on utilization pattern and expenditure incurred. The comparison of these estimates with earlier NSSO surveys would give useful insights into the change in estimates overtime. The other benefits of using secondary data was the saved time and cost of data collection, and also in having a larger sample and more information than that can be collected through primary survey given the limited timeframe of PhD.

Use of secondary data of is not free from limitations. One of the limitations of using of secondary data is that the aim of the researcher may not comply with the aim of the survey so the researcher has to be flexible in how to address the research questions with the available information. For example, NSSO survey does not

collect data on the supply side of healthcare provision which limits our approach to understand the full array of determinants of healthcare use. Moreover, the questions to assess the general health of individual was only asked to older population, therefore this variable could not be used for assessing the need for healthcare for the comparative analyses of the older and younger population. Quantitative data collected by NSSO ignores the social context within which the behaviour took place and lacks qualitative data on individuals' perspective to a particular phenomenon. Qualitative analysis is important to interpret the findings and gain insights into the contextual factors guiding the behaviour. This calls for primary survey to collect qualitative data to support the quantitative data and gain theoretical insights into the problem. Future work by researchers (including myself) should consider complementing secondary data analyses with some qualitative data for more comprehensive understanding of a problem.

4.6 The Andersen's model for healthcare utilization

The behavioural model developed by Andersen and others has been the most widely used framework of health services utilization. The behavioural model which has extensively been revised identifies that both individual and contextual determinants are important to understand healthcare use.[242] Contextual characteristics are measured at some aggregate rather than individual level and include health organization, provider-related factors, and community characteristics. The major component of contextual characteristics is divided in the same way as individual characteristics have traditionally been divided – those that predispose, enable, or suggest need for individual use of health services. This study used only the individual level determinants of healthcare utilization not examining the full array of determinants of healthcare use as suggested by the behavioural model of healthcare utilization (Figure 4.1). The NSSO survey does not collect data on health policy and healthcare delivery system so these variables could not be used in the analyses of healthcare utilization in this study. Although, data on supply side factors was available from other secondary sources, we could not include them in this study because of the unavailability of comparable data at different survey points.
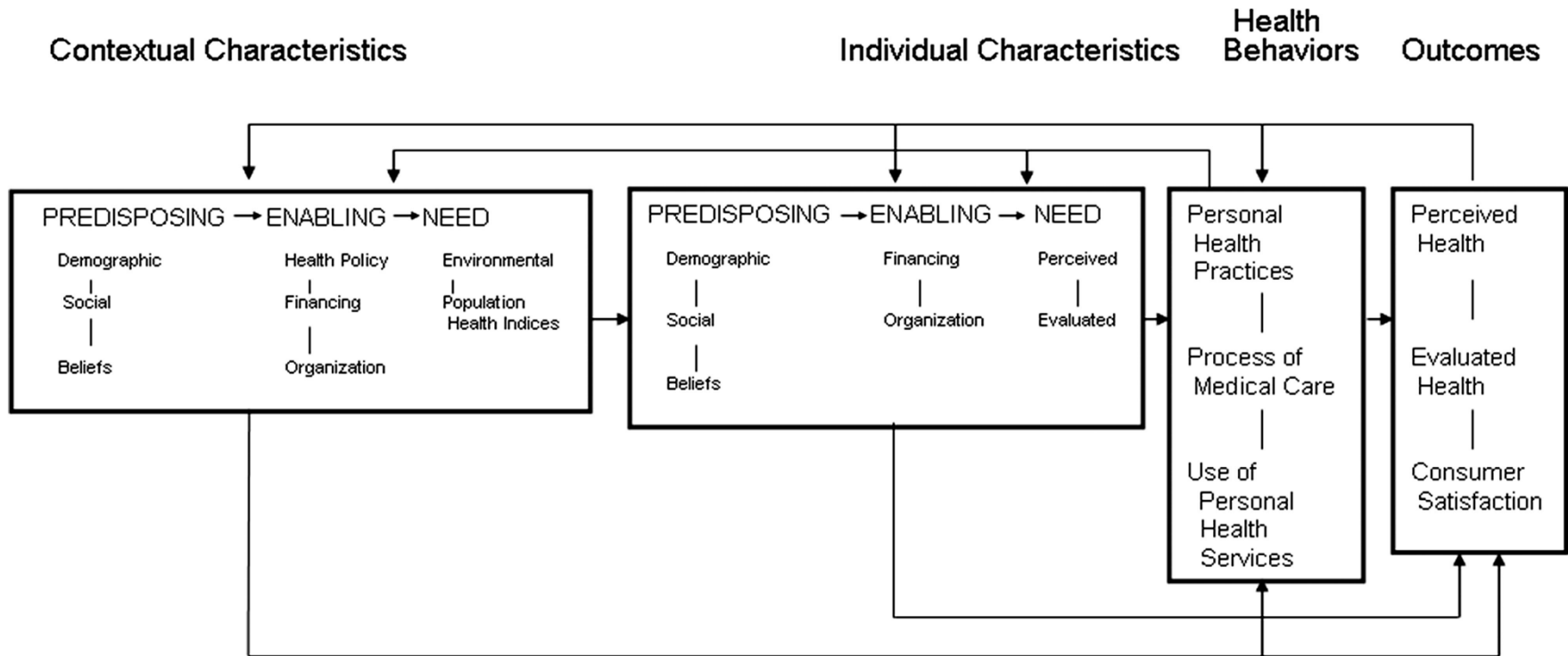
Figure 4.1 Healthcare utilization model (Andersen 2008)

RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED __FOR EACH__ RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Anamika Pandey
Supervisor(s)	Ms Lynda Clarke, Professor Lalit Dandona and Professor George B. Ploubidis
Thesis Title	Socioeconomic inequality in healthcare utilization and expenditure in the older population of India

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	BMJ Open		
When was the work published?	In press		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion	N/A		
Have you retained the copyright for the work?*	Yes	Was the work subject to academic peer review?	Yes

*If yes, please attach evidence of retention. If no, or if the work is being included in its published format, please attach evidence of permission from the copyright holder (publisher or other author) to include this work.

SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	
Please list the paper's authors in the intended authorship order:	
Stage of publication	

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	Please refer the attached Section D after this cover sheet

Student Signature: _Anamika_____ **Date:** ___08/08/2017_____

Supervisor Signature: _____ **Date:** ___08/08/2017_____

Supervisor Signature: _Lalit Dandona_____ **Date:** ___08/08/2017_____

Supervisor Signature: _George B. Ploubidis_____ **Date:** _____

Evidence of copyright retention

BMJ open publication rights policy:
http://www.bmj.com/about-bmj/resources-authors/forms-policies-and-checklists/copyright-open-access-and-permission-reuse.

Permissions for authors

Thus authors may use their own articles for the following non-commercial purposes without asking our permission (and subject only to acknowledging first publication in *The BMJ* and giving a full reference or web link, as appropriate).

- Posting a pdf of their own article on their own personal or institutional website, for which no charge for access is made.

- Making a reasonable number of copies for personal or non-commercial professional use. This includes the contributor's own teaching purposes.

- Republishing part or all of the article in a book or other publication edited by the author (except for multiple contributions in the same book or publication, for which permission needs to be sought.

- Using individual figures or tables or extracts of text (up to 250 words) in other publications published by a third party.

- Using the article in a course pack or compilation (whether paper or electronic) in the authors' institution. This does not apply if a commercial charge is made for the compilation or training programme.

Section D – Student's role in multi-authored work

This paper is authored by Ms Anamika Pandey, Professor George B. Ploubidis, Ms Lynda Clarke and Professor Lalit Dandona. I am the first and the corresponding author. Ms Lynda Clarke from London School of Hygiene and Tropical Medicine, Professor Lalit Dandona from Public Health Foundation of India, and Professor George B. Ploubidis from Institute of Education, University College London are the supervisors for my PhD under the PHFI-UKC Wellcome Trust Capacity Building Programme.

I conceptualized this study and developed the study design under the guidance of my supervisors. I acquired the datasets in ASCII formats from the Ministry of Statistics and Programme Implementation and extracted the relevant data in STATA format for analyses. I conducted the analyses, interpreted the statistical output and the findings in consultation with my supervisors. I wrote the first draft of the research paper and then took input from my supervisors on the manuscript. After receiving substantial inputs, both, in terms of paper writing and data analyses, I further worked on data analyses and revised the paper. I finalized the paper for submission to the journal with guidance and approval from my supervisors. I submitted the paper to the journal, handled journal communications related to the paper, and responded to reviewer queries under the guidance of my supervisors. The paper is currently in press. As the first and corresponding author of the paper, I am responsible and accountable for the accuracy and integrity of all the aspects presented in the paper.

Chapter 5. Hospitalization trends in India from serial cross-sectional nationwide surveys: 1995 to 2014

5.1 Abstract

Objectives

We report hospitalization trends for different age groups across the states of India and for various disease groups, compare the hospitalization trends among the older (60 years or more) and the younger (under 60 years) population, and quantify the factors that contribute to the change in hospitalization rates of the older population over two decades.

Design

Serial cross-sectional study.

Setting

Nationally representative sample, India.

Data sources

3 consecutive National Sample Surveys (NSS) on healthcare utilization in 1995–96, 2004, and 2014.

Participants

633,405 individuals in NSS 1995–96, 385,055 in NSS 2004, and 335,499 in NSS 2014.

Methods

Descriptive statistics, multivariate analyses, and a regression decomposition technique were used to attain the study objectives.

Result

The annual hospitalization rate per 1000 increased from 16.6 to 37.0 in India from 1995–96 to 2014. The hospitalization rate was about half in the less developed than the more developed states in 2014 (26.1 vs 48.6 per 1000). Poor people used more public than private hospitals; this differential was higher in the more developed (40.7% vs 22.9%) than the less developed (54.3% vs 40.1%) states in 2014. When compared to the younger population, the older population had a 3.6 times higher hospitalization rate (109.9 vs

30.7) and a greater proportion of hospitalization for non-communicable diseases (80.5% vs 56.7%) in 2014. Amongst the older population, hospitalization rates were comparatively lower for females, poor, and rural residents. Propensity change contributed to 86.5% of the increase in hospitalization among the older population and compositional change contributed 9.3%.

Conclusion

The older population in India has a much higher hospitalization rate and has continuing greater socioeconomic differentials in hospitalization rates. Specific policy focus on the requirements of the older population for hospital care in India is needed in light of the anticipated increase in their proportion in the population.

Keywords

Aging, decomposition, hospitalization, non-communicable diseases, older population, propensity

Stregths and limitations of this study

- The use of large scale data from nationwide surveys in India over two decades provides the most updated trends for hospitalization.
- The evidence on the changing hospitalization rate by age groups and the reasons behind the increased hospitalization of the older population is timely for policy formulation given the population aging and shifting disease burden.
- It was not possible for us to study the contribution of the supply side factors in the increased hospitalization.
- Self-reported data and the nature of cross-sectional data may lead to recall and reporting biases, which may have affected the accuracy of the results.

5.2 Introduction

The improvement in life expectancy in India has not been matched by the improvements in levels of health of the population.[227, 243] The older population in India suffer from the higher burden of disease at older ages, particularly chronic diseases and disabilities.[87, 205-212] The aging population in India will continue to be one of the major determinants of the change in disease burden over the next two decades.[207] Higher disease burden rates at older ages result in greater demand for healthcare, particularly hospitalization.[86, 244-246] Hospital care is an important aspect of any health system, especially regarding the treatment of the more vulnerable older segment of the population.[95, 247]

Monitoring change in hospitalization rates is important to highlight the necessity for health policies to allocate resources and services to respond to the diverse healthcare needs of different segments of the population. Studies in India have analyzed hospitalization, but they are restricted in their approach and lack comprehensive assessment of rate over time.[59, 60, 88, 93, 95, 248] The purpose of this study was to analyze hospitalization trends from nationally representative data between 1995 and 2014 for different age groups across the less and more developed states of India, and for various disease groups. In addition to this, we aimed to compare the hospitalization trends of the older population with the population under 60 years, and quantify the propensity and compositional change that may contribute to the change in hospitalization rates of the older population.

5.3 Methods

5.3.1 Ethics statement

The study is based on secondary data from the National Sample Surveys with no identifiable information on the survey participants. Exemption from ethics approval for analysis of the National Sample Surveys data was obtained from the institutional ethics committees of the Public Health Foundation of India and the London School of Hygiene and Tropical Medicine.

5.3.2 Data sources and participants

We used individual level data from National Sample Survey (NSS) on healthcare utilization conducted in all Indian states in 1995–96, 2004, and 2014.[196, 199, 234] These surveys record the utilization of healthcare for both inpatient and outpatient care, with

hospitalization episodes in 365 days reference period recorded in detail. In addition, information of certain aspects of the condition of the older population was also collected. Individual level data was collected for a nationally representative sample of 633,405 in NSS 1995–96, 385,055 in NSS 2004, and 335,499 in NSS 2014. The sample of the older population in these surveys was: 35,274 in NSS 1995–96, 35,567 in NSS 2004, and 28,397 in NSS 2014. Samples with missing values for the independent variables were dropped, meaning that we did a complete case analysis. The proportion of missing cases on any independent variable across the three surveys was less than 4% of the total sample (Appendix E-1). Though there was variation in sample size; the sample design was uniform across the three surveys. This permits the construction of comparable variables which could be used to make statistical inferences about change in parameter estimates.

Initial analyses of trends and differentials in hospitalization rates were performed on all persons surveyed including deceased members. However, for the subsequent descriptive, multivariate, and decomposition analyses performed on the older population, the deceased was excluded because the questions on several important background variables were only asked to the older persons who were alive on the date of survey. The sample of deceased older population is reported in Appendix E-1.

5.3.3 Measures

Our outcome variable was hospitalization rate defined as the number of episodes of hospitalization in 365 days reference period per 1000 of the population exposed to the risk. The cause of hospitalization was categorised into non-communicable diseases and injuries (NCDs), and communicable diseases and nutritional disorders (CDs) using the Global Burden of Disease 2013 classification.[227] The diseases included in the two broad categories are listed in Appendix E-2.

We used monthly per capita consumption expenditure (MPCE) adjusted to the household size and composition as a proxy for economic status. The equivalence scale used was $e_h = (A_h + 0.5 K_h)^{0.75}$, where A_h was the number of adults in the household, and K_h was the number of children 0–14 years. Parameters were set on the basis of estimates summarised by Deaton.[241] The state-specific adult equivalent mean MPCE was used as a cut-off to categorise households into poor and non-poor.

We present analyses at the state level for the 35 states and union territories in India by classifying them into two groups –less developed and more developed states. The less developed states include the 18 states namely, eight empowered action group states (Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Uttaranchal, Odisha and Rajasthan), 8 north-eastern states (Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim and Tripura), Himachal Pradesh, and Jammu and Kashmir.[23] State-specific rates were estimated for the 19 major states of India, with a population over 10 million in 2011 census, accounting for 97% of India's population. For comparison Bihar, Madhya Pradesh, Uttar Pradesh, and Andhra Pradesh were considered as undivided states at all survey points.

The Andersen's model of healthcare utilization was used to study the association of individuals' predisposing, enabling, and need variables with hospitalization.[242] Based on the availability of data age, sex, marital status, caste, and education were identified as predisposing variables; place of residence, states, economic independence, economic status, and living arrangement as enabling factors; and physical mobility status, current self-rated health (SRH), and SRH compared to previous year as the need variables, which are likely to affect hospitalization in the older population. These variables were dichotomized for all analyses.

5.3.4 Statistical methods

Descriptive analyses were used to examine the change in hospitalization rate for all diseases, NCDs, and CDs at both aggregate and subgroup levels for all ages, and the change in the composition of the older population in India between 1995 and 2014. A logit model was used to evaluate the effect of covariates on the probability of hospitalization in the older population. The model employed was of the form:

$$Ln[P_i/(1- P_i)]= \sum \beta_i X_i \qquad (5.1)$$

where $Ln[P_i/(1- P_i)]$ was the log odds of hospitalization, X_i was a vector of explanatory variables, and β_i was a vector of regression coefficients. The model was checked for multicollinearity. Fit of the model was assessed using the p-value of the F-adjusted mean residual goodness-of-fit statistic. A p-value below 0.05 was not considered a good fit.

A regression decomposition technique was used to decompose the change in hospitalization rate into its constituent parts.[249-251] A multivariate logit model was estimated for each period. For example, the equation for the period 1995–96 was

$$Ln[P_i/(1-P_i)]_{(1995-96)} = \beta_0 + \beta_i\,X_{i(1995-96)} + \cdots\cdots\cdots + \beta_n\,X_{n(1995-96)}$$
$$i = 1,2,3,4 \cdots\cdots\cdots n \qquad (5.2)$$

while, the equation for the period 2014 was

$$Ln[P_i/(1-P_i)]_{(2014)} = \beta_0 + \beta_i\,X_{i(2014)} + \cdots\cdots\cdots + \beta_n\,X_{n(2014)}$$
$$i = 1,2,3,4 \cdots\cdots\cdots n \qquad (5.3)$$

The difference $Ln[P_i/(1-P_i)]_{(2014)} - Ln[P_i/(1-P_i)]_{(1995-96)}$ was decomposed using equation (5.4), which considered 1995–96 as the base period.

$$Logit_{(2014)} - Logit_{(1995-96)} = [(\beta_{0(2014)} - \beta_{0(1995-96)}) + \sum P_{ij(1995-96)}\,(\beta_{ij(2014)} - \beta_{ij(1995-96)})] +$$
$$\sum \beta_{ij(1995-96)}\,(P_{ij(2014)} - P_{ij(1995-96)}) + \cdots\cdots\cdots + \sum(\beta_{ij(2014)} - \beta_{ij(1995-96)})\,(P_{ij(2014)} - P_{ij(1995-96)})$$
$$(5.4)$$

Where,

$P_{ij(2014)}$ = Proportion of jth category of the ith covariate in NSS 2014

$P_{ij(1995-96)}$ = Proportion of jth category of the ith covariate in NSS 1995–96

$\beta_{ij(2014)}$ = Coefficient for the jth category of the ith covariate in NSS 2014

$\beta_{ij(1995-96)}$ = Coefficient for the jth category of the ith covariate in NSS 1995–96

$\beta_{0(2014)}$ = Regression constant in NSS 2014

$\beta_{0(1995-96)}$ = Regression constant in NSS 1995–96

This procedure yields three components: 1) propensity defined as the change brought by variation in the impact of determinants; 2) composition defined as the change due to variation in the proportion of determinants, and 3) interaction which reflects the change as a result of the interplay between compositional and propensity change.[252] We used p-values for the Wald test to assess the difference between the coefficients from the two logit models. The estimates were generated using survey sampling weights, and the

survey design features including the cluster design effect were taken into account to calculate the 95% confidence intervals (95% CI).

5.4 Results

5.4.1 Hospitalization trends and differentials

The annual hospitalization rate per 1000 increased 2.23 times between 1995 and 2014; the increase was higher for NCDs than CDs (3.61 vs 2.25 times) (Table 5.1). The contribution of NCDs to total hospitalization increased from 38.6% in 1995–96 to 62.2% in 2014. The hospitalization rate increased with age, and was highest for the population aged 70 years or more. The hospitalization rate increased 2.21 times for older population, and 2.01 times for population under 60 years between 1995 and 2014. When compared to younger population, the older population had more than three times higher hospitalization rates, and a greater proportion of hospitalizations for NCDs.

Males and females under 60 years had similar hospitalization rates, while the older males had 64% higher hospitalization rate than the older females in 1995–96 (Figure 5.1). The gender gap reduced for the older population by 2014 because of the higher increase in hospitalization rate for the females compared to the males (2.71 vs 1.89 times). As compared to poor, amongst older population, the non-poor had 62% higher hospitalization rate, while amongst population under 60 years, the non-poor had 36% higher hospitalization rate in 2014. In 1995–96, the urban residents aged 60 years or more had 71% higher hospitalization rate than the rural residents, which declined to 34% higher in 2014. As compared to the less developed states, the hospitalization rate in the more developed states was 2.82 times higher for the older population and 2.07 times higher for those under 60 years; however, the differential become similar by 2014.

The more developed states had 2.21 times and 1.86 times higher hospitalization rate than the less developed states in 1995–96 and 2014, respectively (Table 5.2). Between 1995 and 2014, the increase in hospitalization rate was higher in the less developed compared to the more developed states, more so for the older population for all diseases (3.12 vs 1.89 times), NCDs (4.50 vs 2.63 times), and CDs (2.59 vs 1.66 times). The hospitalization rate for older population by disease groups in the major states of India is shown for 1995-96, 2004 and 2014 in Appendix E-3.

Table 5.1 Hospitalization rate per 1000 (95% CI) by age and disease groups in NSS 1995–96, NSS 2004 and NSS 2014, India

	Hospitalization rates per 1000 (95% CI)			Estimated hospitalized cases (in millions)
	NCDs	CDs	All diseases	(%)
Age (years)	NSS 1995–96			
0-4	2.2 (1.8-2.6)	7.8 (7.0-8.6)	14.1 (12.9-15.3)	1.4 (9.7)
5-14	2.0 (1.8-2.3)	3.0 (2.7-3.3)	6.8 (6.3-7.2)	1.4 (10.3)
15-29	3.6 (3.3-3.9)	6.0 (5.5-6.4)	13.9 (13.2-14.7)	3.1 (22.0)
30-44	6.8 (6.3-7.3)	6.0 (5.5-6.5)	17.8 (17.0-18.6)	2.9 (20.5)
45-59	14.1 (12.9-15.2)	6.4 (5.7-7.2)	28.0 (26.4-29.5)	2.9 (20.5)
60-69	24.4 (22.0-26.8)	8.6 (7.2-10.0)	42.2 (39.2-45.2)	1.2 (8.9)
70 or more	35.7 (31.1-40.3)	11.1 (8.5-13.7)	61.8 (55.9-67.7)	1.1 (8.1)
Under 60 years	5.0 (4.8-5.2)	5.5 (5.2-5.7)	14.6 (14.2-15.0)	11.6 (83.0)
60 years or more	28.7 (26.4-31.0)	9.5 (8.2-10.8)	49.7 (46.8-52.7)	2.4 (17.0)
All ages	6.4 (6.1-6.6)	5.7 (5.5-5.9)	16.6 (16.2-17.0)	14.0 (1.7)
	NSS 2004			
0-4	4.4 (3.8-4.9)	15.0 (13.8-16.1)	23.9 (22.5-25.4)	2.6 (9.5)
5-14	4.0 (3.6-0.5)	5.6 (5.2-6.1)	11.8 (11.1-12.5)	2.7 (9.9)
15-29	10.3 (9.7-10.9)	5.9 (5.5-6.4)	21.4 (20.5-22.2)	5.4 (19.9)
30-44	15.8 (15.0-16.6)	7.5 (6.8-8.2)	29.7 (28.5-30.9)	5.7 (21.0)
45-59	30.1 (28.6-31.6)	10.5 (9.6-11.3)	47.8 (45.9-49.6)	5.6 (20.5)
60-69	45.2 (42.1-48.2)	12.2 (10.7-13.8)	65.7 (62.1-69.3)	2.9 (10.6)
70 or more	70.0 (65.0-74.9)	13.7 (11.7-15.6)	95.9 (90.3-101.6)	2.3 (8.5)
Under 60 years	11.7 (11.4-12.1)	7.9 (7.6-8.2)	24.5 (24.0-24.9)	21.9 (80.8)
60 years or more	54.0 (51.3-56.6)	12.7 (11.5-14.0)	76.4 (73.3-79.5)	5.2 (19.2)
All ages	14.7 (14.4-15.1)	8.3 (8.0-8.6)	28.2 (27.7-28.7)	27.2 (2.8)
	NSS 2014			
0-4	8.3 (7.3-9.3)	25.0 (23.3-26.7)	34.2 (32.3-36.2)	3.4 (8.2)
5-14	6.6 (5.8-7.3)	7.6 (7.0-8.1)	14.4 (13.5-15.4)	3.3 (7.8)
15-29	11.6 (10.8-12.4)	12.2 (11.5-12.9)	24.6 (23.5-25.7)	7.5 (17.9)
30-44	22.1 (20.9-23.3)	11.1 (10.2-12.1)	34.6 (33.0-36.1)	8.4 (20.2)
45-59	41.7 (39.7-43.7)	13.1 (11.8-14.3)	56.5 (54.2-58.9)	9.2 (22.2)
60-69	72.8 (68.0-77.7)	17.1 (15.0-19.3)	92.2 (86.8-97.5)	5.3 (12.7)
70 or more	116.2 (107.4-124.9)	20.8 (18.2-23.4)	141.2 (131.9-150.5)	4.6 (11.0)
Under 60 years	17.4 (16.9-17.9)	12.3 (11.9-12.7)	30.7 (30.0-31.4)	31.8 (76.4)
60 years or more	88.5 (84.1-92.9)	18.4 (16.8-20.1)	109.9 (105.1-114.7)	9.8 (23.6)
All ages	23.1 (22.5-23.7)	12.8 (12.4-13.2)	37.0 (36.3-37.7)	41.6 (3.7)

CI, confidence intervals; NSS, national sample survey.
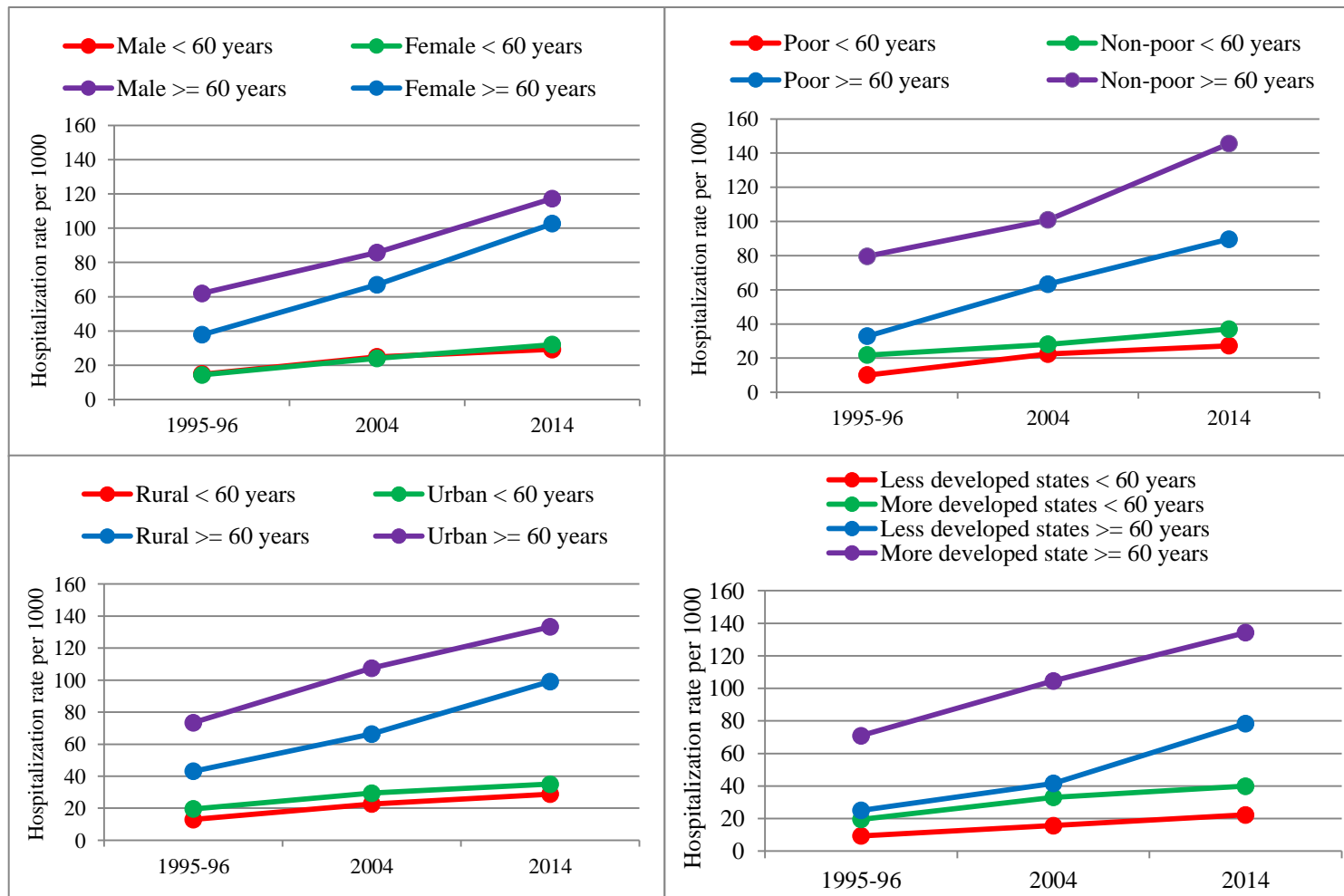
Figure 5.1 Socioeconomic and demographic differentials in hospitalization rates in NSS 1995–96, NSS 2004 and NSS 2014, India

Table 5.2 Hospitalization rates per 100 (95% CI) by disease groups in less and more developed states in NSS 1995–96, NSS 2004 and NSS 2014, India

States	Hospitalization rates per 1000 (95% CI)								
	60 years or more								
	NSS 1995–96			NSS 2004			NSS 2014		
	All hospitalization	NCDs	CDs	All hospitalization	NCDs	CDs	All hospitalization	NCDs	CDs
Less developed	25.1 (22.3-27.9)	13.6 (12.1-15.1)	5.8 (4.0-7.6)	41.6 (38.4-44.9)	28.6 (25.8-31.4)	7.3 (6.2-8.4)	78.4 (71.3-85.5)	61.2 (54.6-67.8)	15.0 (12.7-17.2)
More developed	70.9 (66.1-75.8)	41.7 (37.7-45.8)	12.7 (10.8-14.6)	104.6 (99.8-109.4)	74.6 (70.4-78.7)	17.1 (15.1-19.1)	134.3 (128.0-140.7)	109.7 (103.9-115.5)	21.1 (18.8-23.5)
India	49.7 (46.8-52.6)	28.7 (26.5-31.0)	9.5 (8.2-10.8)	76.4 (73.4-79.4)	54 (51.4-56.5)	12.7 (11.5-13.9)	109.9 (105.2-114.5)	88.5 (84.2-92.8)	18.4 (16.8-20.1)
	Under 60 years								
Less developed	9.4 (8.9-9.8)	2.9 (2.7-3.1)	3.7 (3.4-4.0)	15.7 (15.2-16.1)	7.3 (7.0-7.6)	5.2 (4.9-5.4)	22.3 (21.5-23.1)	11.8 (11.2-12.4)	9.9 (9.4-10.4)
More developed	19.5 (18.9-20.1)	7.0 (6.6-7.3)	7.1 (6.7-7.4)	33.1 (32.3-34.0)	16.1 (15.5-16.7)	10.5 (10.0-11.1)	39.9 (38.8-40.9)	23.5 (22.6-24.4)	15.0 (14.3-15.6)
India	14.6 (14.2-15.0)	5.0 (4.8-5.2)	5.5 (5.2-5.7)	24.5 (24.0-24.9)	11.7 (11.4-12.1)	7.9 (7.6-8.2)	30.7 (30.0-31.4)	17.4 (16.9-17.9)	12.3 (11.9-12.7)
	All ages								
Less developed	10.2 (9.8-10.6)	3.5 (3.3-3.7)	3.8 (3.6-4.1)	17.5 (17.0-18.0)	8.7 (8.4-9.0)	5.4 (5.1-5.6)	26.1 (25.2-27.0)	15.2 (14.4-15.9)	10.2 (9.7-10.7)
More developed	22.5 (21.9-23.1)	9.0 (8.6-9.4)	7.4 (7.0-7.7)	38.7 (37.8-39.6)	20.6 (20.0-21.3)	11.1 (10.6-11.6)	48.6 (47.5-49.8)	31.5 (30.5-32.4)	15.6 (14.9-16.2)
India	16.6 (16.2-17.0)	6.4 (6.1-6.6)	5.7 (5.5-5.9)	28.2 (27.7-28.7)	14.7 (14.4-15.1)	8.3 (8.0-8.6)	37.0 (36.3-37.7)	23.1 (22.5-23.7)	12.8 (12.4-13.2)

CI, confidence intervals; NSS, national sample survey.

Between 1995 and 2014, the hospitalization in public hospitals declined from 44.9% to 38.4% (Table 5.3). The use of public hospitals was higher in the less developed than the more developed states in 2014 (47.6% vs 33.2%). Poor were hospitalized more in public hospitals; this differential was higher in the more developed (40.7% vs 22.9%) compared to the less developed states (54.3% vs 40.1%) in 2014. In less developed states, the decline in the use of public hospitals was higher for the non-poor than the poor (-25.3% vs -16.7%), while in the more developed states, both non-poor and poor showed a similar decline. The hospitalization in public hospitals for the older population in the major states of India for 1995–96, 2004 and 2014 is presented in Appendix E-4.

All subgroups of the older population showed a significant increase in hospitalization rates, but there was considerable variation in the amount of change (Table 5.4). Between 1995 and 2014, the increase in hospitalization rate was higher for females (2.82 vs 1.87 times), single (3.04 vs 1.89 times), poor (2.72 vs 1.87 times), illiterate (2.45 vs 1.77 times), rural residents (2.32 vs 1.88 times), and those living in the less developed states (3.07 vs 1.95 times) compared to their respective counterparts. This reduced the differential in hospitalization rate by gender, marital status, economic status, place of residence, and states.

5.4.2 Compositional change

Most of the older population lived in rural areas, but their proportion decreased by 9.3 percentage points (78.1 % to 68.8%) between 1995 and 2014 (Table 5.5). There was 5.2 percentage points (58.3% in 1995-96 to 63.4% in 2014) increase in the proportion of currently married older population. Literacy in the older population increased by 13.0 percentage points by 2014. In 1995–96, most of the older population were physically mobile (89.5%), less than 70 years of age (62.5%), resident of the more developed states (53.7%), economically dependent (68.9%), and reported good SRH (80.8%), with only marginal change in their proportions. The majority of the older population were non-SC/STs (76.4%), poor (64.2%), living with family (95.6%), and reporting better or nearly same SRH compared to past year (74.3%) in 1995-96 and their proportion remained unchanged in 2014.

Table 5.3 Hospitalization rates per 1000 (95% CI) in public hospitals by economic status in the less and more developed states in NSS 1995–96, NSS 2004 and NSS 2014, India

States	Hospitalization rates per 1000 (95% CI) in public hospitals								
	60 years or more								
	NSS 1995–96			NSS 2004			NSS 2014		
	Non-poor	Poor	Total	Non-poor	Poor	Total	Non-poor	Poor	Total
Less developed	53.3	64.8	57.1	38.7	59.5	48.9	36.0	55.0	45.2
	(45.6-60.8)	(56.0-72.7)	(51.3-62.6)	(33.6-44.2)	(54.9-63.9)	(45.0-52.9)	(30.4-41.9)	(48.9-60.9)	(40.9-49.6)
More developed	27.2	52.4	38.5	28.1	42.6	36.1	20.7	41.1	31.6
	(23.6-31.1)	(46.9-57.8)	(35.0-42.1)	(25.0-31.3)	(39.4-45.8)	(33.9-38.4)	(18.0-23.6)	(38.2-44.1)	(29.5-33.8)
India	34.1	54.6	42.7	30.9	46.3	39.2	25.8	45.2	35.9
	(30.4-37.9)	(49.9-59.2)	(39.7-45.8)	(28.3-33.6)	(43.6-49.1)	(37.3-41.2)	(23.2-28.4)	(42.5-47.9)	(33.9-37.8)
	Under 60 years								
Less developed	53.8	65.3	58.0	43.5	51.7	47.8	41.3	54.2	48.2
	(51.1-56.4)	(60.6-69.7)	(55.6-60.4)	(41.4-45.6)	(49.6-53.8)	(46.3-49.3)	(38.7-43.9)	(51.7-56.7)	(46.4-50.0)
More developed	30.0	51.9	40.0	28.1	44.1	38.0	23.7	40.6	33.7
	(28.3-31.9)	(49.6-54.2)	(38.5-41.5)	(26.4-29.9)	(42.4-45.8)	(36.7-39.2)	(21.8-25.6)	(38.9-42.3)	(32.4-35.1)
India	37.9	55.3	45.4	33.8	46.2	41.1	30.9	45.4	39.2
	(36.3-39.4)	(53.2-57.4)	(44.1-46.7)	(32.4-35.1)	(44.9-47.6)	(40.1-42.1)	(29.4-32.5)	(44.0-46.9)	(38.2-40.3)
	All ages								
Less developed	53.7	65.2	57.9	42.5	52.5	47.7	40.1	54.3	47.6
	(51.2-56.2)	(61.0-69.2)	(55.7-60.0)	(40.5-44.5)	(50.6-54.5)	(46.3-49.1)	(37.7-42.6)	(52.0-56.6)	(45.9-49.3)
More developed	29.5	52.0	39.7	28.0	43.7	37.5	22.9	40.7	33.2
	(27.9-31.1)	(49.8-54.1)	(38.3-41.1)	(26.5-29.6)	(42.3-45.3)	(36.4-38.6)	(21.3-24.5)	(57.8-60.7)	(32.1-34.3)
India	37.2	55.2	44.9	33.1	46.2	40.6	29.6	45.4	38.4
	(35.8-38.7)	(53.3-57.1)	(43.7-46.1)	(31.9-34.3)	(44.9-47.4)	(39.8-41.5)	(28.3-31.0)	(44.1-46.6)	(37.5-39.4)

CI, confidence intervals; NSS, national sample survey.

Table 5.4 Hospitalization rate per 1000 (95% CI) for the older population by background characteristics in NSS 1995-96, NSS 2004 and NSS 2014, India

Background characteristics	Hospitalization rates per 1000 (95% CI)		
Predisposing variables	NSS 1995–96	NSS 2004	NSS 2014
Age (years)			
60–69	37.6 (34.8-40.5)	62.2 (58.8-65.6)	82.6 (77.6-87.6)
70 or more	53.1 (47.8-58.4)	90.6 (85.3-96.0)	124.4 (116.4-132.4)
Sex			
Male	53.9 (49.3-58.4)	80.3 (76.3-84.2)	101.0 (95.5-106.6)
Female	33.3 (30.4-36.1)	63.7 (59.5-67.9)	94.0 (87.5-100.5)
Marital status			
Currently married	50.8 (46.8-54.9)	75.6 (72.0-79.1)	95.9 (91.2-100.7)
Single	32.9 (29.8-36.0)	66.8 (61.9-71.6)	100.1 (91.8-108.4)
Caste			
Non-SC/STs	46.7 (43.5-50.0)	78.8 (75.3-82.2)	105.2 (100.0-110.4)
SC/STs	32.9 (28.4-37.3)	50.7 (45.8-55.5)	71.8 (65.8-77.9)
Education			
Literate	65.9 (60.7-71.1)	106.3 (100.6-112.0)	116.7 (110.2-123.2)
Illiterate	34.0 (30.9-37.2)	54.2 (50.9-57.5)	83.2 (77.5-88.8)
Enabling variables			
Place of residence			
Urban	63.1 (58.7-67.4)	99.5 (92.8-106.3)	118.6 (111.2-126.0)
Rural	37.9 (34.7-41.1)	63.2 (60.0-66.3)	87.8 (82.6-93.1)
States			
More developed	62.1 (57.8-66.5)	98.4 (93.8-103.0)	121.0 (114.9-127.1)
Less developed	21.8 (19.0-24.5)	39.5 (36.4-42.6)	67.0 (61.2-72.9)
Economic dependency			
Economically independent	35.8 (30.9-40.8)	63.2 (58.9-67.5)	89.2 (80.2-98.2)
Economically dependent	47.2 (44.0-50.4)	77.9 (74.1-81.7)	100.7 (96.0-105.5)
Economic status			
Non-poor	68.6 (62.6-74.6)	94.9 (89.2-100.6)	128.2 (119.1-137.4)
Poor	29.4 (26.9-31.9)	59.8 (56.5-63.0)	80.1 (75.8-84.3)
Living arrangement			
With family	44.2 (41.4-47.0)	74.1 (71.1-77.1)	95.3 (91.4-99.3)
Alone	31.1 (22.2-40.0)	54.0 (41.1-67.0)	146.2 (99.3-193.2)
Need variables			
Physical mobility status			
Mobile	38.0 (35.4-40.7)	62.5 (59.8-65.3)	84.3 (80.3-88.3)
Immobile	91.3 (78.8-103.7)	193.9 (175.0-212.8)	249.4 (222.3-276.5)
Current self-rated health (SRH)			
Good	31.2 (28.9-33.4)	54.3 (51.5-57.1)	67.8 (63.8-71.7)
Poor	96.9 (86.4-107.4)	138.3 (129.5-147.1)	200.2 (186.8-213.7)
SRH compared to previous year			
Better or same	31.9 (29.4-34.5)	57.4 (54.6-60.1)	70.1 (66.0-74.3)
Worse	78.3 (70.7-85.9)	138.9 (128.9-148.9)	179.5 (167.8-191.2)
Total	43.4 (40.8-46.1)	72.0 (69.1-74.8)	97.5 (93.2-101.7)

CI, confidence intervals; NSS, national sample survey; SC/STs, scheduled castes/scheduled tribes are officially designated disadvantaged groups in India.

Table 5.5 Background characteristics of the older population in NSS 1995–96, NSS 2004 and NSS 2014, India

Background characteristics	NSS 1995–96		NSS 2004		NSS 2014	
Predisposing variables	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Age (years)						
60-69	21,124	62.5 (61.6-63.4)	22,546	65.3 (64.6-66.0)	17,160	64.5 (63.2-65.8)
70 or more	12,866	37.5 (36.6-38.4)	12,264	34.7 (34.0-35.4)	10,085	35.5 (34.2-36.8)
Sex						
Male	17,173	49.4 (48.5-50.4)	17,750	50.0 (49.3-50.8)	13,692	49.2 (47.8-50.6)
Female	16,817	50.6 (49.6-51.5)	17,081	50.0 (49.2-50.7)	13,553	50.8 (49.4-52.2)
Marital status						
Currently married	20,111	58.3 (57.3-59.2)	20,959	59.2 (58.5-60.0)	17,947	63.4 (62.1-64.7)
Single	13,852	41.7 (40.8-42.7)	13,872	40.8 (40.0-41.5)	9,298	36.6 (35.3-37.9)
Caste						
Non-SC/STs	26,089	76.4 (75.6-77.2)	26,291	76.0 (75.3-76.6)	20,823	76.8 (75.6-77.9)
SC/STs	7,880	23.6 (22.8-24.4)	8,531	24.0 (23.4-24.7)	6,422	23.2 (22.1-24.4)
Education						
Literate	12,406	29.5 (28.7-30.4)	13,514	34.2 (33.5-34.9)	13,362	42.6 (41.2-43.9)
Illiterate	21,543	70.5 (69.6-71.3)	21,301	65.8 (65.1-66.5)	13,883	57.4 (56.1-58.8)
Enabling variables						
Place of residence						
Urban	13,035	21.9 (21.3-22.5)	12,566	24.3 (23.7-24.9)	12,226	31.2 (30.0-32.4)
Rural	20,955	78.1 (77.5-78.7)	22,265	75.7 (75.1-76.3)	15,019	68.8 (67.6-70.0)
States						
More developed	17,389	53.7 (52.8-54.7)	17,019	55.2 (54.4-55.9)	14,466	56.3 (54.9-57.6)
Less developed	16,601	46.3 (45.3-47.2)	17,812	44.8 (44.1-45.6)	12,779	43.7 (42.4-45.1)
Economic dependency						
Economically independent	10,149	31.1 (30.2-32.0)	11,800	34.0 (33.3-34.7)	7,159	28.3 (27.0-29.6)
Economically dependent	23,061	68.9 (68.0-69.8)	22,429	66.0 (65.3-66.7)	20,075	71.7 (70.4-73.0)

(continues…)

(...continued)

Background characteristics	NSS 1995–96		NSS 2004		NSS 2014	
Predisposing variables	N	% (95% CI)	N	% (95% CI)	N	% (95% CI)
Economic status						
Non-poor	15,407	35.8 (35.0-36.7)	14,372	34.8 (34.1-35.5)	11,738	36.1 (34.8-37.4)
Poor	18,583	64.2 (63.3-65.0)	20,459	65.2 (64.5-65.9)	15,507	63.9 (62.6-65.2)
Living arrangement						
With Family	32,482	95.6 (95.2-96.0)	32,595	94.8 (94.4-95.1)	26,659	95.9 (95.3-96.5)
Alone	1,174	4.4 (4.0-4.8)	1,509	5.2 (4.9-5.6)	586	4.1 (3.5-4.7)
Need variables						
Physical mobility status						
Mobile	29,697	89.5 (88.9-90.1)	30,821	91.9 (91.5-92.3)	24,499	92.0 (91.3-92.7)
Immobile	3,635	10.5 (9.9-11.1)	3,224	8.1 (7.7-8.5)	2,735	8.0 (7.3-8.7)
Current self-rated health (SRH)						
Good	27,263	80.8 (79.9-81.5)	24,965	76.4 (75.7-77.0)	20,143	77.6 (76.4-78.7)
Poor	6,217	19.2 (18.5-20.1)	8,216	23.6 (23.0-24.3)	7,091	22.4 (21.3-23.6)
SRH compared to previous year						
Better or same	25,018	74.3 (73.4-75.1)	25,971	79.3 (78.7-79.9)	19,590	75.0 (73.8-76.2)
Worse	8,430	25.7 (24.9-26.6)	7,210	20.7 (20.1-21.3)	7,644	25.0 (23.8-26.2)
N	33,990		34,831		27,245	

CI, confidence intervals; NSS, national sample survey; SC/ST, scheduled castes/scheduled tribes are officially designated disadvantaged groups in India.

5.4.3 Determinants of hospitalization

Older population reporting poor SRH (AOR 2.42 95% CI 1.91-3.07) and living alone (AOR 2.13 95% CI 1.44-3.16) had the highest odds of hospitalization in 1995–96 and 2014, respectively (Table 5.6). Poor older population were 59% (95% CI 0.35-0.48) and 37% (95% CI 0.55-0.72) less likely to be hospitalized in 1995–96 and 2014, respectively. The economically dependent older population was 32% (95% CI 1.08-1.62) more likely to be hospitalized in 1995–96. Older population living in the less developed states had lower odds of hospitalization in 1995–96 (AOR 0.34 95% CI 0.29-0.40) and 2014 (AOR 0.54 95% CI 0.47-0.61). In 1995–96, female and single older population were 30% (95% CI 0.60-0.83) and 34% (95% CI 0.57-0.77) less likely to be hospitalized, respectively. The older population belonging to SC/STs had lower odds of hospitalization (AOR 0.81, 95% CI 0.70-0.94) compared to non-SC/STs in 2014. In 2014, physically immobile and those reporting SRH worse than previous year had 85% (95% CI 1.15-2.27) and 67% (95% CI 1.44-1.94) higher odds of being hospitalized, respectively. After adjusting for the covariates, age and place of residence were not significantly associated with hospitalization.

Between 1995 and 2014, there was a modest increase in intercept for the outcome variable suggesting that when all the explanatory variables in the logit model were set equal to their reference categories, the probability of hospitalization was significantly higher in 2014 than in 1995–96 for the older population. Comparison of 1995–96 and 2014 coefficients showed the convergence of differentials in hospitalization by gender, marital status, economic status, living arrangement, and states (Table 5.6).

5.4.4 Decomposition of increase in hospitalization rate

For the older population in India, the propensity change explained 86.6% of the increase in hospitalization rate between 1995 and 2014 (Table 5.7). The improved propensity to use hospital care by economically poor, residents of the less developed states, females, and singles contributed 16.4%, 12.3%, 9.0%, and 7.1% of the increase in hospitalization rate, respectively, regardless of the change in their composition. The change in intercept accounted for 13.5% of the increase in hospitalization rate. Change in the composition of the characteristics of older population had a modest influence on the level of hospitalization; contributing 9.2% of the increase in hospitalization. Many of the changes in the population structure during the inter-survey period favoured increased hospitalization, except gender and physical mobility status. The increase in the proportion

Table 5.6 Determinants of hospitalization for the older population in 1995–96 and 2014, India

Background characteristics	$\beta_{1995-96}$	Exp ($\beta_{1995-96}$)	95% CI for Exp ($\beta_{1995-96}$)	β_{2014}	Exp (β_{2014})	95% CI for Exp (β_{2014})	$\beta_{2014} - \beta_{1995-96}$	p-Value for Wald test ($\beta_{2014} - \beta_{1995-96}$)
				Whether hospitalized				
Predisposing variables								
Age (years) (ref.=60–69)								
70 or more	-0.028	0.97	[0.83 - 1.14]	0.124	1.13	[0.99 - 1.29]	0.152	0.147
Sex (ref.=male)								
Female	-0.352	0.70	[0.60 - 0.83]	-0.050	0.95	[0.83 - 1.10]	0.302	0.006
Marital Status (ref.=currently married)								
Single	-0.416	0.66	[0.57 - 0.77]	-0.130	0.88	[0.76 - 1.02]	0.286	0.009
Caste (ref.=non-SC/STs)								
SC/STs	0.017	1.02	[0.84 - 1.23]	-0.211	0.81	[0.70 - 0.94]	-0.229	0.060
Literacy status (ref.= literate)								
Illiterate	-0.278	0.76	[0.63 - 0.91]	-0.224	0.80	[0.70 - 0.92]	0.055	0.645
Enabling variables								
Place of residence (ref.= urban)								
Rural	-0.112	0.89	[0.76 - 1.04]	-0.032	0.97	[0.85 - 1.11]	0.080	0.446
States (ref.= more developed)								
Less developed	-1.070	0.34	[0.29 - 0.40]	-0.619	0.54	[0.47 - 0.61]	0.451	<0.001
Economic dependence (ref.= independent)								
Economically dependent	0.281	1.32	[1.08 - 1.62]	0.004	1.00	[0.85 - 1.18]	-0.277	0.035
Economic status (ref.=non-poor)								
Poor	-0.895	0.41	[0.35 - 0.48]	-0.462	0.63	[0.55 - 0.72]	0.432	<0.001

(...continued)

Background characteristics	$\beta_{1995-96}$	Exp ($\beta_{1995-96}$)	95% CI for Exp ($\beta_{1995-96}$)	β_{2014}	Exp (β_{2014})	95% CI for Exp (β_{2014})	$\beta_{2014} - \beta_{1995-96}$	p-Value for Wald test ($\beta_{2014} - \beta_{1995-96}$)
				Whether hospitalized				
Living arrangement (ref.= living with family)								
Living alone	0.197	1.22	[0.85 - 1.74]	0.757	2.13	[1.44 - 3.16]	0.560	0.039
Need variables								
Physical mobility status (ref.= mobile)								
Immobile	0.400	1.49	[1.21 - 1.84]	0.617	1.85	[1.51 - 2.27]	0.217	0.149
Current self-rated health (ref.= good SRH)								
Poor SRH	0.884	2.42	[1.91 - 3.07]	0.736	2.09	[1.78 - 2.44]	-0.149	0.306
SRH compared to last year (ref.= better or nearly the same)								
Worse SRH	0.475	1.61	[1.31 - 1.98]	0.515	1.67	[1.44 - 1.94]	0.039	0.763
Constant	-2.466	0.08	[0.07 - 0.10]	-2.238	0.11	[0.09 - 0.12]	0.228	0.037
F-adjusted test statistic	1.61			0.81				
p-Value	0.106			0.611				
N	32,780			27,234				

CI, confidence intervals; SC/STs, scheduled castes/scheduled tribes are officially designated disadvantaged groups in India.

Table 5.7 Decomposition of increase in hospitalization for the older population between NSS 1995–96 and NSS 2014, India

Background characteristics	Contribution to the increase in hospitalization (%)*		
	Propensity	Composition	Interaction
70 years or more	0.06 (3.4)	0.00 (0.0)	0.00 (-0.2)
Female	0.15 (9.0)	0.00 (-0.1)	0.00 (0.0)
Single	0.12 (7.1)	0.02 (1.3)	-0.01 (-0.9)
SC/STs	-0.05 (-3.2)	0.00 (0.0)	0.00 (0.0)
Illiterate	0.04 (2.3)	0.04 (2.1)	-0.01 (-0.4)
Rural	0.06 (3.7)	0.01 (0.6)	-0.01 (-0.4)
Less developed states	0.21 (12.3)	0.03 (1.6)	-0.01 (-0.7)
Economically dependent	-0.19 (-11.3)	0.01 (0.5)	-0.01 (-0.5)
Economically poor	0.28 (16.4)	0.00 (0.1)	0.00 (-0.1)
Living alone	0.02 (1.4)	0.00 (0.0)	0.00 (-0.1)
Physically immobile	0.02 (1.3)	-0.01 (-0.6)	-0.01 (-0.3)
Poor SRH	-0.03 (-1.7)	0.03 (1.7)	0.00 (-0.3)
Worse SRH than previous year	0.01 (0.6)	0.00 (-0.2)	0.00 (0.0)
Intercept	0.23 (13.5)		
% contribution to the overall increase	86.6	9.2	4.2

*Percent contribution has been calculated as the ratio of the contribution of the covariate and the sum of the absolute contribution of covariates under the propensity, composition and interaction components multiplied by 100; SC/STs, scheduled caste/scheduled tribe are officially designated disadvantaged groups in India; SRH, self-rated health.

of literates, those reporting poor SRH, economically dependent, and single contributed 2.1%, 1.7%, 1.6%, and 1.3% of the increase in hospitalization rate, respectively between 1995 and 2014, regardless of the change in the likelihood of hospitalization by the subgroups.

5.5 Discussion

This report provides evidence on trends in hospitalization rates in India over two decades up to 2014, and compares the older population with population under 60 years. Five key findings relating to hospitalization trends and differentials emerge from this study. First, the hospitalization rate increased two-fold between 1995 and 2014; the increase was higher for NCDs and in less developed states. Second, poor people used more public hospitals; this differential was higher in the more developed than the less developed states. Third, the older population had higher hospitalization rates and greater proportion of hospitalization for NCDs than the population under 60 years. Fourth, amongst the older population, the hospitalization rate was comparatively lower for females, poor, and rural residents. Fifth, propensity change was largely responsible for the increase in hospitalization among the older population in India over these two decades.

Hospitalization is an important indicator of the demand for curative care and is an integral part of any health system. The increase in hospitalization rate found in our study could be due to the growing awareness about the health prevention and other precautionary measures along with proper diagnosis of the health conditions. The evidence on increasing hospitalization is vital for planning of resources to meet the growing demand for inpatient care and for formulating viable publicly funded financial risk protection mechanism. To provide targeted financial protective intervention it would also be useful to know whether the increase in hospitalization was due to higher hospitalizations for preventive care among the rich or emergency inpatient care among the poor. Data from the global burden of disease study suggests that of the total disease burden, measured as disability-adjusted life years lost in India, the contribution of noncommunicable disease and injuries has increased from 38.4% in 1990 to 64.2% in 2013.[204] The higher increase in hospitalization for NCDs over two decades is consistent with the shifting disease burden trends in India.

The developed states in India with good health indicators are usually found to report higher use of healthcare.[60, 87] Higher hospitalization rate in the more developed states of India may indicate a higher volume of health services provided by health sector, rather than reflect higher morbidity prevalence. Interestingly, we found that the increase in hospitalization rate between 1995 and 2014 was more pronounced in the less developed than the more developed states. A plausible reason for this could be the increased burden of chronic, degenerative, and lifestyle diseases in the less developed states because of their advancement through the health transition process. Other factors contributing to this could be the greater availability of health services, better access to healthcare, or the increased propensity to use healthcare.

The increase in the use of private hospitals over two decades in India is a matter of concern from the equity point of view and has cost implications for the poor. The continuing inadequacies of the public health system and the unrestricted growth of private providers are possible reasons for the decline in the use of public hospitals. The decline in the use of public hospitals was found to be higher for the non-poor in the less developed states, which implies that in spite of decline, the poor in the less developed states still largely use public hospitals. The increasing provision of inpatient care in private hospitals and the consequent decline in the utilization of public hospitals is likely to impose a higher financial risk on individuals and households.[154, 217] Strengthening the public

funding model of service delivery in India would increase the ability of public facilities to meet the increasing demand for healthcare and thereby improve the utilization of inpatient care by the poor.

Our results indicated clear distinction in levels and differentials in hospitalization rate between older population and population under 60 years. The older population had more than three times higher hospitalization than any other age groups. Contributing 8.6% to India's population, older population accounted for nearly one-fourth of all hospital stays in 2014. The improved longevity coupled by the increased years of poor health at older ages is predominantly responsible for the difference between the hospitalization rates of the two age groups. Data from the global burden of disease study suggest that in India in 1990, disease burden among the older population accounted for 11.8% of the total disease burden. In 2013, this burden had increased to 22.3% of the total disease burden, and noncommunicable diseases and injuries made up 82.3% of the total disease burden.[204] Our results showed that the contribution of the older population in total hospitalization increased over two decades, and they had higher hospitalization rates for NCDs in any given year. However, the hospitalizations in absolute number and their contribution in total hospitalizations remain higher for the population under 60 years. Evidence suggests that over the past 25 years the burden of premature death and health loss from NCDs such as heart disease, stroke, chronic obstructive pulmonary disease, and road traffic injuries has increased substantially, while the burden due to lower respiratory infections, tuberculosis, diarrhoea and neonatal disorders remains high in India.[204] For the purpose of planning of the resources for universal health coverage and reducing premature mortality it is important to continue focusing on the child and adult population which account for majority of India's population. At the same time, given the increasing proportion of older population it is equally important to allocate resources and provide healthcare services to cater to their specific healthcare needs.

In the population under 60 years, there was no evidence for gender differential, while, in the older population, a higher proportion of males were hospitalized. Studies from the developed nations have also found that the older women have less hospital stays than their male counterparts.[74-76, 246, 253] Greater economic dependency among females at older ages is a major driver of the gender differential in healthcare use in India.[88] On a positive note, we found that the improved likelihood of using hospital care by female older population contributed to the decline in gender differential among the older population.

In the absence of a health financing system, low level of health insurance coverage and high out of pocket cost of healthcare, economic status becomes an important factor affecting healthcare use. We found that the non-poor had higher hospitalization rates than the poor; this differential was higher for the older population than the other ages. Based on the Andersen's model of healthcare use, we found that the poor older population had significantly less likelihood of using hospital care even after controlling for health profiles. The economic inequality in hospitalization among the older population is evident in India.[95] The older population rely more on family and other social structures for financial support, and therefore, they might not have adequate resources for hospital care. Financial empowerment of the poor older population can be one way of effectively improving the healthcare utilization.

An important finding of this study is that the propensity change has contributed most to the two-fold increase in hospitalization of the older population in India between 1995 and 2014. A plausible explanation could be better awareness of the medical conditions and health among the population.[67] A relatively higher increase in hospitalization among the poor compared to the non-poor older population has contributed most to the increase in hospitalization rate attributed to propensity change. This indicates a decline in the differentials in healthcare use by economic status over two decades. It has been argued that lowering of inequality will not make the situation more equitable for the poor if there is a high increase in the rate of hospitalization, a decline in dependence on government hospitals, and a steep hike in the cost of hospital care.[60]

The increase in hospitalization rate was moderately influenced by the factors not explicitly considered in the model. The supply side factors like the expansion of private healthcare market and consequent improvement in the availability of health services could have propelled the use of healthcare.[60] The expansion of morbidity, with a heavier and cumulated concentration of chronic diseases at older ages, could be another potential driver of the increase in hospitalization.[254, 255] Compositional change contributed marginally to the increase in hospitalization of the older population over the past two decades. It would be interesting to see how the anticipated compositional change influences the future demand for hospitalization.

The findings of this report must be interpreted in the light of some limitations. First, we used individual determinants and did not examine the full array of determinants of healthcare use as suggested by the Andersen's model of healthcare use. Data on the supply side of healthcare provision were not available from the national sample surveys, nor were comparable data available from other secondary sources corresponding to the survey time points. Second, the use of self-reported data on diseases from the national sample surveys may be associated with biases. However, we report hospitalization trends for broad groups of diseases which may be reasonable. Even with these limitations, this study uses large-scale data from the nationwide surveys in India over two decades to provide insights into the changing hospitalization rate by age groups, and the reasons behind the increased hospitalization of the older population. Given the anticipated further increase of the older population and their higher demand for healthcare, it is time for the policy makers to pay particular attention to planning how adequate resources and mechanisms can be put in place for the provision of geriatric healthcare in India.

5.6 Acknowledgement

RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Anamika Pandey
Supervisors	Ms Lynda Clarke, Professor Lalit Dandona and Professor George B. Ploubidis
Thesis Title	Socioeconomic inequality in healthcare utilization and expenditure in the older population of India

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?	Health Policy and Planning		
When was the work published?	2017		
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion	N/A		
Have you retained the copyright for the work?*	Yes	Was the work subject to academic peer review?	Yes

*If yes, please attach evidence of retention. If no, or if the work is being included in its published format, please attach evidence of permission from the copyright holder (publisher or other author) to include this work.

SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	
Please list the paper's authors in the intended authorship order:	

Stage of publication	

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	Please refer the attached Section D after this cover sheet

Student Signature: _Anamika_ _____ **Date:** 08/08/2017 _____

Supervisor Signature: _____ **Date:** 08/08/2017 _____

Supervisor Signature: _Lalit Dandona_ _____ **Date:** 08/08/2017 _____

Supervisor Signature: _George B. Ploubidis_ _____ **Date:** 08/08/2017 _____

Evidence of copyright retention

Oxford journals publication rights policies:
http://www.oxfordjournals.org/en/access-purchase/rights-and-permissions/publication-rights.html.

Rights retained by all Oxford Journal Authors

- The right, after publication by Oxford Journals, to use all or part of the Article and abstract, for their own personal use, including their own classroom teaching purposes;

- The right, after publication by Oxford Journals, to use all or part of the Article and abstract, in the preparation of derivative works, extension of the article into book-length or in other works, provided that a full acknowledgement is made to the original publication in the journal;

- The right to include the article in full or in part in a thesis or dissertation, provided that this not published commercially;

For the uses specified here, please note that there is no need for you to apply for written permission from Oxford University Press in advance. Please go ahead with the use ensuring that a full acknowledgment is made to the original source of the material including the journal name, volume, issue, page numbers, year of publication, title of article and to Oxford University Press and/or the learned society.

Section D – Student's role in multi-authored work

This paper is authored by Ms Anamika Pandey, Professor George B. Ploubidis, Ms Lynda Clarke and Professor Lalit Dandona. I am the first and the corresponding author. Ms Lynda Clarke from London School of Hygiene and Tropical Medicine, Professor Lalit Dandona from Public Health Foundation of India, and Professor George B. Ploubidis from Institute of Education, University College London are the supervisors for my PhD under the PHFI-UKC Wellcome Trust Capacity Building Programme.

I conceptualized this study and developed the study design under the guidance of my supervisors. I acquired the datasets in ASCII formats from the Ministry of Statistics and Programme Implementation and extracted the relevant data in STATA format for analyses. I conducted the analyses, interpreted the statistical output and the findings in consultation with my supervisors. I wrote the first draft of the research paper and then took input from my supervisors on the manuscript. After receiving substantial inputs, both, in terms of paper writing and data analyses, I further worked on data analyses and revised the paper. I finalized the paper for submission to the journal with guidance and approval from my supervisors. I submitted the paper to the journal, handled journal communications related to the paper, and responded to reviewer queries under the guidance of my supervisors. As the first and corresponding author of the paper, I am responsible and accountable for the accuracy and integrity of all the aspects presented in the paper.

Chapter 6. Horizontal inequity in outpatient care use and untreated morbidity: evidence from nationwide surveys in India between 1995 and 2014

6.1 Abstract

Background

Equity in healthcare has been a long-term guiding principle of health policy in India. We estimate the change in horizontal inequities in healthcare use over two decades comparing the older population (60 years or more) with the younger population (under 60 years).

Methods

We used data from the nationwide healthcare surveys conducted in India by the National Sample Survey Organization in 1995–96 and 2014 with sample sizes 633,405 and 335,499, respectively. Bivariate and multivariable logit regression analyses were used to study the socioeconomic differentials in self-reported morbidity, outpatient care and untreated morbidity. Deviations in the degree to which healthcare was distributed according to need were measured by horizontal inequity index (HI).

Findings

In each consumption quintile the older population had four times higher self-reported morbidity and outpatient care rate than the younger population in 2014. In 1995–96, the pro-rich inequity in outpatient care was higher for the older (HI: 0.085; 95% confidence interval: 0.066, 0.103) than the younger population (0.039; 0.034, 0.043), but by 2014 this inequity became similar. Untreated morbidity was concentrated among the poor; more so for the older (-0.320; -0.391, -0.249) than the younger (-0.176; -0.211, -0.141) population in 2014. The use of public facilities increased most in the poorest and poor quintiles; the increase was higher for the older than the younger population in the poorest (1.19 times) and poor (1.71 times) quintiles. The use of public facilities was disproportionately higher for the poor in 2014 than in 1995–96 for the older (-0.189; -0.234, -0.145 vs -0.065; -0.129, -0.001) and the younger (-0.145; -0.175, -0.115 vs -0.056; -0.086, -0.026) population.

Conclusion

The older population has much higher morbidity and is often more disadvantaged in obtaining treatment. Health policy in India should pay special attention to equity in access to healthcare for the older population.

Keywords

Concentration index, horizontal inequity, India, older population, outpatient, healthcare use, untreated morbidity

---

Key messages

- This study used data from nationwide healthcare surveys to provide evidence on the changing inequity in outpatient care and untreated morbidity for the older population compared to the population under 60 years over the last two decades in India.

- The pro-rich inequity in outpatient care was higher for the older population than the younger population in 1995–96, but by 2014 this inequity became similar.

- The inequity in untreated morbidity was disproportionately concentrated among the poor; more so for the older population than the younger population in 2014.

- Pro-poor inequity in the use of public facilities was higher in 2014, more so for the older population than the younger population.

6.2 Introduction

Equity in healthcare utilization has increasingly being acknowledged by both developed and developing countries as an important intermediate step to achieve the goal of equity in health.[97] The decision to seek healthcare is not only guided by need, but is also influenced by the sociodemographic background of individuals that predisposes their use of formal medical care and more so by enabling factors such as capacity to pay.[88, 256] The World Health Organization assesses the performance of health systems according to the evidence on the gap in healthcare between the rich and the poor once the need for healthcare is controlled for – horizontal inequity.[17] The resolutions of World Health Assembly (WHA) from 2005 emphasized that everyone should be able be access healthcare and that access to healthcare should not be subjected to financial hardships.[257] The World Health Report 2010 builds upon the resolutions of WHA and aims to assist countries to develop a system of financing that makes healthcare accessible to all.[15] Given the marked disparity in the access to health services, with the poorest and the most disadvantaged being most affected, India has also recognized equitable access to healthcare for all at an affordable cost as an important goal under the new initiative of universal health coverage.[21] Evidence on horizontal inequity in access to healthcare is thus critical for making healthcare delivery systems more efficient.

This study examined the change in horizontal inequities in outpatient care and untreated morbidity between 1995–96 and 2014 contrasting the older population (aged 60 or more) with the younger population (under 60 years). The evidence on inequities in healthcare will help in developing a rational policy to provide affordable, accessible and cost effective healthcare to the older population in an increasingly pluralistic healthcare system.

6.3 Methods

6.3.1 Data

We used individual level data from two rounds of the National Sample Survey Organization (NSSO): the survey on healthcare of 1995–96 (52nd round), and the survey on social consumption: health of 2014 (71st round). Both surveys were conducted under the stewardship of the Ministry of Statistics and Programme Implementation, Government of India. Details of the sampling design, survey instruments, and initial findings can be found in the national reports.[196, 199] Both the surveys collected information

on treatment status of each spell of ailment reported in a 15-days reference period for a nationally representative sample of 633,405 and 335,499 individuals of all ages (including deceased members) in NSSO 1995–96 and NSSO 2014 surveys, respectively.

6.3.2 Measures

Households were divided into quintiles using monthly per capita consumption expenditure (MPCE) adjusted to household size and composition.[241] The state-specific adult equivalent mean MPCE was used as a cut-off to categorise households into poor and non-poor. The states in India were classified as less and more developed. Eighteen less developed states include eight empowered action group states (Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Uttaranchal, Odisha and Rajasthan), eight north-eastern states (Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim, Tripura), Himachal Pradesh and Jammu and Kashmir.[23]

We examined horizontal inequity (the extent to which people in equal need for healthcare receive equal treatment, irrespective of their income) in outpatient care, untreated morbidity and use of public facilities for outpatient care comparing the older population aged 60 years or more and the population under 60 years at two time points: 1995–96 and 2014. By doing so, we were able to assess both the within and between-group, as well as over-time changes in inequity. All the reported spells of ailment that were treated on medical advice in the 15-days reference period but not as an inpatient of hospital were classified as outpatient care. If no treatment was ever taken on medical advice for the spell of ailment reported in the 15-days reference period, it was considered as an untreated morbidity in both the surveys to facilitate comparative analyses in this study. The rate of outpatient care (untreated morbidity) was defined as the spells of outpatient care (untreated morbidity) per 1000 of the population exposed to the risk. The source of outpatient care was categorized as public and private facilities.

6.3.3 Statistical analysis

Bivariate and multivariable logit regression analyses were used to study the socioeconomic differentials in self-reported morbidity (SRM), outpatient care and untreated morbidity. We used horizontal inequity index (HI) to measure the extent of deviation in the use of healthcare for the people in equal need for healthcare irrespective of their income.[45, 258, 259] For multivariable and inequity analyses we focused on the individuals who reported being sick in the 15-days reference period. We preferred an

indirect method to standardize the use of healthcare for the differences in need because it is computationally straight forward and does not depend on grouped data.[258] We estimated the following probit regression model:

$$y_i = P\left(\alpha + \sum_j \beta_j x_{ji} + \sum_k \gamma_k z_{ki}\right) + \varepsilon_i \qquad (6.1)$$

Where, y_i was an indicator of healthcare use; i were the individuals and α, β_j and γ_k were parameter vectors. The x_j were need variables for which we adjusted for and z_k were non-need variables for which we controlled for to reduce potential bias that would arise if non-need variables correlated to need variables were omitted from the regression. [260, 261] We used age (six dummies), gender, reporting of a pre-existing disease, duration of illness and confinement to bed within the reference period to measure the need for healthcare (Appendix F-1). Non-need variables such as marital status, social group, education, place of residence, states and MPCE were controlled for. Regression parameter estimates $(\hat{\alpha},\hat{\beta}_j,\hat{\gamma}_k)$, individual values of confounding variables (x_{ji}) and sample means of the non-confounding variables $(\bar{z}_k)$ were then used to obtain the predicted values of healthcare use $(\hat{y}_i^x)$:

$$\hat{y}_i^x = \hat{\alpha} + \sum_j \hat{\beta}_j x_{ji} + \sum_k \hat{\gamma}_k z_{ki} \qquad (6.2)$$

Estimates of the indirectly need-standardized use $(\hat{y}_i^{Is})$ was obtained as the difference between actual (y_i) and need-expected use $(\hat{y}_i^x)$ plus the overall sample mean $(\bar{y})$:

$$\hat{y}_i^{Is} = y_i - \hat{y}_i^x + \bar{y} \qquad (6.3)$$

The distribution of $\hat{y}_i^{Is}$ across MPCE quintiles was interpreted as the distribution of healthcare use that would be expected to be observed, irrespective of differences in the distribution of the x's across MPCE quintiles. The concentration curve (CC) which plots the cumulative proportions of population (ranked by MPCE) on the x-axis against the cumulative proportions of healthcare use on y-axis was used to graphically present the inequity. To quantify the magnitude of inequity in healthcare utilization we calculated the concentration index for the need-standardized use $(\hat{y}_i^{Is})$ which was termed as HI.[258] HI was calculated by running the following regression:[262]

$$\frac{2\sigma_R^2}{\overline{y}}\hat{y}_i^{Is} = \alpha + \beta R_i + \varepsilon_i \qquad (6.4)$$

Where $\hat{y}_i^{Is}$ was the need standardized healthcare use, $\overline{y}$ was its mean, R_i was the weighted relative fractional rank of the ith individual in the consumption distribution, ($R_i = \left(^1/_N\right) \sum_{j=1}^{i-1} w_j + \frac{1}{2} w_i$, where w_i was the sampling weight $w_0 = 0$ and N was the sample size), σ_R^2 was the weighted variance of R_i. The ordinary least square estimate of the slope coefficient gave the estimate of HI (range: -2 to +2). A negative (positive) value implied that the need standardized use of healthcare was disproportionately concentrated among the poor (rich), while a value of zero indicated no inequity.[259] We reported 95% confidence intervals (95% CI) for the estimates.

6.4 Results

6.4.1 Trends in SRM, outpatient care and untreated morbidity

The SRM rate per 1000 in the 15-days reference period increased 1.97 times for the older population, the increase was higher in the more developed compared to the less developed states (2.30 vs 1.35 times) (Table 6.1). The older population in more developed states had higher SRM rate than the less developed states; this differential was greater in 2014 than in 1995–96 (2.33 vs 1.37 times). Between 1995–96 and 2014, the outpatient care rate increased 2.18 times for the older population. When compared with the less developed states, the older population in more developed states had higher outpatient care rate and also experienced a greater increase (1.34 vs 2.71 times) by 2014. The untreated morbidity rate per 1000 increased marginally in the less developed states (35.3 vs 38.1) but declined in the more developed states (43.4 vs 35.4). The rate of use of public facilities increased 3.02 times for the older population, the increase was higher in the more developed than the less developed states (3.27 vs 2.47 times). When compared with the younger population, the older population had 3.61 times higher SRM rate in 1995–96 (48.8 vs 176.3 per 1000) and a greater increase by 2014(1.75 vs 1.97 times). The older population had 3.16 times higher outpatient care rate in 1995–96 (131.3 vs 41.5 per 1000) and a greater increase by 2014 than the younger population (2.18 vs 1.61 times). The older population had 6.20 times higher untreated morbidity rate compared with their younger counterparts in 1995–96; however, this differential declined to 2.60 times in 2014. Increase in the use of public facilities for outpatient care was higher for the older population than the younger population (3.02 vs 2.26 times).

Table 6.1 Characteristics of spells of ailment reported in 15-days reference period for the population under 60 years and 60 years or more by less and more developed states in India, NSS 1995–96 and NSS 2014

Characteristics	India		Less developed states		More developed states	
	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014
	Under 60 years					
SRM rate per 1000	48.8 (47.9, 49.8)	85.2 (82.9, 87.4)	46.2 (44.9, 47.6)	56.2 (53.6, 58.7)	51.2 (49.8, 52.7)	116.9 (113.1, 120.7)
Healthcare use						
Hospitalization rate per 1000	0.6 (0.5, 0.7)	4.2 (3.9, 4.4)	0.4 (0.3, 0.5)	2.4 (2.1, 2.6)	0.8 (0.6, 1.0)	6.2 (5.7, 6.6)
Outpatient care rate per 1000	41.5 (40.7, 42.3)	66.9 (65.0, 68.8)	38.6 (37.5, 39.7)	42.0 (39.8, 44.1)	44.3 (43.1, 45.5)	94.2 (90.9, 97.5)
Untreated morbidity rate per 1000	6.5 (6.1, 6.8)	14.1 (13.1, 15.0)	7.0 (6.5, 7.5)	11.8 (10.6, 13.1)	5.9 (5.5, 6.4)	16.5 (15.1, 18.0)
Source of outpatient care						
Outpatient care rate in public facilities per 1000	7.2 (6.8, 7.6)	16.3 (15.3, 17.2)	6.3 (5.9, 6.7)	11.9 (10.7, 13.0)	8.1 (7.4, 8.8)	21.1 (19.5, 22.7)
	60 years or more					
SRM rate per 1000	176.3 (168.1, 184.4)	347.3 (332.1, 362.6)	147.2 (137.2, 157.2)	198.5 (180.4, 216.5)	201.2 (188.8, 213.6)	463.0 (439.8, 486.2)
Healthcare use						
Hospitalization rate per 1000	3.6 (2.6, 4.7)	24.0 (22.2, 25.9)	1.3 (0.8, 1.9)	13.6 (11.1, 16.1)	5.6 (3.6, 7.6)	32.1 (29.5, 34.8)
Outpatient care rate per 1000	131.3 (124.4, 138.2)	286.7 (272.9, 300.6)	109.9 (101.3, 118.5)	146.8 (131.6, 162.0)	149.7 (139.1, 160.2)	395.5 (374.0, 417.0)
Untreated morbidity rate per 1000	40.3 (36.4, 44.1)	36.6 (31.0, 42.1)	35.3 (30.5, 40.1)	38.1 (29.1, 47.1)	44.5 (38.7, 50.4)	35.4 (28.4, 42.3)
Source of outpatient care						
Outpatient care rate -in public facilities per 1000	25.7 (22.7, 28.7)	77.6 (70.2, 84.9)	20.7 (16.9, 24.5)	51.1 (42.5, 59.7)	30.0 (25.6, 34.5)	98.2 (87.1, 109.3)

SRM, self-reported morbidity; NSS, national sample survey.

6.4.2 Self-reported morbidity

A clear economic gradient with richer quintiles reporting higher morbidity was observed for the older population in 2014 and for the younger population in both years. In both the years, SRM rate was higher for the older population in each consumption quintile than the younger population (range: 2.89 to 4.64 times). The increase in SRM rate was highest in the richest quintile; more so for the older population than the population under 60 years (2.80 vs 1.95 times) (Figure 6.1).
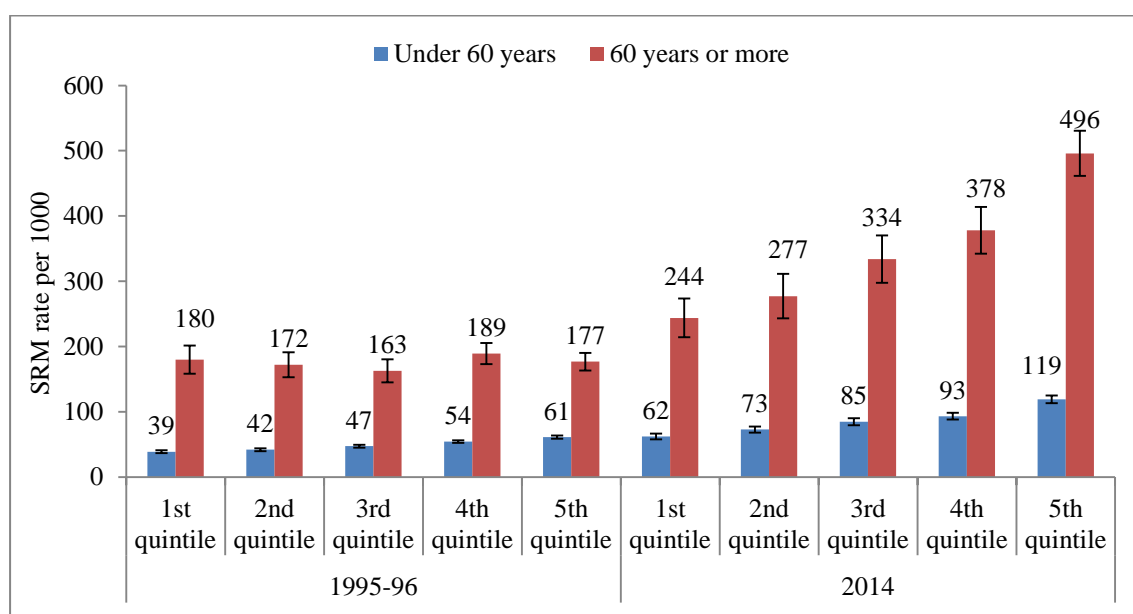
Figure 6.1 Differentials in SRM rate per 1000 in 15 days reference period by MPCE quintiles for the population under 60 years and 60 years or more in India, NSS 1995–96 and NSS 2014

The top four most frequently reported ailments for the older population were non-communicable diseases. Musculoskeletal problem was the most frequently neglected disease for the older population. Among older population, only 2 out of 10 most frequently reported aliments were communicable diseases and 7 out of 10 most frequently neglected ailments were NCDs. Fevers of all types and acute upper respiratory infections were the top two most frequently reported and most frequently neglected ailments for the population under 60 years (Table 6.2).

Table 6.2 Profile of the incidence and neglect of top10 SRM in 15 days reference period for the population under 60 years and 60 years or more in India, NSS 2014

Most frequently reported morbidity	Under 60 years	Most frequently reported morbidity	60 years or more	Most frequently reported morbidity that remained untreated	Under 60 years	Most frequently reported morbidity that remained untreated	60 years or more
All fevers*	22.2	Hypertension	20.9	All fevers*	22.2	Joint or bone disease†	19.0
Acute upper respiratory infections #	9.6	Diabetes	16.5	Acute upper respiratory infections #	18.6	All fevers*	15.6
Diabetes	7.5	Joint or bone disease†	13.6	Headache	7.1	Back or body aches	9.3
Hypertension	6.0	Bronchial asthma‡	6.5	Joint or bone disease†	6.6	Gastric/ peptic ulcer	6.6
Joint or bone disease†	5.9	All fevers*	5.5	Cough with sputum with or without fever not diagnosed as tuberculosis	5.5	Hypertension	6.0
Gastric/ peptic ulcer	5.4	Heart disease	5.5	Gastric/ peptic ulcer	5.3	Acute upper respiratory infections #	5.3
Cough with sputum with or without fever not diagnosed as tuberculosis	3.0	Back or body aches	4.0	Diarrhoea/dysentry	4.7	Diabetes	5.0
Back or body aches	2.9	Gastric/ peptic ulcer	3.8	Back or body aches	4.3	Bronchial asthma‡	4.3
Bronchial asthma‡	2.9	Symptoms not fitting into any categories	2.6	Fever due to diphtheria/whooping cough	2.5	Diarrhoea/dysentry	3.6
Diarrhoea/dysentry	2.7	Acute upper respiratory infections #	2.5	Skin infection and other skin diseases	2.0	Skin infection and other skin diseases	2.9

SRM, self-reported morbidity, *Fever due to malaria, typhoid and fever of unknown origin, all specific fevers that do not have a confirmed diagnosis; # cold, runny nose, sore throat with cough, allergic colds included; †pain or swelling in any joints, or swelling or pus from the bones; ‡recurrent episode of wheezing & breathlessness with or without cough over long periods or known asthma.

6.4.3 Horizontal inequity in outpatient care and untreated morbidity

In each consumption quintile the older population had higher outpatient care rate than the younger population at both time points (range: 2.83 to 4.32 times) (Table 6.3). Between 1995–96 and 2014, outpatient care rates increased most for the richest quintile; this increase was higher for the older population than the younger population (2.73 vs 1.79 times). The CC indicated that for equal need the use of outpatient care was higher for the richer quintiles at both time points irrespective of age groups (Figure 6.2a). The corresponding positive HI values confirmed the pro-rich bias in outpatient care. The older population had higher pro-rich inequity in outpatient care than the younger population in 1995–96 (HI: 0.085; 95% CI: 0.066, 0.103 vs 0.039; 0.034, 0.043). The pro-rich inequity in outpatient care declined for the older population (0.085; 0.066, 0.103 vs 0.027; 0.015, 0.039) but not for the younger population (0.039; 0.034, 0.043 vs 0.030; 0.022, 0.037) which resulted into similar levels of inequity in both age groups by 2014.

The poorest older population had 4.19 times higher untreated morbidity rate than the richest in 1995–96 which declined to 2.78 times in 2014. The gap between the poorest and the richest in untreated morbidity was higher for the older population than the population under 60 years (4.19 vs 2.12 times). The CC showed that the untreated morbidity was disproportionately concentrated among the poor; more so for the older population than the population under 60 years (Figure 6.2b). Even after adjusting for the differences in need, untreated morbidity was reported more by the poor as indicated by the negative value of HI. The magnitude of inequity in untreated morbidity was higher for the older population (-0.320; -0.391, -0.249) than the younger population (-0.176; -0.211, -0.141) in 2014 (Table 6.3).

Between 1995–96 and 2014, the use of public facilities for outpatient care among the older population increased most in the poorest (3.03 times) and the poor quintiles (4.23 times). The younger population showed a similar pattern but of lower magnitude (Table 6.3). The CC for the use of public facilities was above the line of equality which indicated that the use was disproportionately higher among the poor individuals, particularly in the latter time point (Figure 6.2c). The pro-poor inequity in the use of public facilities increased between 1995-96 and 2014 for the older population (-0.065; -0.129, -0.001 vs -0.189; -0.234, -0.145) and the population under 60 years (-0.056; -0.086, -0.026 vs -0.145; -0.175, -0.115).

Table 6.3 Outpatient care, untreated morbidity and the use of public facilities for outpatient care for the population under 60 years and 60 years or more by MPCE quintiles in India, NSS 1995–96 and NSS 2014

	Under 60 years					
MPCE quintiles[#]	Outpatient care rate per 1000*		Untreated morbidity rate per 1000*		Outpatient care rate in public facilities per 1000*	
	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014
Poorest	29.6 (27.7, 31.6)	45.0 (41.1, 48.9)	8.4 (7.4, 9.3)	15.1 (12.8, 17.4)	5.6 (4.9, 6.3)	14.3 (12.3, 16.2)
Poor	33.8 (31.9, 35.8)	54.3 (50.3, 58.2)	7.3 (6.5, 8.2)	15.8 (13.4, 18.1)	6.7 (5.6, 7.7)	16.5 (14.3, 18.7)
Middle	39.8 (37.8, 41.8)	66.5 (61.6, 71.3)	6.9 (6.1, 7.7)	14.3 (12.2, 16.4)	7.0 (6.1, 8.0)	16.6 (14.4, 18.9)
Rich	47.7 (45.7, 49.7)	74.9 (70.1, 79.6)	5.8 (5.0, 6.5)	13.3 (11.2, 15.3)	7.5 (6.8, 8.1)	16.3 (14.1, 18.4)
Richest	56.3 (53.9, 58.6)	100.6 (95.0, 106.1)	3.9 (3.4, 4.5)	11.4 (9.5, 13.4)	9.3 (8.1, 10.5)	18.2 (15.8, 20.5)
HI (95% CI)	0.039 (0.034, 0.043)	0.030 (0.022, 0.037)	-0.240 (-0.268, -0.212)	-0.176 (-0.211, -0.141)	-0.056 (-0.086, -0.026)	-0.145 (-0.175, -0.115)
	60 years or more					
MPCE quintiles[#]	Outpatient care rate per 1000*		Untreated morbidity rate per 1000*		Outpatient care rate in public facilities per 1000*	
	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014
Poorest	115.1 (96.3, 133.9)	176.5 (151.5, 201.6)	60.7 (49.9, 71.6)	56.9 (40.8, 72.9)	26.1 (19.0, 33.1)	78.9 (62.1, 95.6)
Poor	110.3 (94.5, 126.1)	223.7 (192.7, 254.7)	56.7 (46.1, 67.4)	38.4 (24.2, 52.7)	19.2 (14.4, 24.1)	81.3 (61.3, 101.3)
Middle	118.6 (103.7, 133.5)	269.3 (235.6, 302.9)	39.3 (29.9, 48.7)	40.9 (28.3, 53.6)	25.9 (18.6, 33.1)	64.8 (50.2, 79.3)
Rich	156.2 (141.3, 171.2)	323.8 (289.5, 358.1)	27.2 (22.0, 32.4)	25.2 (16.4, 34.0)	30.5 (23.0, 38.0)	88.1 (70.9, 105.3)
Richest	159.0 (146.2, 171.8)	434.7 (401.5, 467.9)	14.5 (10.6, 18.4)	20.5 (12.7, 28.2)	27.1 (20.7, 33.6)	74.8 (61.3, 88.3)
HI (95% CI)	0.085 (0.066, 0.103)	0.027 (0.015, 0.039)	-0.268 (-0.312, -0.223)	-0.320 (-0.391, -0.249)	-0.065 (-0.129, -0.001)	-0.189 (-0.234, -0.145)

*Reference period is 15-days prior to the date of survey; [#] Monthly per capita consumption expenditure quintiles; NSS, national sample survey, CI, confidence interval.
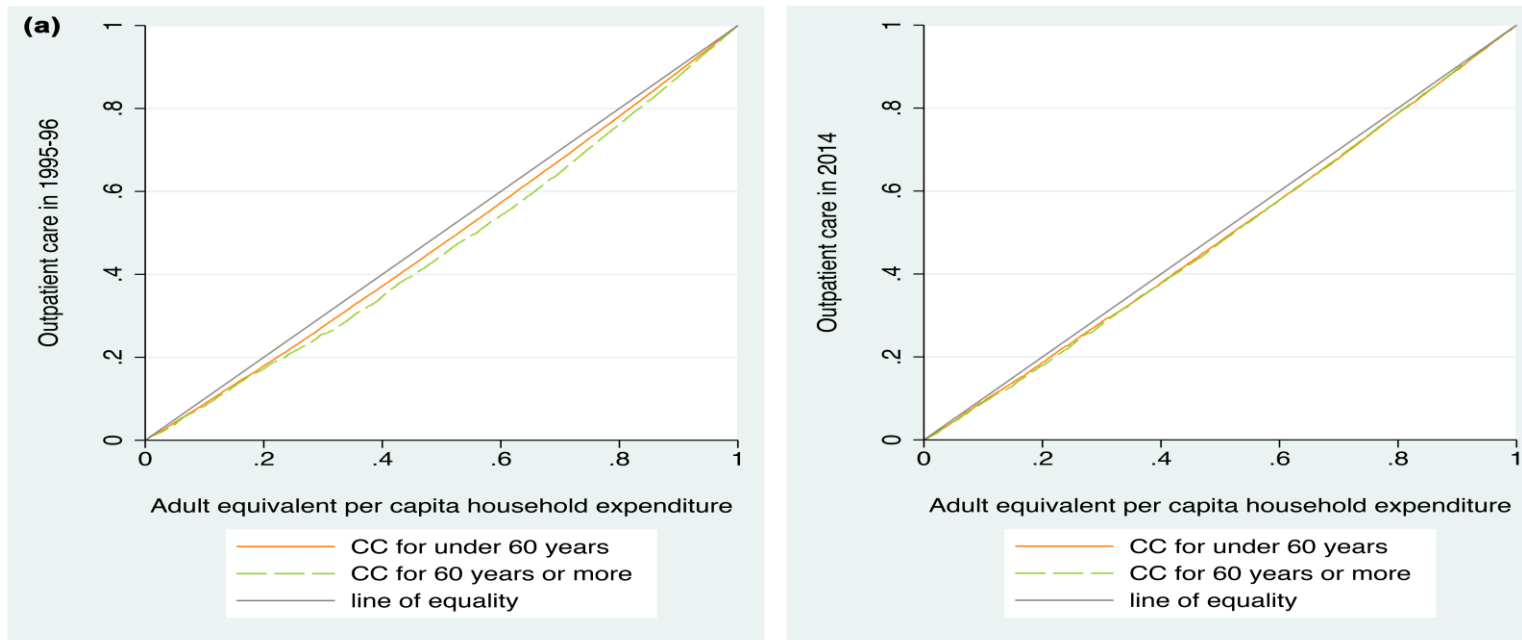
Figure 6.2(a) Concentration curves for the use of outpatient care for the population under 60 years and 60 years or more in India, NSS 1995–96 and NSS 2014
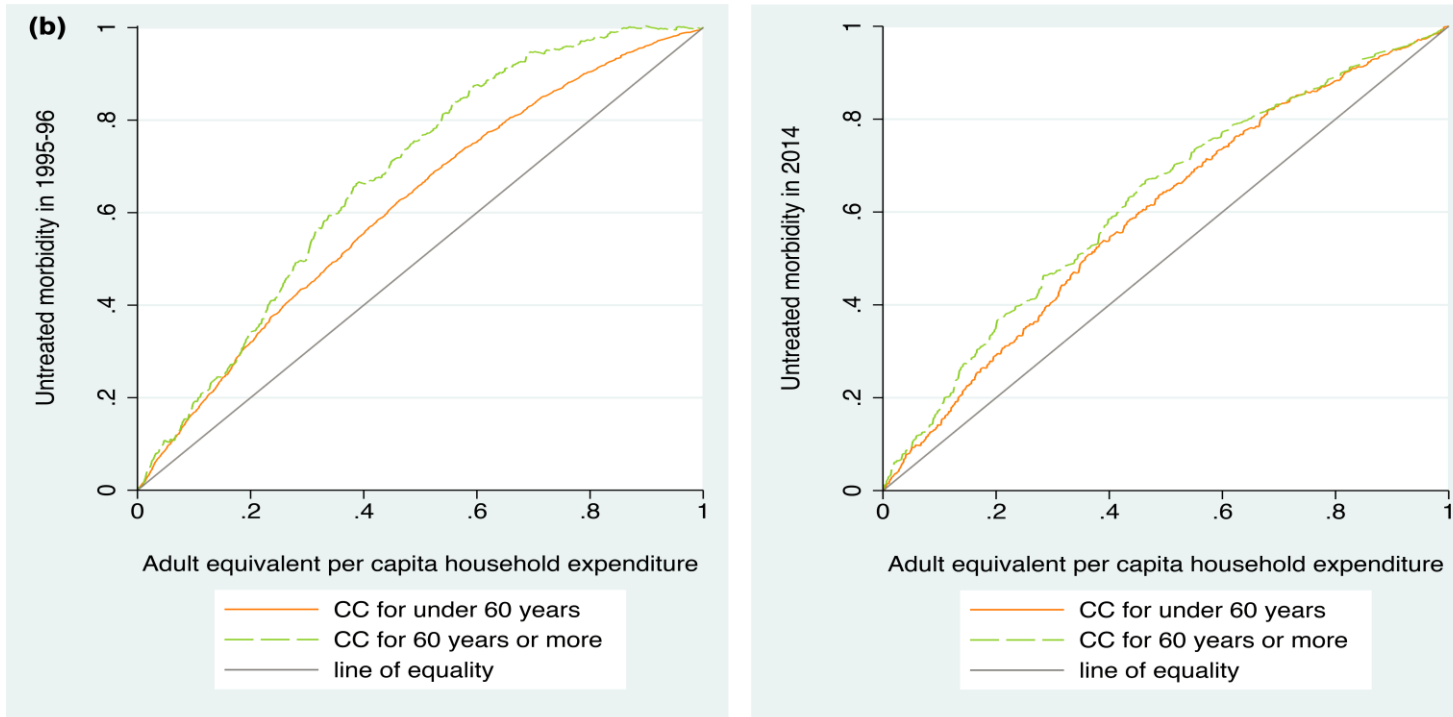
Figure 6.2(b) Concentration curves for untreated morbidity for the population under 60 years and 60 years or more in India, NSS 1995–96 and NSS 2014
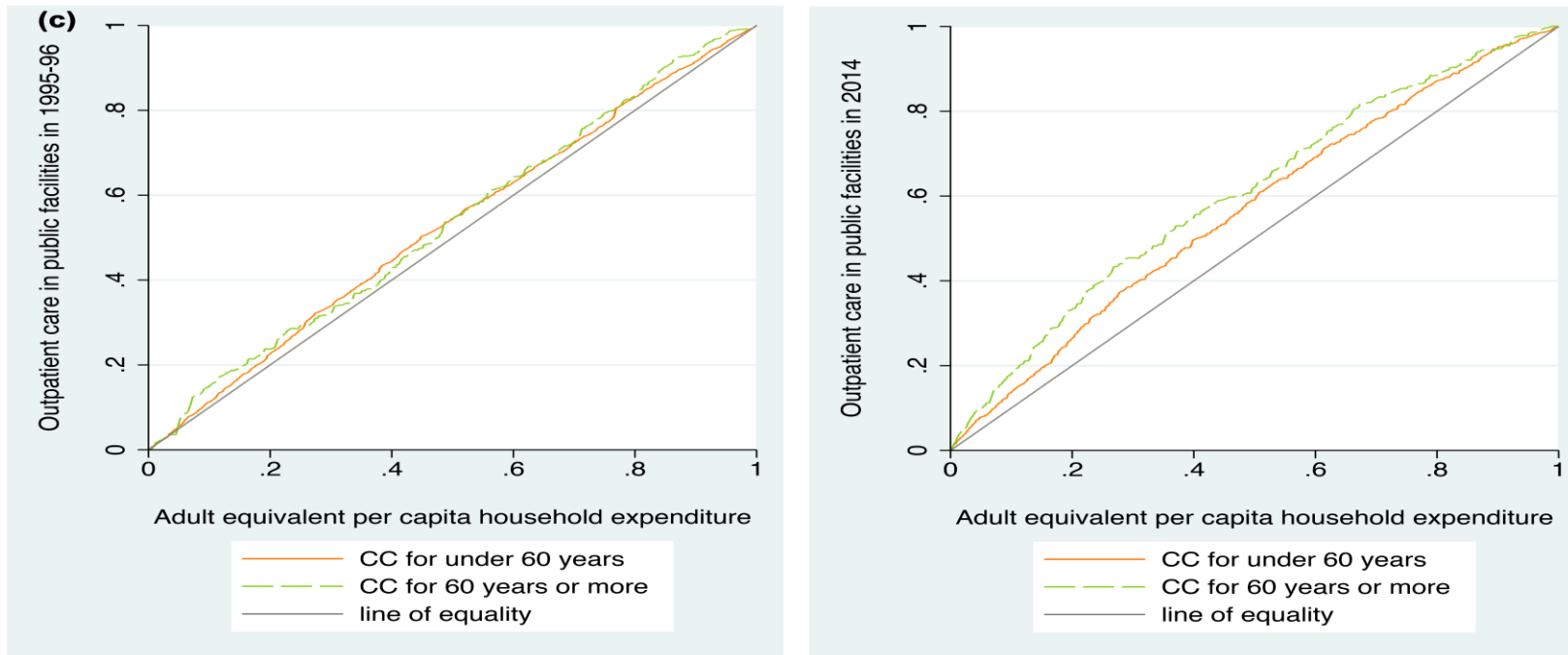
Figure 6.2(c) Concentration curves for the use of public facilities for outpatient care for the population under 60 years and 60 years or more in India, NSS 1995–96 and NSS 2014

6.4.4 Determinants of outpatient care and untreated morbidity

The poorest had significantly lower adjusted odds of using outpatient care than the richest at both the time points. The poorest older population were 80% (95% CI: 0.13 - 0.31) less likely to use outpatient care than the richest in 1995–96; this gap declined by 2014 where the poorest were only 36% (95% CI: 0.43, 0.94) less likely to use outpatient care (Table 6.4). In 1995–96, the older population suffering from a pre-existing disease and with duration of illness > 11 days were 48% (95% CI: 0.36, 0.75) and 41% (95% CI: 0.52, 0.84) less likely to use outpatient care, respectively. Older population confined to bed due to illness were 2.42 (95% CI: 1.80, 3.26) times more likely to use outpatient care in 1995–96; however, by 2014 they had 31% (95% CI: 0.51, 0.95) lower odds of treatment as an outpatient.

When compared with the richest, the poorest older population were 5.20 (95% CI: 3.34, 8.10) times and 3.39 (95% CI: 1.85, 6.20) times more likely to remain untreated in an event of illness in 1995–96 and 2014, respectively. Older population confined to bed due to illness were significantly less likely to remain untreated in 1995–96 and 2014. Older population suffering from a pre-existing disease and with duration of illness > 11 days were 1.59 (95% CI: 1.12, 2.36) times and 1.81 (95% CI: 1.24, 2.65) times more likely to remain untreated in 1995–96. The older population residing in less developed states were 1.61 times significantly more likely to remain untreated in 2014 (Table 6.4).

After adjusting for the confounders, MPCE quintiles was not a significant predictor of the use of public facilities for outpatient care for the older population in 1995–96. However, in 2014, the poorest older population were 2.90 (95% CI: 1.90, 4.43) times more likely to use public facilities (Table 6.4). The older population belonging to SC/STs had 1.46 times significantly higher odds of using public facilities in 2014. The adjusted association of MPCE quintiles with the three outcome variables of healthcare utilization followed similar pattern for the population under 60 years; however, the magnitude was different (Appendix F-2).

6.4.5 Barriers to healthcare utilization

An ailment not being considered serious by the respondent was the most important reason for not seeking treatment on medical advice followed by 'other' reasons both for the poor and the non-poor older population. A financial reason for not seeking treatment was 9.9

Table 6.4 Determinants of outpatient care, untreated morbidity and the use of public facilities for outpatient care for the population 60 years or more in India, NSS 1995–96 and NSS 2014

Background characteristics	Outpatient care		Untreated morbidity		Use of public facilities for outpatient care	
	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014
Age (Ref. 60–69 years)						
70–79 years	0.80 (0.61, 1.05)	0.88 (0.69, 1.12)	1.25 (0.95, 1.65)	0.98 (0.67, 1.42)	1.30 (0.97, 1.76)	0.90 (0.70, 1.17)
80 years or more	0.76 (0.52, 1.10)	0.62 (0.46, 0.85)	1.42 (0.97, 2.08)	1.59 (1.02, 2.47)	0.93 (0.59, 1.47)	1.07 (0.73, 1.57)
Gender (Ref. = Male)						
Female	0.90 (0.70, 1.15)	1.01 (0.80, 1.29)	1.16 (0.90, 1.50)	1.18 (0.83, 1.69)	1.05 (0.77, 1.44)	1.05 (0.81, 1.35)
Duration of illness (Ref. = > 11 days)						
12 days or more	0.59 (0.42, 0.84)	1.25 (0.77, 2.03)	1.59 (1.12, 2.26)	0.45 (0.25, 0.79)	1.01 (0.68, 1.50)	1.30 (0.73, 2.31)
Whether confined to bed (Ref. = No)						
Yes	2.42 (1.80, 3.26)	0.69 (0.51, 0.95)	0.41 (0.30, 0.56)	0.53 (0.32, 0.89)	0.90 (0.69, 1.19)	0.90 (0.61, 1.34)
Whether suffering from a pre-existing disease (Ref. = No)						
Yes	0.52 (0.36, 0.75)	1.49 (0.89, 2.49)	1.81 (1.24, 2.65)	0.59 (0.32, 1.06)	1.08 (0.72, 1.62)	0.98 (0.54, 1.78)
MPCE quintiles (Ref. = Richest)						
Poorest	0.20 (0.13, 0.31)	0.64 (0.43, 0.94)	5.20 (3.34, 8.10)	3.39 (1.85, 6.20)	1.55 (0.89, 2.68)	2.90 (1.90, 4.43)
Poor	0.21 (0.14, 0.30)	0.81 (0.54, 1.21)	4.99 (3.35, 7.42)	2.56 (1.34, 4.87)	1.06 (0.65, 1.71)	2.22 (1.51, 3.27)
Middle	0.27 (0.18, 0.39)	0.70 (0.51, 0.96)	3.62 (2.41, 5.44)	2.57 (1.49, 4.43)	1.39 (0.87, 2.21)	1.29 (0.91, 1.84)
Rich	0.58 (0.40, 0.82)	0.96 (0.72, 1.28)	1.65 (1.13, 2.41)	1.34 (0.78, 2.30)	1.21 (0.81, 1.79)	1.58 (1.15, 2.17)
Marital status (Ref. = Currently married)						
Single	0.68 (0.52, 0.89)	1.15 (0.91, 1.47)	1.47 (1.12, 1.92)	0.94 (0.67, 1.31)	0.97 (0.71, 1.32)	1.09 (0.84, 1.42)
Caste (Ref. = Non SC/STs)						
SC/STs	1.11 (0.82, 1.49)	0.65 (0.48, 0.89)	0.96 (0.71, 1.29)	1.90 (1.28, 2.83)	1.29 (0.92, 1.81)	1.46 (1.09, 1.95)
Place of residence (Ref. = Urban)						
Rural	0.67 (0.52, 0.85)	0.85 (0.68, 1.06)	1.57 (1.21, 2.04)	1.28 (0.91, 1.81)	1.14 (0.87, 1.49)	1.14 (0.89, 1.46)
Education (Ref. = Literate)						
Illiterate	0.82 (0.64, 1.04)	1.05 (0.79, 1.39)	1.23 (0.96, 1.57)	0.89 (0.58, 1.37)	0.85 (0.63, 1.14)	1.21 (0.93, 1.56)
States (Ref. = More developed states)						
Less developed states	0.91 (0.71, 1.17)	0.67 (0.53, 0.86)	1.22 (0.95, 1.57)	1.61 (1.14, 2.28)	0.93 (0.70, 1.22)	1.19 (0.90, 1.58)
Constant	37.42 (23.44, 59.76)	4.95 (3.30, 7.43)	0.02 (0.01, 0.04)	0.10 (0.06, 0.19)	0.18 (0.12, 0.26)	0.14 (0.09, 0.22)
N	6,010	10,236	6,010	10,236	4,421	7,465

MPCE, monthly percapita consumption expenditure; SC/STs, scheduled castes/scheduled tribes.

percentage points higher for the poor than the non-poor older population. Also the unavailability of a medical facility in the neighbourhood was reported more by the poor than the non-poor older population. Even for the younger population, an ailment not considered serious was the single most important reason reported both by the poor and the non-poor; with levels higher than the older population (Table 6.5).

Unsatisfactory quality was the dominant reason for not using public facilities reported equally by the poor and non-poor older population in 2014. A long waiting time and 'other reasons' for not using public facilities was higher for the non-poor while the unavailability of a public facility was reported more by the poor older population. The gap between poor and non-poor in reporting 'facility too far', a long waiting time and 'other reasons' for not using public facilities was higher for the older population than the younger population (Table 6.5).

Table 6.5 Reasons for not seeking treatment on medical advice and not using public facilities for outpatient care by the non-poor and the poor population under 60 years and 60 years or more in India, NSS 2014

	Under 60 years			60 years or more		
Reasons for not seeking treatment on medical advice	Non-poor	Poor	Total	Non-poor	Poor	Total
No medical facility available in the neighbourhood	9.5	13.2	12.0	7.1	12.0	10.8
Facility of satisfactory quality not available	1.6	3.5	2.9	9.3	3.6	5.0
Facility of satisfactory quality too expensive	2.3	5.3	4.4	5.9	15.8	13.3
Facility of satisfactory quality involves long waiting	2.6	3.5	3.2	4.6	1.5	2.3
Ailment not considered serious	71.3	60.7	64.2	45.8	42.3	43.2
Others	12.7	13.8	13.5	27.3	24.7	25.4
Reasons for not using public facilities for outpatient care						
Required specific service not available	8.4	12.2	10.6	6.3	10.3	8.4
Facility available but quality not satisfactory	42.0	40.9	41.4	45.6	45.2	45.4
Quality satisfactory but facility too far	10.7	13.8	12.5	6.7	13.1	10.0
Facility of satisfactory quality but involves long waiting	29.6	24.9	26.9	33.8	26.1	29.8
Financial constraint	0.2	0.7	0.5	0.1	1.0	0.6
Others	9.1	7.6	8.3	7.5	4.4	5.9

6.5 Discussion

Our findings show that the economic status is a strong independent determinant of healthcare use in India. The horizontal inequity in the use of outpatient care favoured the rich while the poor had more untreated morbidity. There was however, a difference in the

degree to which horizontal inequities in healthcare use occurred in the two age groups over the two decades. Three salient findings related to inequity emerge from this study. First, the pro-rich inequity in the use of outpatient care among the older population declined between 1995–96 and 2014. Second, the untreated morbidity was disproportionately higher among the poor; more so for the older population and the inequity increased over the last two decades. Third, the proportion of poor people using public facilities for outpatient care was higher than the rich in 1995–96, and this gap increased over the next 20 years.

Socioeconomic inequality in the use of healthcare with the wealthier population group having a higher probability of using healthcare when needed is a persistent phenomenon in low- and middle-income countries.[36, 41, 263, 264] Even in countries with universal health coverage the use of healthcare was found to be disproportionately concentrated among the richer groups after adjusting for the differences in healthcare needs.[32, 33] Equitable access to preventive and curative care will help in averting deaths and diseases leading to better health outcomes. In this study, we focused on the inequity in outpatient care because it is the entry point for most people in the healthcare system and can have an effect on the use of other services as well.[81, 265, 266] The pro-rich inequity in the use of outpatient care found in our study is consistent with the evidence from other studies in India and China.[49, 267] On a positive note, we found that the pro-rich inequity in the use of outpatient care declined significantly for the older population over the past two decades. Increase in the government funded insurance schemes, improved physical and financial access to public healthcare services and the increased awareness about the treatable medical conditions might have contributed to the increase in outpatient care among the poor older population. Highly subsidized healthcare, high insurance coverage and low cost of healthcare are important means to achieve equitable access to outpatient care for all.[81, 102]

Both the levels of untreated morbidity and the difference in untreated morbidity rate between the richest and the poorest quintiles was substantially higher for the older population at both time points. Untreated morbidity is common among the older population because they generally associate their illness with the aging process and neglect medical treatment.[67, 77] They usually start with self-medication and seek care from qualified medical professionals only when health conditions deteriorate.[69, 268] A previous study comparing 23 low and middle-income countries found that the older population suffering from disability and chronic disease tend to avoid healthcare.[269] Equity in

healthcare has greater importance for the older population because of their greater need for medical care and consequently higher demand for health services.[270]

We found a high level of reporting of morbidity among the older population indicating that they have a greater need for healthcare. The older population most frequently reported non-communicable diseases and showed a tendency to forgo medical treatment when the reported morbidity was perceived to be age-related. Evidence suggests that ignoring minor symptoms or early signs of chronic diseases might lead to severe consequences that would require more medical treatment and involve higher cost.[78] Our observation is important in light of the inadequate provision of geriatric healthcare services in India. Only recently India has initiated the National Programme for the Healthcare of Elderly to promote active and healthy aging. The policy targets a range of services including diagnosis and management of geriatric medical problems to deal with the increasing disease burden among the older population.[271]

The SRM rate increased nearly two-fold over the past two decades in India. This can partly be due to the increase in disease burden of the country given the population aging and higher morbidity prevalence at older ages. Data from the Global Burden of Disease Study shows that total disease burden measured as the disability adjusted life years lost in India has increased for the older population from 67 million in 1990 to 110 million in 2013.[204] Another reason could be the enhanced perception of morbidity as captured by the self-reported responses of being ill in the reference period. However, in the absence of any objective measure of health or a vignette schedule in the NSSO surveys it would be difficult to judge how much of the increase in the level of reported illness can be attributed to real increase in burden of disease and how much to the enhanced subjective perception of illness.

We found substantial variation in SRM rate by economic status and states in India. Residing in the more developed states and having higher socioeconomic position was found to be associated with higher reporting of morbidity. This could be attributed to 'perception bias'; a tendency among the deprived to report less ill-health and underestimate their health problems.[272] The individuals in the more developed states have improved provision of health services and are therefore in a better position to perceive and report health problems than their counterparts in the less developed states. Economically disadvantaged people lack awareness about treatable medical conditions

and often do not consider themselves ill due to the high cost of healthcare and accessibility issues.[273-275] The differential rates of epidemiological transition between different socioeconomic strata could be another explanation for the high prevalence of self-reported morbidity among the rich people.[273, 276]

We found that the perceived non-serious nature of the ailment was the most important reason for not seeking medical treatment irrespective of economic status. This confirms that apart from supply and economic constraints, the demand for healthcare is also affected by the individual's perception of their medical conditions. In contrast to this, a previous study in India using data from the NSSO 2004 showed that in the poorer consumption quintiles financial reasons dominated, while in the richer quintiles self-perception of illness was the prominent reason.[67] Evidence from India also suggests that financial barriers hinder the healthcare use of the poor, particularly in times of health sector reforms.[66] However, our finding suggested that the high cost of healthcare remains a persistent barrier to medical treatment only for the poor older population. Economic factors are more important in determining the healthcare of the older population because of their higher economic dependency and poverty as a result of a lack of a regular source of income.[219, 277] The 'other' reason for not seeking medical care was high for the older population, indicating that they have greater preference to seek informal care when ill.

Even though public healthcare in India has the provision of free or low cost services, the utilization of public facilities was found to be low due to the perceived poor quality of services. Higher use of private facilities for healthcare has been reported by other studies in India.[64, 116, 155, 174, 265] The heavy reliance on the private sector indicates that the public sector has not kept up with the growing demand for healthcare. We found that the use of public facilities was disproportionately higher for the poor than the rich and the gap increased over the past two decades. Another study in India using the NSSO 1995–96 data also showed that the outpatient treatment in public facility was distributed in favour of the population living below poverty line.[278] Increased use of outpatient care from public facilities by the poor might be due to their decreased ability to bear the increasingly high cost of outpatient care in the private sector. Lack of resources and the high cost involved in private facilities might have forced the poor to revert to public facilities. Evidence suggests that the publicly financed health services in India represent the best way for providing critical services for the poor.[279] Therefore, investments to improve the quality of services in public facilities would help in securing affordable

health services in India, particularly for those who cannot afford the expensive private healthcare.[64]

There are some limitations of this study which should be taken into account while interpreting our results. First, the use of self-reported data on morbidity to adjust for the need for healthcare might suffer from health perception bias. Second, we couldn't make causal inference between economic status and healthcare use. Third, no adjustment could be made for the differences in quality of healthcare while studying inequity in utilization. Fourth, we could use only individual level determinants of healthcare use. Other factors like culture, community and health system reforms are likely to affect the use of healthcare which could not be included due to the lack of such information in these national sample surveys. In spite of the limitations, this study provides large scale evidence on how the inequity in healthcare use has changed over the last two decades in India that could inform health policy.

In conclusion, this study provides evidence of a higher burden of self-reported morbidity, greater use of outpatient care, higher level of untreated morbidity and greater inequities in healthcare use for the older population compared to rest of the population in India. Policy initiatives aiming to reduce these inequities in healthcare use should focus on increasing public investment in health, providing insurance coverage for outpatient care and making better provisions for geriatric healthcare in India.

6.6 Ethics statement
The study is based on secondary data from the National Sample Surveys with no identifiable information on the survey participants. Exemption from ethics approval for analysis of the National Sample Surveys data was obtained from the institutional ethics committees of the Public Health Foundation of India and the London School of Hygiene and Tropical Medicine.

6.7 Acknowledgement

RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Anamika Pandey
Principal Supervisor	Ms Lynda Clarke, Professor Lalit Dandona and Professor George B. Ploubidis
Thesis Title	Socioeconomic inequality in healthcare utilization and expenditure in the older population of India

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*		Was the work subject to academic peer review?	

*If yes, please attach evidence of retention. If no, or if the work is being included in its published format, please attach evidence of permission from the copyright holder (publisher or other author) to include this work.

SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	Bulletin of the World Health Organization
Please list the paper's authors in the intended authorship order:	Anamika Pandey, George B. Ploubidis, Lynda Clarke, Lalit Dandona
Stage of publication	Under peer-review

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	Please refer the attached Section D after this cover sheet

Student Signature: _Anamika_____ **Date:** ___08/08/2017_____

Supervisor Signature: _____ **Date:** ___08/08/2017_____

Supervisor Signature: _Lalit Dandona_____ **Date:** ___08/08/2017_____

Supervisor Signature: _George B. Ploubidis_____ **Date:** ___08/08/2017_____

138

Section D – Student's role in multi-authored work

This paper is authored by Ms Anamika Pandey, Professor George B. Ploubidis, Ms Lynda Clarke and Professor Lalit Dandona. I am the first and the corresponding author. Ms Lynda Clarke from London School of Hygiene and Tropical Medicine, Professor Lalit Dandona from Public Health Foundation of India, and Professor George B. Ploubidis from Institute of Education, University College London are the supervisors for my PhD under the PHFI-UKC Wellcome Trust Capacity Building Programme.

I conceptualized this study and developed the study design under the guidance of my supervisors. I acquired the datasets in ASCII formats from the Ministry of Statistics and Programme Implementation and extracted the relevant data in STATA format for analyses. I conducted the analyses, interpreted the statistical output and the findings in consultation with my supervisors. I wrote the first draft of the research paper and then took input from my supervisors on the manuscript. After receiving substantial inputs, both, in terms of paper writing and data analyses, I further worked on data analyses and revised the paper. I finalized the paper for submission to the journal with guidance and approval from my supervisors. I submitted the paper to the journal and handled journal communications related to the paper. The paper is currently under peer-review. As the first and corresponding author of the paper, I am responsible and accountable for the accuracy and integrity of all the aspects presented in the paper.

Chapter 7. Trends in catastrophic health expenditures in India from serial nationwide surveys: 1993 to 2014

7.1 Abstract

Objective

To compare the trends in out-of-pocket (OOP) payments and catastrophic health expenditure (CHE) between households with and without older persons (60 years or more).

Methods

We used National Sample Survey data from various consumer expenditure surveys (NSS-CES1993–94, NSS- CES1999–2000, NSS-CES 2004–05, and NSS-CES 2011–12) and healthcare utilization surveys (NSS-HUS 1995–96, NSS-HUS 2004 and NSS-HUS 2014). We classified households into three mutually exclusive groups; households with non-older persons only, households with older and non-older persons, and households with older persons only. CHE was defined as OOP payments equalling or exceeding 10% of household's total expenditure. Multivariable logistic regression analysis was used to study the associations of CHE.

Findings

CHE increased 1.47 times between NSS-CES 1993–94 (12.4%) and NSS-CES 2011–12 (18.2%), and 2.24 times between NSS-HUS 1995–96 (11.1%) and NSS-HUS 2014 (24.9%). CHE increased more between NSS-HUS 1995–96 and NSS-HUS 2004 than in the later decade (1.91 vs 1.17 times). Households with older persons only had higher median per capita OOP payments (2.47-4.00 times across NSS-CES and 3.10-5.09 times across NSS-HUS) and CHE (1.01-2.99 times across NSS-CES and 1.10-1.89 times across NSS-HUS) than the other households. In multivariate analysis, the odds of CHE were significantly higher in households with older persons, households headed by females and rural households.

Conclusion

The continuing higher risk of CHE among households with older persons suggests that urgent attention is needed to provide viable healthcare protection mechanisms for the

increasing older population in India. Better protection is also needed for rural households and those headed by females.

7.2 Introduction

Financial catastrophe occurs in countries at all income levels; however, the problem is most severe in low-income countries and more severe in middle- than high-income settings. The incidence of financial catastrophe is negatively correlated with the extent to which countries fund their health systems using prepayment of some form, for example taxes or insurance.[280] Catastrophic payments are more common in low-income countries that mainly finance healthcare by direct payments and less common in high-income countries with more developed prepayment methods of finance.[139] In many low- and middle-income countries (LMICs), a large proportion of the health expenditure is paid out-of-pocket (OOP) by households. Excessive reliance on OOP payments can either lead to the financial barrier for the less well-off, enhancing inequalities in access to healthcare or result in financial catastrophe or impoverishment for households using health services.[280, 281] Estimate from household surveys show that on average 100 million individuals are impoverished, and another 150 million individuals face severe financial difficulties worldwide during any given year because of direct health expenditures and more than 90 percent of these people live in low-income countries.[280]

Healthcare financing through OOP payments results in catastrophic health expenditure (CHE) and impoverishment in many Asian countries, India being prominent among them.[139, 142] The OOP payment by households has remained persistently high in India and was estimated to account for 62 percent of the total health expenditure in 2014.[216] A high OOP payment for healthcare is particularly important as the national insurance coverage is low, with only 15 percent of the total population covered by health insurance as per the recent estimate from the National Sample Survey undertaken in India.[196] Also, the public expenditure on health in India has remained stagnant at one percent of gross domestic product, which is far below its BRICS counterparts (Brazil, Russia, India, China, and South Africa), and lower even than its neighbouring countries Nepal and Srilanka.[216]

Older people generally have greater health and long-term care needs than the younger population, leading to higher likelihood of expenditure. They are also less likely to work if they are unhealthy, which could impose an increased economic burden on their families and society.[282] India's population is aging, with those aged 60 years or more expected to increase from 8.9% of the total population in 2015 to 12.5% in 2030.[181] Understanding the trends of CHE among the older population versus other age groups is therefore relevant for public health policy and planning. We analyzed the trends in OOP payments

and CHE between households with and without older persons, using data from seven nationwide household surveys conducted in India between 1993 and 2014.

7.3 Methods

We used data from seven surveys on health expenditure and other expenditures in India since 1993. The surveys are of two types: consumer expenditure surveys (CES) and healthcare utilization surveys (HUS).

7.3.1 Consumer expenditure surveys

We obtained data from the National Sample Survey on Household Consumer Expenditure conducted in all Indian states in 1993–94 (NSS-CES 1993–94), 1999–2000 (NSS-CES 1999–2000), 2004–05 (NSS-CES 2004–05), and 2011–12 (NSS-CES 2011–12).[235-238] We did not use NSS-CES 2009–10 survey for our analyses, as 2009-10 was considered to be a non-normal year for calculating price indices and national income estimates, and therefore was repeated in 2011–12.[238] CES collected data on direct expenditure for any health service, whether or not the household paid for the service. The expenditure data thus collected is considered an approximation of OOP payments, since most private payments for healthcare in India are made OOP. Appendix G-1 gives the items used in NSS-CES to assess OOP payments for inpatient and outpatient care. These surveys collected detailed information on food and non-food items to estimate the total household consumption expenditure. NSS-CES 2011–12 used two schedules for enquiry – Type I and Type II which had the same item break up but differed in reference periods used for the collection of consumption data. Schedule Type I, as far as the reference periods are concerned was a repeat of the schedule used in the previous NSS-CES and hence was used for all analyses; in the Type II schedule, the recall period for food expenditure differed from the one that was used in the Type I schedule.

7.3.2 Healthcare utilization surveys

We analyzed data on OOP payments from the National Sample Survey on healthcare utilization conducted in all Indian states in 1995–96 (NSS-HUS 1995–96); 2004 (NSS-HUS 2004) and 2014 (NSS-HUS 2014).[196, 199, 234] These surveys collected information on direct expenditure from all individuals in the households pertaining to each episode of hospitalization in the reference period of 1 year and each spell of ailment treated as outpatient in 15 days reference period. To obtain OOP payments on inpatient and outpatient care we deducted any payments that were later reimbursed. Appendix G-2

gives the items used in NSS-HUS to assess OOP payments for inpatient and outpatient care. Household consumption expenditure was obtained as an aggregate only in NSS-HUS.

7.3.3 Measurement of CHE

We measured CHE using two types of definitions reported in the literature.[137, 139, 147, 283-285] The first definition of CHE was OOP payments on health equalling or exceeding 10% of the total household expenditure, and the second definition of CHE was OOP payments on health equalling or exceeding 40% of household's capacity to pay (CTP).[139, 174, 286, 287] Household's CTP was calculated as the household's total expenditure less subsistence expenditure.[137] Subsistence expenditure – defined as the mean food expenditure of households falling between the 45th and 55th percentiles of the total sample in terms of the share of total household expenditure spent on food – was estimated for each NSS-CES separately. We also explored two alternate cut-offs in the definitions for these two approaches: 15% and 20% of household's total expenditure, and 25% and 30% of household's CTP. We applied both definitions to estimate CHE from NSS-CES and used only the first definition for NSS-HUS because these surveys did not collect data on food expenditure.

7.3.4 OOP payments for healthcare

We report the mean, median and interquartile range of per capita OOP payments for healthcare in the most recent month in United States dollars (US$). All INR costs were converted to 2014 constant prices using the gross domestic product deflators,[288] and then to US$ using the average 2014 exchange rate (US$ 1 = 63.3 INR).[289] Since the inpatient and outpatient expenditures were collected for different recall periods we converted them into the same recall period of one month to calculate the per capita OOP payments.

7.3.5 Associations with CHE

The relation of CHE with several other variables was assessed. Households were divided into three mutually exclusive groups, namely households with non-older persons only, households with older and non-older persons, and households with older persons only. The states in India were classified as less and more developed. Eighteen less developed states included the eight empowered action group states (Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Uttaranchal, Odisha and Rajasthan), 8 north-eastern states (Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim,

Tripura), Himachal Pradesh and Jammu and Kashmir.[23] Monthly per capita consumption expenditure (MPCE) adjusted for household size and composition were used as a proxy for economic status. The equivalence scale used was $e_h = (A_h + 0.5K_h)^{0.75}$, where A_h was the number of adults in the household, and K_h was the number of children 0–14 years. Parameters were set on the basis of estimates summarised by Deaton.[241]

We used multivariable logistic regression analysis to assess the associations of socio-demographic and economic variables with CHE in the two most recent surveys, NSS-CES 2011–12 and NSS-HUS 2014. The predictors of CHE considered were age, sex, marital status, and education of the household head, social group, place of residence, MPCE quintiles, household's occupation, household size, states, and type of survey. We present odds ratios with 95% confidence intervals (95% CI).

7.4 Results

CHE defined as 10% or more of the household's total expenditure increased 1.47 times between NSS-CES 1993–94 and NSS-CES 2011–12, and 2.24 times between NSS-HUS 1995–96 and NSS-HUS 2014 (Table 7.1). CHE increased more between NSS-HUS 1995-96 and NSS-HUS 2004 than in the later decade (1.91 vs 1.17 times). CHE incidence was higher in NSS-HUS 2004 than in NSS-CES 2004-05 (1.39 times). When defined as the proportion of household's CTP at 40% cut-off, the CHE incidence was much lower than with the previous definition of 10% or more of the household's total expenditure but was generally in a similar range if CHE was defined as 20% or more of household's total expenditure. The incidence of CHE defined as 15% or more of the household's total expenditure and as 30% or more of CTP were also generally similar in range.

The more developed states had a higher increase in CHE between NSS-HUS 1995–96 and NSS-HUS 2014 than the less developed states (2.45 vs 1.98 times), which led to an increase in the gap between the less and more developed states. In NSS-HUS 1995–96 the CHE incidence was similar in these two groups of states but was 1.27 times higher in the more developed states in NSS-HUS 2014 (Figure 7.1).

The proportion of households with older persons ranged between 2.2 to 3.6% across the seven national surveys in India (Table 7.2 and Table 7.3). The households with older persons only had higher median per capita OOP payments across NSS-HUS (3.10- 5.09 times) and NSS-CES (2.47- 4.00 times) than the other households. Mean and median

Table 7.1 Percentage of households with catastrophic health expenditure (CHE), defined two different ways at various thresholds, as estimated from data obtained from seven major household surveys conducted in India

Survey	CHE (95% CI)					
	Definition 1[a]	Definition 1[b]	Definition 1[c]	Definition 2[a]	Definition 2[b]	Definition 2[c]
NSS-CES 1993–94	12.4 (12.2, 12.7)	6.8 (6.6, 7.0)	3.9 (3.7, 4.0)	10.5 (10.3, 10.8)	7.6 (7.4, 7.8)	4.0 (3.8, 4.1)
NSS-CES 1999–2000	11.0 (10.7, 11.3)	5.5 (5.4, 5.7)	3.3 (3.1, 3.4)	9.8 (9.5, 10.1)	7.0 (6.8, 7.2)	3.7 (3.6, 3.9)
NSS-CES 2004–05	15.2 (14.9, 15.5)	9.0 (8.7, 9.2)	5.6 (5.4, 5.8)	8.7 (8.5, 8.9)	6.3 (6.1, 6.5)	3.3 (3.2, 3.5)
NSS-CES 2011–12	18.2 (17.7, 18.6)	10.5 (10.1, 10.8)	6.6 (6.4, 6.9)	11.3 (10.9, 11.7)	8.3 (8.0, 8.6)	4.6 (4.4,4.9)
NSS-HUS 1995–96	11.1 (10.8, 11.4)	8.5 (8.3, 8.8)	6.8 (6.5, 7.0)			
NSS-HUS 2004	21.2 (20.7, 21.6)	16.9 (16.5, 17.3)	14.0 (13.6, 14.3)			
NSS-HUS 2014	24.9 (24.2, 25.5)	19.8 (19.2, 20.4)	16.2 (15.6, 16.7)			

NSS-CES 1993–94, NSS-CES 1999–2000, NSS-CES 2004–05 and NSS-CES 2011–12 are National Sample Surveys on household consumer expenditure; NSS-HUS 1995–96, NSS-HUS 2004 and NSS-HUS 2014 are National Sample Surveys on healthcare utilization; 1[a, b and c] out-of-pocket payments equalling or exceeding 10%, 15% and 20% of household's total expenditure, respectively; 2[a, b and c] out-of-pocket payments equalling or exceeding 25%, 30% and 40% of household's capacity to pay, respectively; CI, confidence interval.
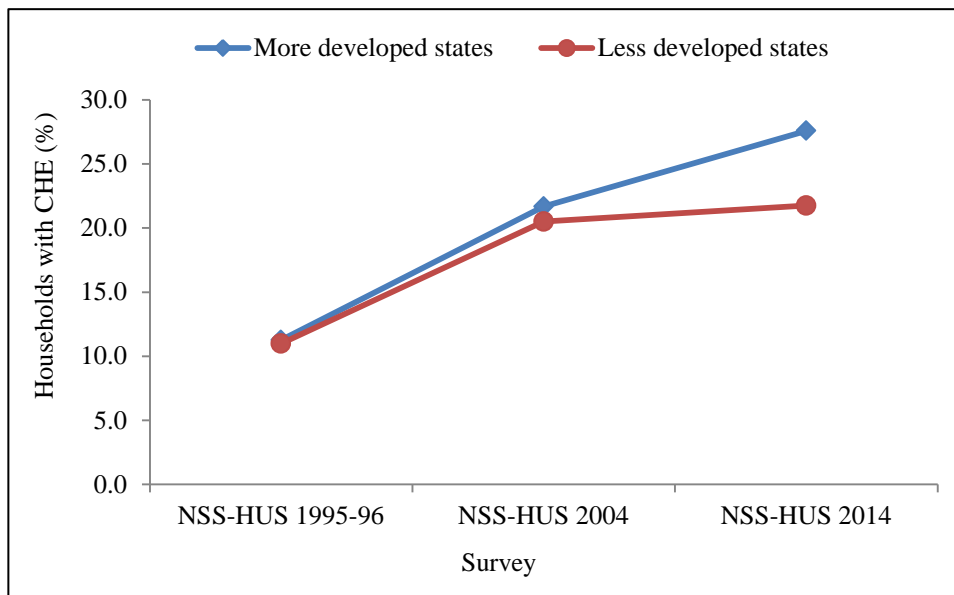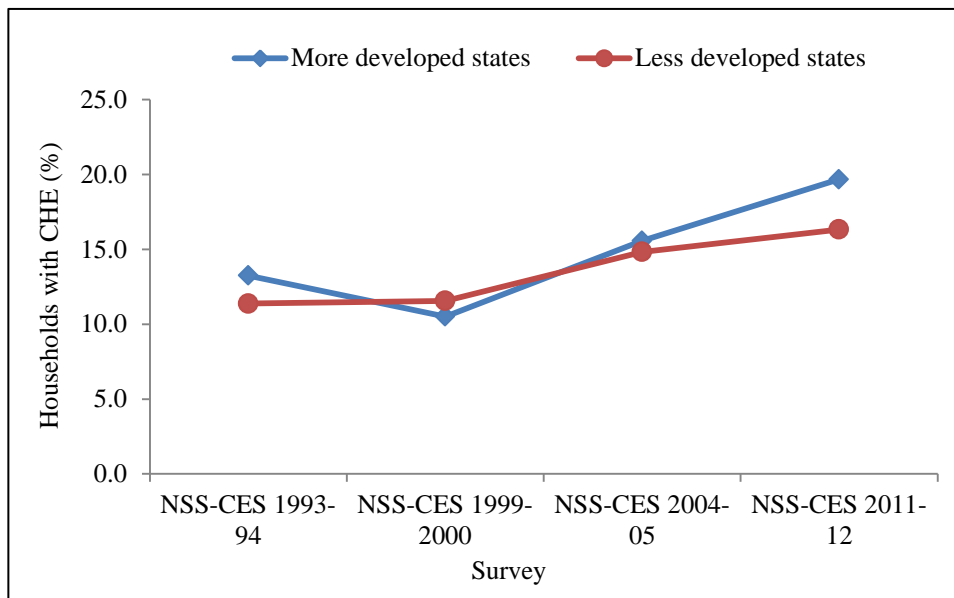
NSS-HUS 1995–96, NSS-HUS 2004, and NSS-HUS 2014 are National Sample Surveys on healthcare utilization; 1[a] out-of-pocket payments equalling or exceeding 10% of household's total expenditure; CHE, catastrophic health expenditure.

Figure 7.1 Percentage of households with catastrophic health expenditure by states, as estimated from data obtained from seven major household surveys conducted in India

Table 7.2 Mean and Median (IOR) out-of-pocket healthcare payments by household type for households that reported such payments across the three major healthcare utilization surveys conducted in India

| MPCE quintiles | OOP payments (US$) for healthcare in the most recent month | | | | | |
| | Households with non-older persons only | | Households with older and non-older persons | | Households with older persons only | |
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
	NSS-HUS 1995–96					
Poorest	2.1 (4.0)	1.0 (0.5, 2.4)	2.6 (7.9)	0.8 (0.4, 1.9)	6.0 (7.1)	3.6 (2.3, 6.8)
Poor	2.5 (7.5)	1.1 (0.5, 2.7)	2.3 (4.7)	1.1 (0.5, 2.3)	6.7 (12.2)	3.6 (1.8, 6.1)
Middle	3.3 (9.6)	1.4 (0.6, 3.1)	3.3 (11.3)	1.3 (0.5, 3.2)	8.3 (8.8)	4.5 (2.3, 11.9)
Rich	3.6 (11.7)	1.6 (0.7, 3.7)	3.4 (7.3)	1.7 (0.7, 3.8)	14.7 (16.1)	11.3 (3.6, 17.8)
Richest	6.7 (16.7)	2.7 (1.1, 7.0)	6.3 (14.5)	2.6 (1.1, 6.0)	26.5 (45.6)	15.3 (9.0, 27.4)
Total	4.0 (11.8)	1.6 (0.6, 3.8)	3.8 (10.3)	1.4 (0.6, 3.8)	11.7 (22.9)	5.6 (2.7, 14.0)
Households with OOP payments (%)	18.6 (18.2, 19.0)		31.4 (30.4, 32.4)		22.1 (19.4, 24.8)	
N (%)	93,481 (78.1)		25,430 (19.7)		2,031 (2.2)	
	NSS-HUS 2004					
Poorest	2.1 (4.2)	0.8 (0.2, 2.2)	2.6 (5.1)	1.1 (0.3, 2.9)	7.1 (10.7)	4.1 (1.2, 8.1)
Poor	2.6 (5.3)	1.0 (0.3, 2.9)	3.1 (7.3)	1.3 (0.4, 3.5)	9.2 (12.0)	5.7 (2.9, 11.3)
Middle	3.6 (12.7)	1.4 (0.4, 3.6)	3.4 (5.8)	1.7 (0.5, 4.1)	9.8 (12.9)	5.4 (1.4, 12.3)
Rich	4.2 (8.4)	1.7 (0.5, 4.8)	4.2 (7.5)	2.0 (0.7, 5.0)	17.1 (31.4)	11.6 (4.5, 19.6)
Richest	6.1 (15.0)	2.5 (0.7, 6.4)	7.4 (15.3)	3.3 (1.3, 7.6)	31.9 (73.6)	16.6 (6.9, 27.8)
Total	3.8 (10.3)	1.4 (0.4, 3.9)	4.4 (1.9)	1.9 (0.6, 4.8)	15.5 (41.0)	7.2 (2.7, 16.5)
Households with OOP payments (%)	36.4 (35.8, 37.1)		50.4 (49.5, 51.3)		31.2 (29.0, 33.4)	
N (%)	45,944 (73.0)		24,981 (23.8)		2,893 (3.2)	

(…continues)

(...continued)

MPCE quintiles	OOP payments (US$) for healthcare in the most recent month					
	Households with non-older persons only		Households with older and non-older persons		Households with older persons only	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
	NSS-HUS 2014					
Poorest	4.0 (11.3)	1.6 (0.5, 4.0)	4.7 (11.7)	1.9 (0.8, 4.7)	9.7 (15.1)	6.0 (1.6, 10.0)
Poor	4.1 (8.0)	1.8 (0.7, 4.4)	5.1 (8.7)	2.3 (0.9, 5.6)	11.6 (25.8)	7.4 (1.6, 12.2)
Middle	4.9 (8.6)	2.1 (0.8, 5.8)	5.6 (14.9)	2.9 (1.1, 6.4)	21.8 (46.7)	7.4 (1.9, 18.3)
Rich	6.1 (12.2)	2.7 (1.1, 6.9)	6.7 (12.1)	3.3 (1.3, 7.2)	21.4 (27.6)	12.0 (7.9, 26.6)
Richest	11.1 (24.1)	4.9 (1.9, 11.8)	13.6 (27.7)	5.8 (2.3, 14.2)	38.3 (50.5)	24.5 (9.5, 45.0)
Total	5.9 (13.8)	2.4 (0.9, 6.3)	7.3 (17.1)	3.1 (1.1, 7.4)	21.6 (38.3)	9.5 (3.2, 23.7)
Households with OOP payments (%)	38.2 (37.3,39.1)		57.0 (55.2, 58.7)		49.7 (45.1, 54.3)	
N (%)	45,069 (72.6)		19,184 (23.9)		1,679 (3.4)	

OOP; out-of-pocket payments; NSS-HUS 1995–96, NSS-HUS 2004, and NSS-HUS 2014 are National Sample Surveys on healthcare utilization; MPCE, monthly per capita consumption expenditure; IQR, interquartile range; [*] Includes expenditure on maternal health, immunization, and child birth.

Table 7.3 Mean and Median (IOR) out-of-pocket healthcare payments by household type for households that reported such payments across the four major consumption expenditure surveys conducted in India

MPCE quintiles	OOP payments (US$) for healthcare in the most recent month					
	Households with non-older persons only		Households with older and non-older persons		Households with older persons only	
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
	NSS-CES 1993–94					
Poorest	0.5 (0.6)	0.3 (0.2, 0.6)	0.5 (0.6)	0.3 (0.2, 0.6)	1.2 (1.1)	0.8 (0.4, 1.6)
Poor	0.7 (0.7)	0.4 (0.2, 0.9)	0.7 (0.7)	0.4 (0.2, 0.8)	2.1 (2.0)	1.4 (0.8, 2.7)
Middle	0.9 (1.0)	0.6 (0.3, 1.2)	0.9 (0.9)	0.5 (0.3, 1.1)	2.5 (2.5)	1.6 (0.8, 3.2)
Rich	1.3 (1.5)	0.8 (0.4, 1.7)	1.3 (1.4)	0.8 (0.4, 1.6)	3.7 (3.5)	2.7 (1.4, 5.4)
Richest	2.8 (5.1)	1.4 (0.6, 3.0)	2.6 (3.9)	1.4 (0.6, 2.9)	8.9 (15.4)	5.4 (2.3, 10.8)
Total	1.3 (2.8)	0.6 (0.3, 1.4)	1.3 (2.2)	0.7 (0.3, 1.4)	3.3 (7.1)	1.6 (0.8, 3.5)
HHs with OOP payments (%)	57.1 (56.7, 57.5)		66.7 (66.0, 67.4)		51.8 (49.5, 54.2)	
N (%)	85,446 (74.6)		27,364 (22.9)		2,544 (2.5)	
	NSS-CES 1999–2000					
Poorest	0.4 (0.5)	0.3 (0.1, 0.5)	0.5 (0.6)	0.3 (0.1, 0.6)	1.1 (1.1)	0.8 (0.4, 1.7)
Poor	0.7 (0.8)	0.4 (0.2, 0.8)	0.7 (0.7)	0.4 (0.2, 0.9)	1.8 (1.8)	1.1 (0.6, 2.6)
Middle	0.9 (1.1)	0.5 (0.2, 1.2)	0.9 (1.1)	0.5 (0.3, 1.1)	2.6 (2.6)	1.8 (0.8, 3.5)
Rich	1.3 (1.7)	0.7 (0.3, 1.5)	1.3 (1.6)	0.7 (0.4, 1.5)	4.4 (4.7)	2.9 (1.4, 5.3)
Richest	2.7 (7.8)	1.2 (0.5, 2.6)	2.4 (4.8)	1.2 (0.6, 2.5)	8.6 (24.5)	3.9 (1.8, 8.7)
Total	1.2 (3.8)	0.6 (0.2, 1.3)	1.2 (2.6)	0.6 (0.3, 1.3)	3.3 (10.9)	1.7 (0.7, 3.5)
HHs with OOP payments (%)	67.3 (66.9, 67.8)		77.3 (76.6, 78.0)		67.8 (65.6, 70.0)	
N (%)	87,257 (73.3)		30,156 (24.0)		2,894 (2.8)	

(…continues)

| MPCE quintiles | OOP payments (US$) for healthcare in the most recent month | | | | | |
| | Households with non-older persons only | | Households with older and non-older persons | | Households with older persons only | |
	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)	Mean (SD)	Median (IQR)
	NSS-CES 2004–05					
Poorest	0.6 (0.7)	0.4 (0.2, 0.7)	0.6 (0.7)	0.3 (0.1, 0.7)	1.1 (1.1)	0.7 (0.4, 1.0)
Poor	1.0 (1.2)	0.6 (0.2, 1.2)	1.0 (1.2)	0.6 (0.2, 1.3)	1.4 (1.3)	0.7 (0.3, 2.3)
Middle	1.4 (1.7)	0.8 (0.3, 1.8)	1.5 (2.0)	0.8 (0.3, 1.9)	2.3 (2.8)	1.2 (0.7, 2.9)
Rich	2.3 (2.9)	1.2 (0.5, 2.9)	2.3 (2.9)	1.2 (0.5, 2.9)	3.0 (3.2)	2.2 (0.9, 4.0)
Richest	5.5 (12.1)	2.1 (0.9, 5.4)	6.1 (15.1)	1.9 (0.8, 5.3)	7.5 (12.0)	3.3 (1.4, 8.7)
Total	2.0 (5.4)	0.8 (0.3, 1.9)	1.6 (5.1)	0.6 (0.2, 1.5)	5.3 (9.5)	2.3 (1.0, 5.6)
HHs with OOP payments (%)	66.2 (65.7, 66.7)		67.4 (66.6, 68.2)		65.8 (63.5, 68.1)	
N (%)	90,129 (73.3)		30,949 (23.6)		3,566 (3.1)	
	NSS-CES 2011–12					
Poorest	0.7 (0.7)	0.4 (0.2, 0.9)	0.8 (0.8)	0.5 (0.2, 1.0)	2.1 (1.9)	1.5 (0.7, 3.0)
Poor	1.0 (1.1)	0.6 (0.3, 1.2)	1.2 (1.3)	0.7 (0.4, 1.5)	3.6 (3.0)	2.8 (1.4, 5.0)
Middle	1.5 (2.0)	0.9 (0.4, 1.9)	1.8 (2.2)	0.9 (0.5, 2.2)	5.3 (4.8)	4.2 (1.9, 6.5)
Rich	2.4 (3.1)	1.3 (0.6, 2.8)	2.9 (3.6)	1.6 (0.7, 3.7)	9.0 (7.9)	6.7 (2.8, 13.1)
Richest	5.8 (12.6)	2.3 (1.0, 6.0)	7.8 (15.6)	3.6 (1.4, 9.0)	24.1 (33.9)	14.9 (6.0, 29.0)
Total	2.2 (6.0)	0.9 (0.4, 2.1)	2.9 (7.5)	1.1 (0.5, 2.7)	8.5 (18.1)	3.7 (1.4, 8.3)
HHs with OOP payments (%)	78.2 (77.6, 78.8)		87.9 (87.2, 88.7)		83.4 (81.0, 85.8)	
N (%)	72,465 (72.7)		26,131 (23.7)		3,066 (3.6)	

OOP, out-of-pocket; NSS-CES 1993–94, NSS-CES 1999–2000, NSS-CES 2004–05 and NSS-CES 2011–12 are National Sample Surveys on household consumer expenditure; IQR, interquartile range; MPCE, monthly per capita consumption expenditures.

monthly per capita OOP payments increased with MPCE quintiles, and the gap between poorest and richest was higher in households with older persons only. For instance, in NSS-HUS 2014, the richest had 4.07 times higher median per capita OOP payments than the poorest in households with older persons only, while this was 3.08 times in households with non-older persons only, and 2.98 times in households with both older and non-older persons.

After adjusting for covariates, the odds of CHE was 2.80 times (95% CI 2.38, 3.30) higher in households with older persons only, followed by households with older and non-older persons as compared to households with non-older persons only (Table 7.4). Households headed by females, larger households, household's employment in casual labour, and households in rural areas and those in more developed states were more likely to experience CHE. Richer households were significantly more likely to incur CHE. The incidence of CHE was higher in NSS-HUS 2014 than NSS-HUS 2011–12.

7.5 Discussion

This report provides evidence on the trends in OOP payments and CHE in India since 1993, comparing households with and without older persons. Three key findings relating to CHE emerge from this study. First, the incidence of CHE increased 1.5-2.2 times in India over the past twenty years up to 2014; the increase being lower in the decade after 2004. Second, CHE were higher in households with older persons than in other households. Third, other policy relevant variables associated with higher odds of CHE were households headed by females and rural households.

India spends around five percent of its Gross Domestic Product (GDP) on health with government contributing as low as one percent and the remaining being borne privately by the patients or their families.[216] The persistently low public investment in health, lack of adequate human resource, and poor health infrastructure in India is unable to cover the entire spectrum of healthcare needs resulting into worsening situation in terms of cost of care and its consequent financial burden.[290] According to a recent report, about 8% of the population in India was estimated to have been pushed below the poverty line due to high OOP payments for healthcare.[163] The relatively lower increase in CHE between NSS-HUS 2004 and NSS-HUS 2014 in our analyses is an encouraging finding. The introduction of nationwide health programmes like National Rural Health Mission in

Table 7.4 Associations of socio-demographic and economic variables with CHE (definition 1[a]) in NSS-CES 2011–12 and NSS-HUS 2014 using multivariate logistic regression

Variable	Categories	Total	CHE incidence	
		Total= 167,594* (% of total)	Number (%)	odds of CHE (95% CI)
Household type	Households with non-older persons only	117,534 (72.7)	29,317 (17.9)	1.00
	Households with older and non-older persons	45,315 (23.8)	16,791 (29.6)	1.69 (1.55, 1.85)
	Households with older persons only	4,745 (3.5)	2,358 (41.7)	2.80 (2.38, 3.30)
Place of residence	Urban	71,419 (31.9)	20,810 (20.4)	1.00
	Rural	96,175 (68.1)	27,656 (22.0)	1.28 (1.21, 1.36)
Household size	1–3 members	46,615 (32.3)	13,360 (21.6)	1.00
	4–6 members	92,186 (53.6)	25,921 (20.6)	1.03 (0.97, 1.10)
	7–9 members	22,465 (11.4)	7,064 (24.2)	1.21 (1.10, 1.32)
	10 or more members	6,328 (2.7)	2,121 (26.5)	1.16 (1.01, 1.33)
Gender of household head	Male	148,315 (88.0)	42,212 (21.0)	1.00
	Female	19,279 (12.0)	6,254 (25.0)	1.37 (1.23, 1.52)
Age of household head	Under 60 years	133,488 (81.5)	34,910 (19.0)	1.00
	60 years or more	34,106 (18.5)	13,556 (32.7)	1.17 (1.06, 1.29)
Marital status of household head	Others	24,884 (15.8)	7,339 (21.3)	1.00
	Currently married	142,708 (84.2)	41,127 (21.5)	1.42 (1.29, 1.56)
Caste	SC/STs	48,766 (27.9)	12,000 (19.2)	1.00
	Non SC/STs	118,814 (72.1)	36,465 (22.4)	1.13 (1.07, 1.20)
Education of household head	Literate	118,788 (66.4)	32,127 (20.9)	1.00
	Illiterate	41,707 (33.6)	12,953 (22.6)	1.07 (1.00, 1.14)
Household's employment	Regular wage/salary earning	42,795 (19.5)	11,075 (19.4)	1.00
	Self-employed	79,345 (46.2)	22,990 (21.5)	1.04 (0.96, 1.11)
	Casual labour	33,287 (26.9)	9,914 (21.0)	1.18 (1.08, 1.28)
	Others	12,140 (7.4)	4,482 (29.1)	1.20 (1.07, 1.35)
MPCE quintiles	Poorest	2,4813 (20.2)	6,639 (18.8)	1.00
	Poor	28,871 (19.9)	7,824 (19.7)	1.11 (1.01, 1.21)
	Middle	33,274 (20.0)	9,093 (21.5)	1.27 (1.17, 1.39)
	Rich	37,957 (20.0)	11,051 (23.0)	1.45 (1.32, 1.58)
	Richest	42,669 (20.0)	13,859 (24.6)	1.79 (1.63, 1.97)
State	Less developed states	86,652 (46.0)	21,359 (19.1)	1.00
	More developed states	80,942 (54.0)	27,107 (23.6)	1.24 (1.18, 1.31)
Survey	NSS-CES 2011–12	101,662 (50.2)	16,838 (18.2)	1.00
	NSS-HUS 2014	65,932 (49.8)	31,628 (24.9)	1.55 (1.48, 1.63)

1[a] out-of-pocket payments equalling or exceeding 10% of a household's total expenditure; NSS-CES is the National Sample Survey on consumption expenditure; NSS-HUS is the National Sample Survey on healthcare utilization; MPCE, monthly per capita consumption expenditure; CI, confidence interval; SC/STs, scheduled castes/scheduled tribes; *data missing: marital status for 2; caste for 14; 7,099 for education of household head; 27 for household's occupation; MPCE quintiles for 10.

2005 and Rashtriya Swasthya Bima Yojana in 2008 may have had some protective effect against the high cost of healthcare for the poor and marginalised population in India. In areas with weak institutional capacity to organize mandatory nationwide risk-pooling, the community-based health insurance schemes can be an effective tool to protect poor households from the uncertain risk of medical expenses.[286] Strengthening the health

system for providing comprehensive care through increased investment in healthcare and human resources will be instrumental in reducing the burden of CHE.

The high healthcare expenditure by the older population and the consequent higher financial burden found in our study is of special relevance in the context of India's aging demographic profile. A previous study in India using data from NSS-CES 1999–2000 also showed that monthly per capita health spending of households with older persons was 3.8 times higher than in households with non-older persons.[173] High expenditure on healthcare among the older population can largely be attributed to the deteriorating health at older ages, and the higher prevalence of chronic diseases and disabilities. Evidence from LMICs indicates that the households with older persons, especially those with chronic non-communicable diseases or disabilities, experience higher rates of CHE than other households.[114, 147, 168, 282] Even in some of the wealthiest countries in Europe, older people with diagnosed chronic diseases faced CHE.[117] The growing older population and the absence of active measures to reduce CHE will result in increasing proportion of the older population falling into poverty and poor health in the coming decades.[174]

Recognizing the population at risk of catastrophic health expenditure is important to provide targeted preventative health interventions and financial protective interventions through prepayment schemes. Whether or not to seek healthcare usually involves a shared decision made by household members, in which the head of household plays a critical role.[150] We found that households headed by females were at a higher risk of CHE indicating gender differences in capacity to pay for healthcare. Households in rural areas had higher incidence of CHE. Rural households are inherently disadvantaged in many systems as their health needs are greatest, but their economic resources are severely constrained.[291] Greater supply of health services and better physical access might have resulted in higher use of health services and CHE in the more developed states. It is important to increase the availability of health services in less developed states to improve healthcare use, but this needs to be accompanied by ways of protecting households from the adverse consequences of OOP payments.

Some studies report a higher incidence of CHE among the poor,[111, 144, 149, 177, 292] while others report higher CHE incidence among the rich.[138, 139, 147, 293] We found that CHE increased with monthly per capita consumption expenditure quintiles even after adjusting for other covariates in the model. The higher incidence of CHE among the rich illustrates

the inequity in access to healthcare when payments for care are OOP.[166] Better-off households can more often respond to medical needs, but are less likely to face permanent impoverishment. Whereas, in the absence of adequate resources, poor households simply choose to forgo healthcare to avoid CHE in the short run, but possibly with long term severe consequences on health and earnings. Evidence suggests that the exclusion of households who are too poor to afford high healthcare costs from the calculation of CHE grossly underestimates the adverse impact of ill-health in poorer households.[294]

The NSS-HUS had higher CHE rates than NSS-CES. This trend persisted in the multivariable analysis for NSS-HUS 2014 and NSS-CES 2011–12. The health expenditure data obtained form NSS-HUS is associated with less recall bias and more accurate reporting as this information is largely collected form the individual who utilized healthcare, while in NSS-CES the respondent is the head of the household. In addition, a more comprehensive collection of health expenditure data in the intensive health utilization surveys often results in higher CHE than the estimate obtained from consumer expenditure surveys.[166, 285, 295] The magnitude of both OOP payments and catastrophic spending on health are affected by the survey design, choice of recall period, and number of items included to obtain health expenditures.[296] Therefore, the comparison of estimates across different types of surveys or across time for a given survey must be done in light of the variations in the survey instruments used.

As expected, CHE defined as 40% or more of household's CTP produced a much lower incidence than with the definition of 10% or more of the household's consumption expenditure (3.3- 4.6% vs 11.0-18.2% across the NSS-CES) in our study. This difference has also been reported in other studies.[153, 166, 285] In order to understand the sensitivity of CHE estimates to the threshold for defining CHE, we explored different thresholds for these two types of definition of CHE. CHE incidence was generally similar when defined as 40% or more of household's CTP and 20% or more of the household's consumption expenditure, and also similar when defined as 30% or more of household's CTP and 15% or more of the household's consumption expenditure. These comparisons offer insights into how different definitions and thresholds for CHE can be explored for a complete understanding of the distribution of CHE.

The findings in this report must be interpreted in the light of some limitations. First, the calculation of OOP payments does not include indirect costs like the loss of household

income which might underestimate the incidence of CHE. Second, by estimating CHE based on the households that incurred health expenditure, those who did not seek treatment due to high costs were left out of the adverse impact of healthcare expenditure. Third, the expenditure data are self-reported and are not verifiable from other sources. Fourth, longitudinal data should ideally be used to estimate the extent to which living standards are seriously disrupted by the purchase of healthcare in response to illness shocks. However, in the absence of these data, the use of repeated cross-sectional data provides a fairly reliable estimate of CHE trends.

The increasing life expectancy and the growing proportion of the older population are contributing to the increasing morbidity and health expenditure in India. This report provides evidence on the extent of the changing OOP payments and CHE for the older and non-older persons over two decades. The continuing higher risk of OOP payments and CHE among households with older persons suggests that viable pre-payment and risk pooling mechanisms should be provided for the increasing older population in India. Risk protection for other vulnerable households, those headed by females and those in rural areas, also needs to be more effective.

7.6 Ethics statement

The study is based on secondary data from the National Sample Surveys with no identifiable information on the survey participants. Exemption from ethics approval for analysis of the National Sample Surveys data was obtained from the institutional ethics committees of the Public Health Foundation of India and the London School of Hygiene and Tropical Medicine.

7.7 Acknowledgement

RESEARCH PAPER COVER SHEET

PLEASE NOTE THAT A COVER SHEET MUST BE COMPLETED FOR EACH RESEARCH PAPER INCLUDED IN A THESIS.

SECTION A – Student Details

Student	Anamika Pandey
Supervisor(s)	Ms Lynda Clarke, Professor Lalit Dandona and Professor George B. Ploubidis
Thesis Title	Socioeconomic inequality in healthcare utilization and expenditure in the older population of India

If the Research Paper has previously been published please complete Section B, if not please move to Section C

SECTION B – Paper already published

Where was the work published?			
When was the work published?			
If the work was published prior to registration for your research degree, give a brief rationale for its inclusion			
Have you retained the copyright for the work?*		Was the work subject to academic peer review?	

*If yes, please attach evidence of retention. If no, or if the work is being included in its published format, please attach evidence of permission from the copyright holder (publisher or other author) to include this work.

SECTION C – Prepared for publication, but not yet published

Where is the work intended to be published?	Social Science and Medicine
Please list the paper's authors in the intended authorship order:	Anamika Pandey, Lynda Clarke, Lalit Dandona, George B. Ploubidis

Stage of publication	Under peer-review

SECTION D – Multi-authored work

For multi-authored work, give full details of your role in the research included in the paper and in the preparation of the paper. (Attach a further sheet if necessary)	Please refer the attached Section D after this cover sheet

Student Signature: _Anamika_____ **Date:** _08/08/2017_____

Supervisor Signature: _____ **Date:** _08/08/2017_____

Supervisor Signature: _Lalit Dandona_____ **Date:** _08/08/2017_____

Supervisor Signature: _George B. Ploubidis_____ **Date:** _08/08/2017_____

Section D – Student's role in multi-authored work

This paper is authored by Ms Anamika Pandey, Professor George B. Ploubidis, Ms Lynda Clarke and Professor Lalit Dandona. I am the first and the corresponding author. Ms Lynda Clarke from London School of Hygiene and Tropical Medicine, Professor Lalit Dandona from Public Health Foundation of India, and Professor George B. Ploubidis from Institute of Education, University College London are the supervisors for my PhD under the PHFI-UKC Wellcome Trust Capacity Building Programme.

I conceptualized this study and developed the study design under the guidance of my supervisors. I acquired the datasets in ASCII formats from the Ministry of Statistics and Programme Implementation and extracted the relevant data in STATA format for analyses. I conducted the analyses, interpreted the statistical output and the findings in consultation with my supervisors. I wrote the first draft of the research paper and then took input from my supervisors on the manuscript. After receiving substantial inputs, both, in terms of paper writing and data analyses, I further worked on data analyses and revised the paper. I finalized the paper for submission to the journal with guidance and approval from my supervisors. I submitted the paper to the journal and handled journal communications related to the paper. The paper is currently under peer-review. As the first and corresponding author of the paper, I am responsible and accountable for the accuracy and integrity of all the aspects presented in the paper.

Chapter 8. Has the inequity in out-of-pocket payments for hospitalization increased in India? Evidence from the National Sample Surveys, 1995–2014

8.1 Abstract

Objective

We report changes in inequity in out-of-pocket (OOP) payments for hospitalization in India between 1995 and 2014 contrasting older population (60 years or more) with population under 60 years (younger population).

Methods

We used data from nationwide healthcare surveys conducted in India by the National Sample Survey Organization in 1995-96, 2004 and 2014 with the sample sizes ranging from 333,104 to 629,888. We used generalized linear and fractional response models to study the determinants of OOP payments and their burden (share of OOP payments in household consumption expenditure). The relationship between predicted OOP payments and its burden with monthly per capita consumption expenditure (MPCE) quintiles and selected socioeconomic characteristics were used to examine vertical and horizontal inequities in OOP payments.

Results

The older population had higher OOP payments for hospitalization at all time points (range: 1.15-1.48 times) and a greater increase between 1995 and 2014 than the younger population (2.43 vs 1.88 times). The burden of OOP payments increased slightly more for the older than the younger population in the poorest (3.17 vs 3.01 times) and in the richest quintiles (1.37 vs 1.14 times) between 1995 and 2014. The burden of OOP payments was positively related to MPCE quintiles in 1995–96 indicating a progressive system, whereas the burden of OOP payments was negatively associated with MPCE quintiles in 2004 and 2014 indicating a regressive system of healthcare financing. Horizontal inequities worsened between 1995 and 2014 for both age groups. The burden of OOP payments was higher in the less developed than the more developed states across MPCE quintiles; this differential was higher for the older population in 2014 (range: 1.79-6.93 percentage points) and for the younger population in 2004 (range: 1.88-4.62 percentage points).

Conclusion

High OOP payments for hospitalization and the worsening inequities among older population calls for better risk pooling and prepayment mechanisms in India.

Keywords

Gender, horizontal inequity, hospitalization, less developed states, older population, out-of-pocket payments, progressive, regressive, vertical inequity.

Highlights

- Used serial nationwide healthcare surveys conducted in India.
- Examined change in inequity in out-of-pocket (OOP) payments for hospitalization.
- Provided comparative analyses of older population with younger population.
- Older population had higher OOP payments for hospitalization and a greater increase.
- An OOP payment for hospitalization was progressive in 1995–96 but regressive in 2004 and 2014.

8.2 Introduction

Equitable financing, based on the premise that the risks each household faces due to the costs of the healthcare are distributed according to ability to pay rather than to the risk of illness, is the fundamental goal of healthcare systems.[17] Financial protection is also the key element of Universal Health Coverage which aims at ensuring health services for people without the risk of financial catastrophe.[297] The increasing dependence on private care with an absence of adequate medical insurance and increasing cost of medical care are some of the principal causes of direct debt and poverty in India.[217] Catastrophic healthcare expenditures are a major cause of household debt for families on low and middle incomes; indeed, the cost of healthcare is a leading cause of poverty in India.[142, 154, 156, 266] Approximately, 60 million Indians were pushed below the poverty line in 2010 because they could not meet their healthcare costs.[157]

India's health system ranks as one of the most heavily dependent on out-of-pocket (OOP) expenditure in the world.[20] High proportions of OOP payments for healthcare can keep a country from attaining equitable financing, because OOP payments for healthcare tend to be regressive and often impede access to health services.[17] Evidence suggests that the burden associated with OOP payments for hospitalization is higher than the outpatient care in India.[151, 163] Moreover, the healthcare expenditure for the older population is considerably higher than other age groups and the concerns over high OOP expenditures are greatest for this group.[127, 136, 167, 170, 173] It is of immense importance from a policy perspective to obtain evidence on the inequities in OOP payments for hospitalization of the older population in India, given their increasing proportion in the total population, higher disease burden, increasingly higher cost of healthcare and persistently low public investment in healthcare.

Against this backdrop, this study is the first of its kind to examine the changes in both horizontal and vertical inequities in OOP payments for hospitalization of the older population (aged 60 years or more) in India between 1995 and 2014 using national wide healthcare surveys. We compare the results with the population under 60 years (younger population) to examine if there are any differences in the levels and trends of inequity.

8.3 Methods

8.3.1 Data

We used individual level data from three rounds of the National Sample Survey Organization (NSSO): survey on healthcare of 1995–96 (52nd round); survey on morbidity and healthcare of 2004 (60th round); and survey on social consumption: health of 2014 (71st round) conducted under the stewardship of the Ministry of Statistics and Programme Implementation, Government of India. Details of the sampling design, survey instruments, and initial findings can be found in the national reports.[196, 199, 234] All the surveys collected detailed information on the expenditure incurred on each episode of hospitalization within a 365-days reference period. We limit our analysis to the older population who were hospitalized at least once during the 365-days reference period and were alive at the time of survey with sample sizes 3,209 in NSS 1995–96; 4,974 in NSS 2004 and 7,065 in NSS 2014. For comparison purposes, we present results of the hospitalized population under 60 years with sample sizes: 19,597 in NSS 1995–96; 24,062 in NSS 2004 and 28,606 in NSS 2014.

8.3.2 Dependent variables

Our dependent variable was the OOP payments made on all episodes of hospitalization by an individual and the ratio of individual OOP payments on hospitalization in total household consumption expenditure, henceforth called as the burden of OOP payments. We exclude from individuals' OOP expenses any payments that were later reimbursed by employers/other agencies. The expenditure on hospitalization includes doctor's/surgeon's fee, bed charges, cost of medicines, charges for diagnostics tests, charges for ambulance and other services, cost of oxygen and blood supply, attendant charges, cost of personal medical appliances, physiotherapy, food and other materials, transportation other than ambulance and lodging charges of the escorts. The expenditure reported in Indian rupees (INR) was converted to 2014 prices using gross domestic product deflator and then to United States dollars (US$; exchange rate: US$ 1=63.33 INR).[288, 289]

8.3.3 Covariates

Information on household consumption expenditure was available in these surveys only in aggregate in the 30-days reference period. We converted the consumption expenditure to correspond to the same recall period to make them comparable with OOP payments for hospitalization. We used household consumption expenditure adjusted for household size

and economies of scale as a measure of economic status.[241] Based on the Andersen model of healthcare utilization we identified, age, sex, marital status and social group as predisposing factors, monthly per capita consumption expenditure (MPCE) quintiles, education, rural/urban, and less/more developed states as enabling factors and whether hospitalized more than once, whether hospitalized at least once in private hospital, and whether hospitalized at least once for non-communicable diseases (NCDs) as the need factors.[242]

8.3.4 Statistical analysis

To model individual OOP payments for hospitalization we used a generalized linear model with gamma distribution and log link function to take into account the positive skewness in the expenditure data.[298] The output was presented as exponentiated coefficients with 95% confidence interval (95% CI). In order to analyze the burden of OOP payments, a fractional response generalized linear model was used.[299-301] We used a logit link function which is the canonical link function for generalized linear models for the binomial family. This model can predict determinants of proportions and requires a dependent variable ranging from '0' to '1'. The share of OOP payments in household's consumption expenditure is a proportion. However, it could occur that total OOP payments exceeded the consumption expenditure in the preceding 365-days. In these cases, when the dependent variable was greater than '1', the values were replaced by '1' for the regression analysis. The results of this model were reported as average marginal effects with robust standard errors.

To assess vertical inequities (dissimilar out-of-pocket payments by households of unequal ability to pay), we examined how predicted OOP payments for hospitalization, both absolute and as a share of household consumption expenditure varied across MPCE quintiles. Mean predicted OOP expenditure and shares were calculated across MPCE quintiles, setting all other covariates at their sample means. To assess horizontal inequities (similar out-of-pocket payments by households of equal ability to pay), we compared whether predicted OOP payments, both absolute and as a share of household consumption expenditure, varied among individuals across two groups distinguished by a non-income-related characteristic, but were otherwise similar in terms of MPCE quintiles and other non-income-related characteristics. The non-income-related characteristics that were varied to assess horizontal inequities across the two groups were gender (male or female), place of residence (rural vs urban), state (less developed vs more developed

states), whether hospitalized in private hospital (yes or no) and whether hospitalized for NCDs (yes or no) controlling for the MPCE quintiles and all other non-income-related characteristics that might affect ATP. Mean predicted payment shares (burden of OOP payments) across adult equivalent MPCE quintiles were obtained by setting the relevant non-income-related characteristics to zero or one (instead of the sample average), and all other covariates at their sample mean. The regression based method for assessing inequities in healthcare cost used here is in line with previous studies.[132, 133] We carried all analyses at the individual level and applied survey sampling weights.

8.4 Results

8.4.1 Sample characteristics

The proportion of the older population who had been hospitalized within 365-days reference period showed a steady increase; from 3.8% in 1995–96 to 8.0% in 2014. The older population in the higher MPCE quintiles reported higher hospitalization, particularly for NCDs and greater use of private hospitals in all the three surveys. The increase in mean annual OOP payments for hospitalization was higher than the increase in mean annual household consumption expenditure per capita, more so for the poorest older population (4.60 vs 1.25 times). Higher proportions of the older population in the lower quintiles were illiterate and lived in rural areas (Table 8.1).

Compared to the younger population, the older people had higher hospitalization for NCDs (range, 1.46-1.78 times) and consequently higher OOP payments (range, 1.15-1.48 times) at all-time points. Also the increase in OOP payments for hospitalization between 1995 and 2014 was higher for the older population than the population under 60 years (2.43 vs 1.88 times) (Appendix H-1).

8.4.2 Determinants of OOP payments for hospitalization

Economic status measured in terms of MPCE quintiles were a significant predictor of OOP payments after controlling for all other covariates (Table 8.2). Compared to the richer quintiles, the poorest quintile of the older population had 0.171 times (95% CI 0.125, 0.235) and 0.388 times (95% CI 0.305, 0.493) lower OOP payments in 1995–96 and 2014, respectively. Those residing in less developed states had higher mean OOP payments than their counterparts in more developed states 42.9% (94% CI 1.205, 1.694)

Table 8.1 Selected socio-economic characteristics by monthly per capita consumption expenditure quintiles for hospitalized older population in India, NSS 1995–96, NSS 2004 and NSS 2014

Characteristics	Poorest	Poor	Middle	Rich	Richest	All
			NSS 1995–96			
Female (%)	38.0	43.3	35.3	44.3	38.9	40.2
Illiterate (%)	76.1	65.1	65.8	55.1	42.2	54.9
Rural (%)	79.6	82.1	76.1	73.1	53.0	67.7
Less developed states[1] (%)	32.4	28.0	27.2	24.0	20.5	24.4
Hospitalized for NCDs[2] (%)	58.2	48.7	54.5	62.4	64.7	60.1
Used private hospital (%)	39.7	46.3	52.8	50.6	74.8	58.5
Mean annual OOP payments (US$) per hospitalized person (SD)	40 (76)	40 (46)	100 (112)	118 (131)	328 (488)	179 (334)
Mean annual household consumption expenditure (US$) per capita (SD)	180 (31)	248 (15)	307 (20)	388 (31)	712 (348)	463 (294)
Hospitalized (%)	1.6	2.1	3.0	5.0	7.7	3.8
			NSS 2004			
Female (%)	42.3	41.0	45.5	44.1	46.7	44.5
Illiterate (%)	77.3	63.3	61.4	50.6	28.7	51.0
Rural (%)	91.1	85.8	80.0	65.8	38.8	66.1
Less developed states[1] (%)	30.6	33.6	28.1	25.5	19.5	25.9
Hospitalized for NCDs[2] (%)	71.9	68.2	68.6	67.1	76.1	71.1
Used private hospital (%)	39.9	52.8	60.4	65.1	78.1	63.1
Mean annual OOP payments (US$) per hospitalized person (SD)	110 (210)	150 (257)	177 (323)	248 (464)	477 (1,157)	276 (730)
Mean annual household consumption expenditure (US$) per capita (SD)	163 (31)	237 (17)	302 (20)	397 (36)	816 (537)	459 (398)
Hospitalized (%)	3.8	4.6	5.7	7.2	9.8	6.1
			NSS 2014			
Female (%)	54.0	50.3	49.9	45.2	50.5	49.8
Illiterate (%)	71.7	67.3	63.5	45.6	28.5	49.8
Rural (%)	83.4	78.1	75.3	62.5	38.7	61.9
Less developed states[1] (%)	53.6	39.8	31.2	27.8	20.4	31.2
Hospitalized for NCDs[2] (%)	80.7	78.1	75.5	80.2	86.1	81.1
Used private hospital (%)	42.2	52.5	63.6	66.5	81.0	65.5
Mean annual OOP payment (US$) per hospitalized person (SD)	186 (354)	180 (430)	254 (437)	371 (714)	779 (1,454)	435 (979)
Mean annual household consumption expenditure (US$) per capita (SD)	224 (47)	331 (26)	425 (30)	566 (54)	1,199 (734)	674 (578)
Hospitalized (%)	4.9	6.2	7.9	8.5	12.3	8.0

[1] Includes eight empowered action group states (Bihar, Jharkhand, Madhya Pradesh, Chhattisgarh, Uttar Pradesh, Uttaranchal, Odisha and Rajasthan), 8 north-eastern states (Assam, Arunachal Pradesh, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim, Tripura), Himachal Pradesh and Jammu and Kashmir. [2] Based on Global Burden of Disease 2013 classification; NCDs, non-communicable diseases and injuries; OOP, out-of-pocket, SD: standard deviation.

Table 8.2 Determinants of out-of-pocket payment for hospitalization among older population in India, NSS 1995–96, NSS 2004 and NSS 2014

MPCE quintiles (*ref. = Richest*)	GLM exp (b) (95% CI)		
	NSS 1995–96	NSS 2004	NSS 2014
Poorest	0.171 (0.125,0.235)	0.371 (0.304,0.452)	0.388 (0.305,0.493)
Poor	0.193 (0.154,0.241)	0.467 (0.390,0.560)	0.373 (0.299,0.466)
Middle	0.362 (0.287,0.457)	0.472 (0.403,0.553)	0.543 (0.448,0.657)
Rich	0.478 (0.401,0.570)	0.605 (0.521,0.702)	0.584 (0.488,0.700)
Age (years)	1.000 (0.989,1.012)	0.993 (0.986,0.999)	1.002 (0.990,1.014)
Gender (ref.= Male)			
Female	0.876 (0.742,1.035)	0.995 (0.865,1.144)	0.845 (0.744,0.959)
Marital status (ref. = Married)			
Single	0.864 (0.745,1.002)	0.813 (0.709,0.933)	0.822 (0.722,0.937)
Social group (ref. = Non-SC/STs)			
SC/STs	1.040 (0.865,1.250)	0.816 (0.714,0.933)	0.777 (0.694,0.871)
Education (ref. = Literate)			
Illiterate	0.862 (0.726,1.022)	0.759 (0.670,0.859)	0.802 (0.723,0.889)
Place of residence (ref. = Urban)			
Rural	0.953 (0.827,1.098)	0.910 (0.802,1.032)	0.819 (0.716,0.937)
States (ref. = More developed states)			
Less developed states	1.429 (1.205,1.696)	1.505 (1.344,1.686)	1.674 (1.402,2.000)
Whether hospitalized more than once (ref. = No)			
Yes	1.183 (0.950,1.473)	1.369 (1.083,1.730)	1.041 (0.904,1.199)
Duration of stay in hospital (days)	1.013 (1.005,1.022)	1.044 (1.036,1.053)	1.057 (1.047,1.067)
Whether hospitalized for NCDs (ref. = No)			
Yes	1.218 (1.062,1.397)	1.335 (1.196,1.490)	1.720 (1.524,1.942)
Whether hospitalized in private hospital (ref. = No)			
Yes	2.147 (1.828,2.522)	2.750 (2.402,3.149)	3.602 (3.004,4.320)
Constant	117 (51,268)	151 (89,254)	79 (42,148)
N	3,139	4,913	7,062

GLM generalized linear model; CI, confidence interval; MPCE, monthly per capita consumption expenditure; NCDs, non-communicable diseases and injuries, SC/STs, scheduled castes/scheduled tribes.

and this increased further to 67.4% (95% CI 1.402, 2.000) in 2014. Longer duration of hospitalization significantly increased the mean cost by 5.7% in 2014. Hospitalization for NCDs was significantly associated with higher mean OOP payments ranging from 21.8% in 1995-96 to 72.0% in 2014. Those hospitalized in private hospitals incurred 2.147 (95% CI 1.828, 2.522) times higher OOP payments in 1995-96 which increased to 3.602 (95% CI 3.004, 4.320) in 2014. Residing in rural areas, being female, illiterate and belonging to the SC/ST social group were associated with significantly lower OOP payments in 2014.

8.4.3 Determinants of financial burden of OOP payments for hospitalization

Compared to the richest quintile, the poorest older population had 5.2 percentage points lower share of OOP payments in their total household consumption expenditure in 1995–96; however, in 2014 the burden was 12.2 percentage points higher for the poorest than the richest (Table 8.3). Those hospitalized for NCDs had significantly higher burden of OOP payments ranging from 2.9 to 7.4 percentage points between 1995 and 2015. The

Table 8.3 Determinants of out-of-pocket payments for hospitalization as a share of household consumption expenditure for the older population in India, NSS 1995–96, NSS 2004 and NSS 2014

Background characteristics	Average partial effects (95% CI)		
MPCE quintiles (*ref. = Richest*)	NSS 1995–96	NSS 2004	NSS 2014
Poorest	-0.052 (-0.083,-0.020)	0.122 (0.086,0.159)	0.122 (0.071,0.173)
Poor	-0.073 (-0.092,-0.055)	0.075 (0.046,0.103)	0.013 (-0.033,0.058)
Middle	-0.014 (-0.068,0.040)	0.038 (0.015,0.061)	0.029 (-0.009,0.066)
Rich	-0.034 (-0.054,-0.014)	0.019 (-0.001,0.039)	0.007 (-0.027,0.041)
Age (years)	-0.001 (-0.002,0.001)	-0.001 (-0.002,0.000)	-0.001 (-0.003,0.000)
Gender (ref.= Male)			
Female	-0.031 (-0.055,-0.007)	-0.011(-0.030,0.009)	-0.032 (-0.053,-0.012)
Marital status (ref. = Married)			
Single	-0.005 (-0.024,0.014)	-0.011 (-0.031,0.008)	0.004 (-0.022,0.031)
Social group (ref. = Non-SC/STs)			
SC/STs	0.003 (-0.024,0.030)	-0.033 (-0.053,-0.013)	-0.032 (-0.051,-0.012)
Education (ref. = Literate)			
Illiterate	0.007 (-0.022,0.035)	-0.031 (-0.050,-0.012)	-0.016 (-0.037,0.005)
Place of residence (ref. = Urban)			
Rural	0.018 (0.003,0.033)	0.006 (-0.013,0.024)	-0.013 (-0.038,0.012)
States (ref. = More developed states)			
Less developed states	0.007 (-0.015,0.028)	0.033 (0.016,0.050)	0.069 (0.033,0.105)
Whether hospitalized more than once (ref. = No)			
Yes	0.032 (0.000,0.064)	0.027 (0.000,0.055)	0.033 (0.004,0.061)
Duration of stay in hospital (days)	0.000 (0.000,0.001)	0.005 (0.004,0.006)	0.006 (0.005,0.007)
Whether hospitalized for NCDs (ref. = No)			
Yes	0.028 (0.007,0.049)	0.038 (0.021,0.055)	0.074 (0.055,0.094)
Whether hospitalized in private hospital (ref. = No)			
Yes	0.070 (0.050,0.089)	0.141 (0.126,0.155)	0.180 (0.157,0.202)
N	3,139	4,913	7,062

CI, confidence interval; MPCE, monthly per capita consumption expenditure; NCDs, non-communicable diseases and injuries, SC/STs, scheduled castes/scheduled tribes.

burden of OOP expenditure was 7.0 percentage points higher in private hospitals which increased to 14.1 percentage points in 2004 and further to18.0 percentage points in 2014. Increase in duration of stay by one day was associated with 0.60 percentage points increase in the burden of OOP payments in 2014. Being female and belonging to the SC/ST caste group was significantly associated with a lower burden (by 3.2 percentage points) of OOP payments in 2014. Those residing in the less developed states had 6.9 percentage points higher share of OOP payments in total household consumption expenditure in 2014 than the more developed states. The rural residents had 1.80 percentage points significantly higher burden of OOP payments in 1995–96 than the urban residents. Literacy was significantly associated with the burden of OOP payments but only in 2004 where the illiterate older population had 3.1 percentage points lower financial burden.

8.4.4 Vertical inequities in OOP payments for hospitalization

Figure 8.1 shows the trends in predicted mean OOP payments for hospitalization across MPCE quintiles for the older population and the population under 60 years in India. The OOP payments increased with the rising household consumption expenditure for all the three surveys. The OOP expenditure of the poorest older population increased 3.38 times in the past two decades, while that of the richest increased 1.85 times. Since payments are expressed in absolute terms, it does not truly assess the "progressivity" (or vertical equity) of the financial system. Figure 8.2 captures the latter aspect as it shows the proportion of consumption spent on hospitalization across the MPCE quintiles in the past two decades. In 1995-96, the older population in the lower MPCE quintiles paid a lower share, indicating a progressive system. However, in 2004 and 2014, the richer quintiles were paying a lower share indicating a regressive system of healthcare financing. The share of OOP payments in total household consumption expenditure increased 1.37 times for the richest while it increased 3.17 times for the poorest in the past two decades. Most of the increase in burden of OOP payments across MPCE quintiles occurred between 1995 and 2004.

The trends in OOP payments and its burden were similar for the two age groups; however, the levels were different. The OOP payments of the older population in poor quintiles were similar to those under 60 years, but in the rich quintiles the older population had higher OOP payments than the younger population at all-time points (range, 1.12-1.82 times). Between 1995 and 2014, the burden due to OOP payments increased more for the older population than the younger population in the poorest (3.17 vs 3.01 times) and the richest quintile (1.37 vs 1.14 times) (Figure 8.2).

8.4.5 Horizontal inequities in OOP payments for hospitalization

Table 8.4 shows that the OOP payments for hospitalization in private hospitals by the older population was considerably higher than that in the public hospitals across quintiles in all years (range, 46.6-74.9%) with the gap being highest in 2014. The cost of hospitalization for NCDs was higher than CDs/other diseases; this difference was lower for the poorest than the richest older population in 1995–96. However, in the latter time points the difference between the OOP payments by disease group was higher for the poor than the rich older population. The OOP payments for hospitalization of the older population was higher in the less developed than the more developed states across all
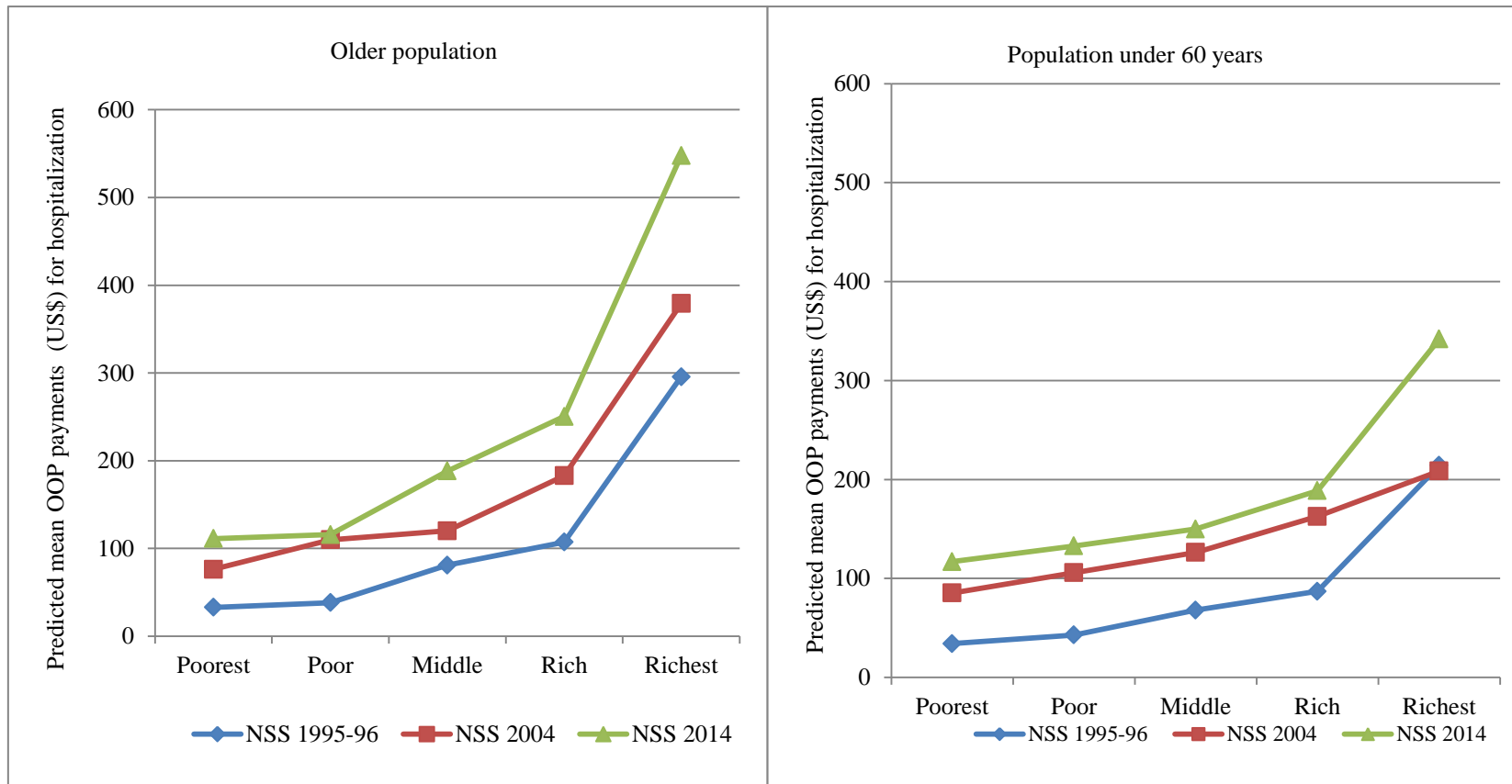
Figure 8.1 Predicted mean out-of-pocket payments (US$) for hospitalization across monthly per capita consumption expenditure quintiles by age groups in India, NSS 1995–96, NSS 2004 and NSS 2014
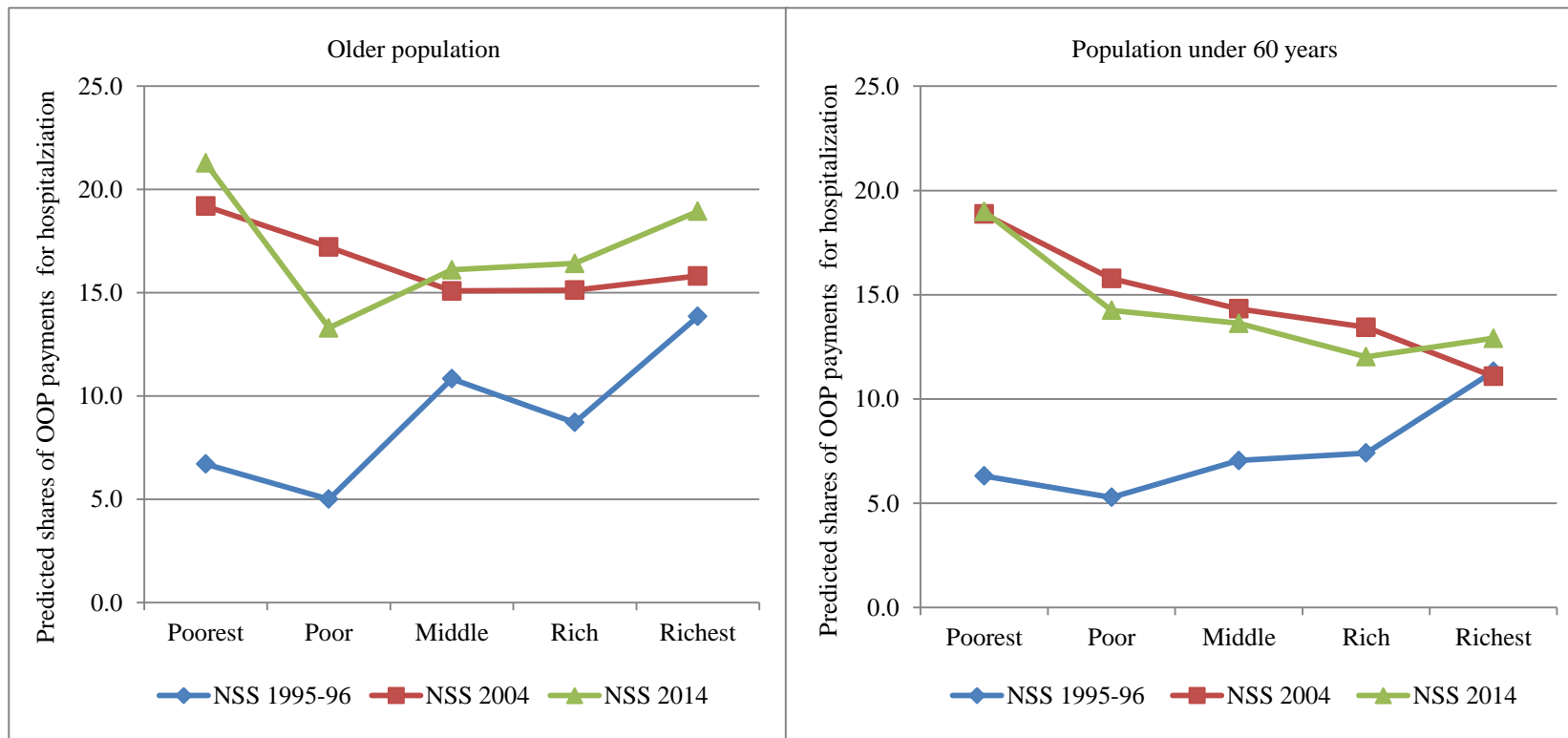
Figure 8.2 Predicted shares of out-of-pocket payments for hospitalization in household consumption expenditure across monthly per capita consumption expenditure quintiles by age groups in India, NSS 1995–96, NSS 2004 and NSS 2014

Table 8.4 Predicted mean out-of-pocket payments (US$) for hospitalization of older population and population under 60 years in India, NSS 1995–96 NSS 2004 and NSS 2014

| | Older population | | | | | | | | | |
| | Predicted mean out-of-pocket payments (US$) | | | | | | | | | |
MPCE quintiles	Male	Female	Urban	Rural	More developed states	Less developed states	Public	Private	CDs/other diseases	NCDs
					NSS 1995–96					
Poorest	36	29	28	34	31	38	25	49	28	37
Poor	45	31	35	39	37	41	29	54	35	42
Middle	88	70	76	83	79	85	54	116	64	98
Rich	120	92	109	107	102	127	75	149	96	114
Richest	343	233	275	315	288	327	178	350	232	336
					NSS 2004					
Poorest	77	75	69	77	72	87	53	130	54	87
Poor	127	89	119	108	103	124	63	178	77	130
Middle	136	103	125	119	110	152	67	176	87	139
Rich	208	156	183	183	166	245	99	254	142	207
Richest	422	335	385	370	368	429	189	461	283	416
					NSS 2014					
Poorest	131	96	113	111	85	140	62	247	55	131
Poor	138	98	130	112	103	139	60	211	67	135
Middle	234	151	217	180	167	245	90	288	110	224
Rich	341	172	276	236	218	360	104	389	126	297
Richest	677	445	583	496	529	627	186	706	272	613

(…continues)

(....continued)

MPCE quintiles	Male	Female	Urban	Rural	More developed states	Less developed states	Public	Private	CDs/other diseases	NCDs
					Population under 60 years					
					Predicted mean out-of-pocket payments (US$)					
					NSS 1995–96					
Poorest	36	33	24	37	29	46	26	56	31	46
Poor	48	39	34	45	40	49	33	68	37	63
Middle	73	62	52	73	65	75	50	91	58	97
Rich	92	82	71	95	82	98	64	111	72	129
Richest	229	199	184	250	202	254	148	256	165	316
					NSS 2004					
Poorest	95	76	77	86	71	106	57	147	65	127
Poor	115	97	102	106	93	132	64	164	76	162
Middle	128	124	115	129	112	158	77	184	93	175
Rich	173	152	145	173	149	197	98	218	118	226
Richest	215	201	194	230	195	261	114	261	147	292
					NSS 2014					
Poorest	134	104	122	116	105	124	66	258	78	166
Poor	147	121	138	132	128	138	68	254	92	186
Middle	164	137	146	151	143	162	71	251	100	203
Rich	210	170	180	194	181	205	83	288	127	263
Richest	393	301	337	349	329	393	159	416	223	459

MPCE, monthly per capita consumption expenditure; CDs, communicable diseases and nutritional disorders; Other diseases, includes other diagnosed and undiagnosed ailments; NCDs, non-communicable diseases and injuries.

quintiles ranging from 7.2 to 20.1% in 1995–96; the gap further increased in 2014 (range, 15.5-39.6%). The rural older population were spending more on hospitalization in 1995–96; however this trend reversed by 2014. A substantial difference in OOP payments was observed by gender with the male older population incurring higher OOP payments for hospitalization; this gap had increased by 2014.

Table 8.5 reveals the horizontal inequities in OOP payments across various subgroups in the three time points. The largest difference in the payment shares of the older population was observed across provider type (range, 3.8-27.5 percentage points); the gap was higher in 2014 than in 1995–96, more so for the poor older population. The older population hospitalized for NCDs incurred a higher share of consumption expenditure in all the years; however, the gap was lower in 1995–96 (range, 1.6-4.7 percentage points) than in 2014 (range, 7.4-12.6 percentage points). In 2014, the OOP payments share was higher in the less developed than the more developed states; this difference was higher for the poorest than the richest older population (6.9 vs 1.8 percentage points). The predicted payment share was higher for the male than the female older population for all the years (range, 0.1-7.8 percentage points). The older population residing in rural areas had a higher burden of OOP payments in 1995–96 (range, 1.4-4.0 percentage points) and 2004 (range, 1.0-2.9 percentage points).

Comparison with the hospitalization of the younger population showed that the difference in both absolute OOP payments and payment shares between less and more developed states across quintiles increased for the older population and declined for the population under 60 years between 1995 and 2014. Also the inequity in OOP payments shares by gender differed as males had a greater burden for the older population across the MPCE quintiles at all time points (range: 0.1-7.8 percentage points) than for the younger population (range: 0.1-3.7 percentage points).

8.5 Discussion

The most important finding of this study is that the predicted absolute OOP payments for hospitalization was positively associated with economic status measured by MPCE quintiles in all the three time periods but that the predicted share of OOP payments for hospitalization in the household consumption expenditure was positively associated with MPCE quintiles only in 1995–96 and was negatively associated with MPCE quintiles in

Table 8.5 Predicted shares of out-of-pocket payments for hospitalization in household consumption expenditure for the older population and population under 60 years in India, NSS 1995–96, NSS 2004 and NSS 2014

| MPCE quintiles | Older population | | | | | | | | | |
| | Predicted shares of out-of-pocket payments for hospitalization (%) | | | | | | | | | |
	Male	Female	Urban	Rural	More developed states	Less developed states	Public	Private	CDs/other diseases	NCDs
NSS 1995–96										
Poorest	7.7	5.4	5.1	7.2	6.6	7	4.9	10.3	5.6	7.6
Poor	5.9	4	3.8	5.3	5	4.9	3.6	7.4	4.3	5.9
Middle	12.1	8.8	9	11.5	11.2	9.9	7.3	15.2	8.5	13.2
Rich	10.1	7.2	7.7	9.1	8.7	8.9	6	12.2	7.5	9.5
Richest	15.9	11	11.8	15.9	14.1	12.8	8	16.5	11	15.6
NSS 2004										
Poorest	19.2	19.2	16.5	19.5	19	19.6	13.4	31	14.5	21.3
Poor	19.5	14.3	16.2	17.4	17.3	17.1	9.9	26.7	12.8	19.7
Middle	16.5	13.5	14.1	15.4	14.6	16.4	8.1	21.9	11.3	17.2
Rich	16.8	13.2	14	15.7	14.5	17.1	7.9	20.9	12.3	16.7
Richest	17.2	14.3	15.4	16.4	15.8	15.7	7.6	19.2	12.7	16.9
NSS 2014										
Poorest	23.4	19.6	20.5	21.4	17.8	24.7	12.3	39.8	11.7	24.3
Poor	14.4	12.3	13.3	13.3	12.4	14.7	6.7	23.5	7.9	15.3
Middle	18.3	14.2	16.7	15.9	14.8	19.2	7.4	24.1	9.8	18.7
Rich	20.3	12.5	16.8	16.2	14.8	21.3	6.8	24.5	9	18.9
Richest	21.8	16.4	19.2	18.5	18.6	20.4	6.4	23.8	10.5	20.7

(…continues)

MPCE quintiles	Population under 60 years									
	Predicted shares of out-of-pocket payments for hospitalization (%)									
	Male	Female	Urban	Rural	More developed states	Less developed states	Public	Private	CDs/other diseases	NCDs
NSS 1995–96										
Poorest	6.5	6.1	4	6.9	5.7	7.7	5.3	8.8	5.8	8
Poor	5.8	4.9	3.6	5.7	5	6	4.3	7.5	4.6	7.5
Middle	7.5	6.5	4.8	7.8	6.8	7.7	5.3	9	6.1	9.6
Rich	7.8	7	5.5	8.4	7.1	8.1	5.6	9.1	6.3	10.2
Richest	11.9	10.7	9.2	13.9	11	12.3	8.3	13.1	9.2	15.3
NSS 2004										
Poorest	20.1	17.7	17.1	19	16.9	21.5	13	29.5	15	25.6
Poorest	16.5	15	14	16.1	14.4	18.3	9.8	23.2	12	21.9
Middle	14.4	14.3	12.6	14.8	13.3	16.5	8.8	20.2	11	18.7
Rich	13.9	12.9	11.9	14.4	12.8	15	8	17.8	10.1	17.7
Richest	11.2	10.9	10.3	12.2	10.7	12.6	6	13.9	8.1	14.8
NSS 2014										
Poorest	21	17.3	19.5	18.9	18.3	19.4	11.2	35.4	13.3	25.3
Poor	15.5	13.2	14.5	14.2	14.5	14	7.4	25.2	10.1	19.2
Middle	14.6	12.7	13.1	13.8	13.6	13.7	6.5	21.7	9.4	17.7
Rich	13.2	11	11.4	12.4	12	12.1	5.3	17.9	8.3	16.1
Richest	14.3	11.7	12.6	13.4	12.8	13.4	5.7	15.7	8.8	16.6

CDs, communicable diseases; NCDs, non-communicable diseases and injuries; MPCE, monthly per capita consumption expenditure.

2004 and 2014. This indicates that the OOP payments for hospitalization was a progressive means of financing healthcare in India in 1995–96; thereafter it become regressive. OOP payments shares were substantially higher for hospitalization in private than in the public hospitals and for NCDs than the CDs/other diseases across MPCE quintiles; this gap increased by 2014, more so for the poor older population. We also found that the rural residents and those living in less developed states had considerably higher burden of OOP payments for hospitalization than their urban and developed state counterparts. Both vertical and horizontal inequities in OOP payments for hospitalization by the older population increased in India between 1995 and 2014. Compared to the population under 60 years, the older population had higher OOP payments for hospitalization, greater increase in OOP payments in the past two decades and higher inequity in OOP payments.

The progressive nature of OOP payments found in our study is similar to the evidence from many developing countries in Asia including India.[133, 138] It has been argued that the progressive nature of healthcare expenditure cannot be a positive indicator of fairness in financing if the poor population use less care despite a greater burden of illness.[132] Given the low public spending on healthcare in India; a progressive nature of OOP payments only reflects the capacity of the better-off to respond to healthcare needs by diverting resources from consumption while the poor simply forgo treatment to avoid the high cost of hospitalization. A study in Srilanka found that the burden of OOP health payments did not vary substantially with ability to pay which again reflects that the poor might be facing more hardships and financial impoverishment due to high healthcare costs.[127] On the contrary, a heavily subsidized public sector and a user charged private sector produced a progressive health financing system in Malaysia.[119] The distribution of OOP payments also depends largely on the level of development of a country. In high-income economies with widespread insurance coverage, OOP payments absorb a larger fraction of the resources of low-income households whereas in poor economies, it is the better-off that spend relatively more OOP.[118]

The change from the progressive system of OOP payments for hospitalization in 1995-96 to regressive in 2004 and 2014 is an important finding from a policy perspective. Another study in India also showed that the OOP payment for hospitalization was regressive in 2004.[134] An OOP payment in most countries are an especially regressive means of raising healthcare revenues and indicates the inability and weakness of the healthcare system in

financing and protecting its poor population from negative health shocks.[122-124, 126, 130, 145, 164] The regressiveness of OOP payment also stems in part from the higher rates of sickness and medical consumption of the worse-off.[120] For example, in Thailand, in spite of the provision of access to free care at public facilities for low income households, the poor incurred higher costs of healthcare due to their preference for private facilities to avoid long delays involved in the referral system in public facilities.[145] We found that the burden of OOP payments increased dramatically for the poor older population between 1995 and 2004 resulting into a regressive system of healthcare financing. This might be the consequence of the introduction of the user fee in India during the eighth five-year plan (1992–97) under the umbrella of health sector reforms. Evidence suggests that the introduction of the user fee in public facilities did increase the hospitalization cost and resulted in large socio-economic inequalities in affordability of healthcare in India.[176, 302, 303]

On the positive note, we found only a marginal increase in the burden of OOP payments for hospitalization for the poor older population in the latter decade. This is an encouraging finding indicating that the comprehensive strategies, ranging from the National Rural Health Mission (NRHM) in 2005, the Rashtriya Swastya Bima Yojana in 2008, and a multitude of state-sponsored health insurance schemes in India have provided protection to the poor against high healthcare costs. Although these pro-poor programmes are far from achieving the goal of equity in healthcare financing, they seem to have a positive impact by protecting the poor households against catastrophic OOP expenditures.[176, 304] Providing insurance coverage is a means of protecting the households from large health expenditure without increasing public expenditure on health.[172] The most recent move towards achieving universal health coverage prioritises financial protection and health security against impoverishment for the entire population of the country.[305]

The privatization of healthcare services no doubt created enough provision for high quality and adequate services but they offered little relief to those who were constrained by resources in their ability to pay for these services, adding more to the dismal state of healthcare system in India.[306] We found that the OOP payments in private hospitals were substantially higher than the public hospitals consistent with the finding from other studies in India.[307, 308] Additionally, the gap in the burden of OOP payments between private and public hospitals increased between 1995-96 and 2014 more so for the poor

older population. The initiation of user fees in government facilities might have deterred the use of public hospitals and persuaded people to increase their utilization of better quality private hospitals, ultimately increasing the cost of hospitalization.[176] Prior to the health sector reforms in 1990s, inpatient care was mostly available at public hospitals. Even though these services were fraught with quality issues, the poor could still access public inpatient care.[309] The increasing dependence on the private sector with a very weak regulation mechanism has led to a huge increase in healthcare costs in India. [217] Strengthening of the public health facilities to provide quality care will provide financial protection against high cost of hospitalization for the poor who rely more on public hospitals.

Due to the higher burden of NCDs among the older population delivering healthcare is a big challenge for the healthcare system in India. We found that the cost of hospitalization was higher for NCDs rather than CDs/other diseases and the rich were spending more in absolute terms on NCD hospitalization at all time points. However, the burden of OOP payments on hospitalization for NCDs was higher for the poor than the non-poor older population in 2004 and 2014. Another study in India showed that the wealthier spend more on the hospitalization for CVDs and diabetes than the poor.[310] However, the NCD related OOP payments for hospitalization was catastrophic (out-of-pocket expenditure equalling or exceeding 10% of annual household consumption expenditure) for the poorest quintile.[160] The burden of OOP payments for hospitalization for NCDs increased dramatically for the poorest quintile compared to the richest quintile between 1995–96 and 2014 widening the gap in the cost of CDs and NCDs most for the poorest than the richest.

The location of the hospitalized individual reflects the living conditions and has an impact on medical expenditures through health.[138] We found that the older population residing in the rural areas and in the less developed states had higher burden of OOP payments for hospitalization. These findings are consistent with a previous study in India which found that rural areas and poor states experience a higher poverty headcount through OOP expenditure mainly because a large proportion of their population is concentrated around the poverty line, and hence even a small amount of OOP expenditure will push many households below the poverty line.[156] Limited choice of local qualified providers, higher travel cost, including food and lodging for the escorts of the ailing household member, and access issues causing delay in care seeking behaviour for conditions which then

become more disabling and expensive to treat are some of the reasons for high burden of healthcare among rural households.[151, 156] Higher rates of poverty, low per capita gross state domestic product, poor access to health infrastructure and professionals and low public health expenditure in less developed states results into households bearing higher burden of OOP payments for hospitalization.[231]

Comparisons with the younger population reveal some interesting findings. Higher OOP payments by the older population and greater increases in them over time is likely to stem from the fact that they have higher burden of chronic diseases, more frequent hospitalizations and longer duration of stay in hospital. The horizontal inequity in OOP payments for hospitalization by gender with male having higher OOP payments and consequently greater burden than female was more so for the older population than the younger population which is in line with a recent study in India.[161] Lower socioeconomic status and lack of financial empowerment among females are likely to be accentuated in older ages hindering the use of healthcare services resulting into lower expenditure than the male counterparts. Another interesting finding was that the disparity in OOP payments by states improved for the younger population and deteriorated for the older population between 1995 and 2014. It can be inferred that the introduction of NRHM in 2005 with major focus on the 18 less developed states had a positive impact on the health expenditures of the younger age groups in these states with no impact on those aged 60 years or more. Also the rapid epidemiological and age transition in less developed states might have added to the burden of morbidity among older population in these states resulting into higher burden of OOP payments for hospitalization.

One of the limitations of this study is that the measure we employed to capture household economic status was collected using a single question to investigate total household expenditure and did not collect data on food expenditure separately. However, as we were not measuring the catastrophic health expenditure or impoverishment due to high health expenditure, but were rather interested only in OOP expenditure as a proportion of household consumption expenditure it does not affect our inferences relating to the burden of OOP payments. Due to the lack of data we could not control for the heterogeneity in the quality of health facilities in this study. The hospitalization expenditure was collected for the reference period of 365-days which might have introduced some recall bias in reporting. We concentrated only on the direct medical and non-medical expenditures, not taking into account the indirect burden due to

hospitalization episodes like work loss, worker replacement, and reduced productivity from illness and disease which might have underestimated the burden of healthcare cost in this study.

In spite of the limitations this study provides a comprehensive overview of the changing horizontal and vertical inequities in OOP payments for hospitalization of the older population comparing it with younger age groups in India during a time of health sector reforms. Moreover, the use of regression methods provides a more accurate description of the nature of inequities prevailing in the distribution of OOP payments rather than the summary measure of progressivity or horizontal inequity.[122] The merit of this study lies in the use of more comprehensive data on health expenditure available from health surveys to calculate the OOP payments and its burden at individual level. Additionally, since we restricted our analyses only to hospitalized individuals we can infer with greater confidence that the observed difference in OOP payments by economic status was due to the inadequacy of the healthcare system rather than the differences in underlying health status.[133]

In conclusion, we can say that there exist substantial vertical and horizontal inequities in OOP payments for hospitalization of the older population which worsened between 1995 and 2014. Given the rising cost of hospitalization and the corresponding burden on the poor older population, health policy in India should prioritise universal health coverage, promote risk pooling mechanisms and most importantly increase the public expenditure on health. These measures will be instrumental in reducing the burden of OOP payments for hospitalization among older population in India.

8.6 Ethics statement

The study is based on secondary data from the National Sample Surveys with no identifiable information on the survey participants. Exemption from ethics approval for analysis of the National Sample Surveys data was obtained from the institutional ethics committees of the Public Health Foundation of India and the London School of Hygiene and Tropical Medicine.

8.7 Acknowledgement

Anamika Pandey's PhD for which she is registered at the London School of Hygiene and Tropical Medicine.

Chapter 9. Summary and recommendations

This thesis provided evidence on the changing socioeconomic inequality in healthcare utilization and expenditure contrasting the older population with the younger population over two decades in India. The final section of this thesis is structured into six parts. First, I summarize the findings of this thesis relating to the study objectives on utilization and cost of healthcare. Second, I discuss the overall strengths and limitations of the thesis. Third, I present recommendations for future research, primarily focusing on improving the measurement, analyses, and the understanding of socioeconomic inequalities in utilization and financial burden. Fourth, I propose some recommendations for improving data in national surveys. Fifth, I present brief recommendations for policy in the Indian context, and sixth, I provide the concluding remarks.

9.1 Summary of findings

Population aging is poised to become one of the most significant socio-demographic transformations of the twenty-first century, with implications for nearly all sectors of society, as well as family structures and intergenerational ties.[181] The increasing number and proportion of the older population is paralleled by the mounting concern over the impact of this trend on the demand for healthcare and expenditure particularly in low- and middle-income countries. Socioeconomic inequality in access to healthcare and high out-of-pocket payments for healthcare is a major health policy challenge. Ensuring equity in physical and financial access to healthcare is a central issue in public health policy and health services research. Monitoring socioeconomic inequality over time is an essential element in policies aimed at reducing health inequalities. An investigation regarding changes in socioeconomic inequalities in utilization and expenditure over time is relevant in the context of population aging, changing disease burden and low public expenditure on health.

In this thesis, I focused on changes in socioeconomic inequality in healthcare utilization and expenditure contrasting the older population with those under 60 years over two decades in India. The analysis was underpinned by theoretical model of healthcare utilization which identifies a host of predisposing, enabling and need factors that affect utilization. A comprehensive review of published literature on socioeconomic differentials in utilization and out-of-pocket payments for healthcare in India yielded few studies that compared older population with other age groups, none of which analyzed the changing trends and differentials over time using nationally representative data. In

general, the older population has been neglected in research on socioeconomic inequality in healthcare and expenditure compared with other age brackets. Therefore, this study fills an important knowledge gap essential for designing heath policy and allocating resources to provide healthcare to all, under the initiative of universal health coverage.

I used the repeated cross-sectional data from the national sample survey on healthcare utilization and consumer expenditure in India since 1990 to quantify the inequality by socioeconomic status in the demand for healthcare and expenditure across time and between age groups. The NSSO surveys are the most comprehensive source of data on the utilization of inpatient and outpatient care and expenditure incurred on them for each household member. This goal was addressed through series of research papers with the following aims:

1. Examine the hospitalization trends in India over two decades comparing older population with younger population and quantify the factors contributing to the change in hospitalization among the older population.

2. Estimate the change in horizontal inequities in outpatient care and untreated morbidity in India between 1995 and 2014 comparing the older population with the younger population.

3. Compare the trends in out-of-pocket payments and catastrophic health expenditure between the households with and without older persons.

4. Study the change in horizontal and vertical inequities in out-of-pocket payments for hospitalization in India over two decades contrasting the older population with the younger population.

In Chapter 5, I analyzed the hospitalization trends and differentials over two decades contrasting older population with the population under 60 years across the less and more developed states of India, and for various disease groups and quantified the factors contributing to the changes in hospitalization among older population in India. Hospitalization is an important aspect of curative care and assumes greater importance in the context of older population who have higher disease burden and requires long term care. Using three consecutive National Sample Survey data on healthcare utilization

conducted in 1995–96, 2004 and 2014, I found that the older population had higher demand for inpatient care, particularly hospitalizations for NCDs. The vulnerable groups among older population were the females, poor, rural residents and those residing in less developed states who utilized less hospital care. Improved likelihood of using healthcare among the older population (propensity change) was largely responsible for the increase in hospitalization rather than the compositional change. These findings are relevant given knowledge that older population resort more frequently to informal care and avoid going to the formal doctors in the first instance of disease.

Moving from curative to preventive care I analyzed the inequity in outpatient care and untreated morbidity among older population in India in relation to the population under 60 years using nationally representative data from two rounds of NSSO conducted in 1995–96 and 2014. A horizontal inequity index was used to measure the inequality in the healthcare use when standardized for need. Self-reported morbidity, pro-rich inequity in outpatient care usage and the pro-poor inequity in untreated morbidity was higher among the older population. Compared with more developed states, the older population in less developed states reported lower morbidity and utilization of outpatient care. The poor in India, particularly among the older population, used public facilities for healthcare more often than the rich, which was even more evident in the most recent study period.

Utilization of healthcare is associated with out-of-pocket payments in India. In this context, I examined the trends in out-of-pocket payments for healthcare in households with and without older persons, and measured its burden using various consumption expenditure surveys and healthcare utilization surveys of NSSO since 1990. The OOP payments for healthcare and the incidence of CHE increased over the two decades in India for both populations. Households with older persons only had higher median OOP payments for healthcare and faced more financial catastrophe than the other households. Incidence of CHE increased with MPCE quintiles even after adjusting for the other covariates in the multivariable model. The OOP payments for healthcare and the incidence of CHE were higher in the more developed states of India.

In the 4th research paper, I analyzed the inequity in the OOP for hospitalization and if this has changed over two decades in India. Instead of using a summary measure of inequity such as Kakwani index, in this paper I used regression based technique to measure both horizontal and vertical inequity in the OOP payments for hospitalization. Both vertical

and horizontal inequity in OOP payments has worsened in India between 1995–96 and 2014. The OOP payments was a progressive means of financing healthcare in 1995–96, however by 2014 it became regressive meaning thereby that the burden of OOP payments declined with MPCE quintiles. Also the older population had higher OOP payments for hospitalization and greater inequity compared with other age groups in India. The OOP payments for hospitalization and its burden were higher for the individuals in the less developed compared with the more developed states. This state wise differential in expenditure burden for hospitalization declined for the younger population but increased for the older population over time.

The findings from all the four research papers, collectively, underscore that the older population experience higher morbidity, have increased demand for healthcare services and are at higher risk of OOP payments and consequent burden of financial catastrophe. The vulnerable groups among the older population are female, poor, rural residents and those residing in less developed states. As the Indian population is growing increasingly aged, it becomes more important than ever that the government should design innovative policies and public services specifically targeted to older persons such as providing affordable and accessible healthcare, improving geriatric health infrastructure and strengthening the social protection system. These would be important in achieving the goals on health laid down in the 2030 agenda of sustainable development. Additionally, the government should continue focusing on the population under 60 years who make up majority of India's population.

9.2 General strengths and limitations

Each research paper has its own strengths and limitations, which are discussed in the respective papers. In this section I will discuss the general strengths and limitations of my thesis.

9.2.1 General strengths

First, in my thesis I have used nationally representative data from national sample survey organization to provide both national and state level estimates. NSSO uses uniform survey methodology and schedules of enquiry for the various rounds of healthcare utilization survey and consumption expenditure survey that allowed comparison across surveys to study the trends over time. Second, in the absence of longitudinal data, I used data from repeated cross-sectional surveys between 1990 and 2015 to study the trends in

socioeconomic inequality in utilization and expenditure over two decades which is a useful input for the planning of health services in India. Third, the comparison of the older population with the population under 60 years is relevant in Indian which on one hand is witnessing a gradual increase in the older population and on the other hand has most of its population in the younger ages. This presents a unique challenge to provide adequate healthcare to all. Fourth, the source of healthcare utilization assumes importance as the healthcare system in India is a mix of public and private. I therefore analyzed the healthcare utilization by public and private source of healthcare to provide evidence on the relative preference of public and private sector. Fifth, the focus was both on the utilization of preventive and curative healthcare along with the OOP expenditure for these services to provide comprehensive analyses of the demand for healthcare and its economic burden. Sixth, the use of a variety of established analytical methods for analyzing the objectives like, regression based decomposition technique, quantifying horizontal inequity, measuring progressivity and regressivity in health expenditure using a regression based method and using two definitions for measuring catastrophic health expenditure adds to the strength of this thesis. Finally, by identifying the socioeconomic groups which are less likely to use the available healthcare, incur high cost of healthcare and face financial catastrophe, this thesis has generated evidence that can usefully inform the need for specific targeting by the policy makers.

9.2.2 General limitations

First, the use of cross-sectional data restricted our understanding of the direction of the association of socioeconomic status with healthcare utilization and burden of healthcare expenditure. Second, the utilization of health services was assessed by means of self-reporting by the respondents which may have affected the validity of the information. Self-reported use of health services are found to be associated with reporting error which increased with greater utilization.[311]. The reporting bias may have affected the estimation of the absolute level of healthcare but not the study of differences in the use of healthcare according to socioeconomic characteristics. Response bias hardly affects risk estimates of utilization by background characteristics.[312] Third, socioeconomic patterning of the perception of need for care may have introduced selection bias to the sample of individuals reporting utilization. Fourth, in this thesis, I focused mainly on the differentials in utilization and cost by economic status measured in terms of adult equivalent consumption expenditure controlling for potential confounders. Alternative measures of socioeconomic status were not explored due to the unavailability of such data

in the NSSO surveys. Fifth, quality of care and satisfaction with healthcare is important while considering need for care; however, this is outside the scope and the data availability for this thesis. Sixth, only individual and household level factors were analyzed. Supply side factors have changed over the two decades and are likely to affect healthcare. However, since the aim was to analyze how the utilization and expenditure were associated with socioeconomic status, given the supply of health services at that point of time, it is fairly reasonable to draw inferences regarding socioeconomic inequality in the outcome variables. Seventh, this study assessed inequality in the probability of healthcare use, but did not measure the intensity of utilization for those that used healthcare services due to the lack of this information in the secondary data used. Eighth, lack of qualitative data further limits our understanding of the underlying mechanism of observed trends and differentials. Ninth, while defining catastrophic OOP health expenditure I took only the short term approach and ignored the effect of health expenditure on future consumption. It is likely that a household protects its present consumption by borrowing (or some other source of finance) and thus, OOP health expenditure does not show impact on present consumption, however, it might have impact on future consumption. Such future impact of OOP health expenditure is beyond the scope of this analysis.

9.3 Recommendation for future research

Based on this study, I have some recommendations for the future research. First, the higher life expectancy for females compared to males has resulted into higher number of women at older ages. As the women are more likely to have poor health status and are more disadvantaged in terms of socioeconomic resourcefulness, it is important to assess whether the existing socioeconomic inequality in healthcare utilization and expenditure among older population varies by gender. Research should also use different equivalence scales for men and women while calculating adult equivalent MPCE as the consumption pattern of men and women differs greatly in India. Second, alternative measures of socioeconomic status should be explored given that there is no consensus on the best measure of socioeconomic status for the older population. Third, qualitative investigation to understand the mechanism behind the observed phenomenon and people's perception would provide explanations for the actual pattern of healthcare utilization. Fourth, the use of both propensity (patient initiated) and intensity (doctor-driven) measures of healthcare use would generate further insights especially those concerning whether the greater share of the observed pattern of socioeconomic inequality originate from patient-initiated or

doctor-driven service utilization. Fifth, the supply side factors that is likely to affect the demand for healthcare should also be explored. Sixth, future research should also attempt projecting OOP payments and its burden on the economy in near future to aid policy makers in planning of public investment in health. Seventh, the global WHO and World Bank monitoring framework proposes the use of two indicators: the incidence of disproportionate spending on health which is labelled "catastrophic"; and the incidence of poverty resulting from health expenditures paid directly by households which is labelled "impoverishing".[13] This thesis focused on catastrophic health expenditure as a measure of financial burden. Future research should measure the impoverishing effect of out-of-pocket payments for healthcare defining the poverty line according to national standards and also against an international poverty line consistent with SDG targets 1.1.1 and 1.2.1. Eighth, future studies should attempt to calculate potential (both observed and unobserved) incidence of CHE as most of the poor households simply forgo treatment in India and are excluded from the analysis of CHE. This can be done by calculating the expected OOP expenditure for those who were unable to use services despite their need and combining it with the observed OOP expenditure for people who actually used services to arrive at the total potential incidence of CHE.[313] Ninth, ignoring coping strategies not only overstates the risk to current consumption and exaggerates the scale of catastrophic health payments, but also overlooks the long-run burden of health payments.[314] In this context, future research should include coping strategies adopted by households to finance their health expenditure in the calculation of CHE.

9.4 Recommendation for surveys

First, the national sample survey data are the single most comprehensive data on healthcare utilization and expenditure at the national and subnational level conducted once in 10 years to provide evidence for planning of health services. Frequency of NSSO surveys on healthcare utilization should be increased given the changing demographic and epidemiological profile of India. If the updated data is available every 5 year instead of 10 year it will help in timely formulation of policies to address the changing demand. Second, at present the data on subjective measure of health is collected only for the older population. Since the subjective measure of health is an important proxy for the need for healthcare it should be collected for all individuals aged 18 years or more. Third, data should be collected on some objective measure of health such as anthropometrics, biomarkers and performance tests, and medically diagnosed diseases to assess the true health of the population. Also, the ability to accurately detect differential resource use

between persons of different socioeconomic status relies on the accuracy of health-needs adjustment measures. Adjustment for health-needs using a comprehensive morbidity burden diagnoses-based measure is important to measure the inequity in health resource use. Fourth, household consumption expenditure data is collected as an aggregate only in health utilization surveys. This does not allow the calculation of the capacity of pay of the household for assessing the burden of OOP payments. Consumption data should be collected for both food and non-food items in healthcare utilization surveys as well; this need not be as comprehensive as consumer expenditure surveys but should be reasonably broad to allow the measurement of expenditure burden.

9.5 Policy implications

Based on the findings of this research, the following is the summary of key policy recommendations. First, government should enact policies to evolve and expand the health system to prepare for the growing burden of non-communicable diseases, promote preventive care and create provision for the long term care for the older population, both facility-based and home-based. Second, government should prioritize increasing budgetary allocation on health and allocating separate funds for the planning of health services for the older population. Third, health insurance programmes specifically targeting the older population to protect them against financial catastrophe should be encouraged. Fourth, strengthening public health systems in terms of quality of care and provision of geriatric healthcare at low cost would deliver affordable healthcare for the growing older population. Fifth, policies aiming to reduce inequity in utilization and financial burden of healthcare should focus on poor, female and rural older population, and those residing in less developed states.

A common and long-running concern across the world relates to the impact of increasing longevity on healthcare utilization. The longer life span accompanied by higher burden of morbidity at older ages requires the health system to be well-equipped to diagnose and treat health problems of the older persons. Evidence from this study suggests that the older population in India has higher morbidity than any other age groups, particularly non-communicable diseases, and are also more likely to remain untreated in an event of illness. Expanding the health system to prepare for the growing burden of non-communicable diseases, promoting preventive care and creating provision for long term care, both facility-based and home-based, will be a step towards preparing health system to deal with the higher disease burden of the growing older population. Home visiting

programmes reduce mortality and the risk of admission to long term institutional care among members of the general older population and frail older people who are at risk of adverse outcomes.[315] The heterogeneous model of healthcare including both professional and non-professional caregivers and services for the older population in their homes adopted by the United States offers a possible path for India, which is facing growing health needs and has limited resources to care for the older persons.[316] The developed world has evolved many models of healthcare for the older population, however in India the older population is only provided healthcare through general healthcare delivery system, which often has limited dedicated service offerings or facilities for the older population. India still relies on the family as the primary care giver to the older people and training the family members will provide support to the existing programs.

The ramifications of population aging from the perspective of healthcare cost are significant and diverse. This study showed that the older population incur higher out-of-pocket healthcare expenditure than other age groups. Currently, India does not have an adequate healthcare financing system in place to ensure equity in treatment and protect the older population against high healthcare costs. According to World Bank estimates, India's healthcare spending as a percentage of GDP is among the lowest in emerging markets. During 2014, India spent a total of around 4.7% of GDP on healthcare, whereas Brazil and China spent 8.3% and 5.5%, respectively.[317] In 2014, among the BRICS country, India had the second highest economic growth, but witnessed the least improvement in public funding for health.[233] In spite of India's commitment in 2010, following the recommendation of High Level Expert Group on UHC to increase public financing of health to 2·5% of GDP by 2017, the government spending on health has stagnated at 1% of GDP. The National Health Policy of 2017 has now set the target to increase health expenditure by government as a percentage of GDP from the existing 1.15% to 2.5% by 2025.[318] Government of India has generally attached a relatively low priority to health when allocating their budgets and the healthcare for older population has been a neglected component of healthcare delivery system. In the most recent budget (2017–18) an additional Rs 10,600 crores have been allocated for health compared to previous year. But, in real terms this allocation is not even equal to that made in 2011–12. Given the severe cuts in the overall health budget over last three years due to fiscal strains, the increase in allocation this year may not be enough to maintain existing health programmes. The economic consequences arising from a lack of stable income at older ages resulting into greater economic dependency and the inability to bear the cost of

healthcare necessitates higher public expenditure on benefits and social services such as pension and public health. Also, effective health interventions, particularly health promotion and disease prevention programmes, that target the main causes of morbidity and mortality, can help to minimize the cost pressures associated with aging by ensuring that people stay healthy in old age.

Achieving universal health coverage (UHC) is an important target under the sustainable development goal (SDG 3) of 2030 adopted in 2015 which aims to ensure healthy lives and promote well-being for all at all ages.[13] UHC includes providing financial risk protection, access to quality essential healthcare services, and access to safe, effective, quality, and affordable essential medicines and vaccines. This study found that the incidence of catastrophic health expenditure increased over the two decades and the older population were more likely to face financial catastrophe compared with other age groups. Additionally, OOP payments were the regressive means of financing healthcare. Recent evidence suggests that the household health spending in India is growing faster than the consumption expenditure (economic well-being) of the household and changing age structure is significantly affecting health spending in India.[136] The Indian government took the first serious step towards providing financial protection against OOP payments by establishing national health insurance programme with the launch of RSBY in 2007. The scheme provides free inpatient care in designated private and public facilities to recognized poor households to a maximum of INR 30,000 (USD 500) per annum. A study showed that the treatment seeking behaviour in the beneficiaries of RSBY improved among comparatively older group with chronic conditions.[304] This suggests that RSBY may have provided some financial protection to the older population as it did not have any age bar and covered all age brackets. However, it is recommended that government should launch health insurance programme specifically targeting the older population to protect them against financial catastrophe. Healthcare policies should aim to narrow the gap in access and benefit sharing between different socially and economically underprivileged classes with that of the better placed ones and a consequent expansion of subsidized healthcare to ensure equity in access.

In 2000, the Indian healthcare system was ranked 112th out of 191 countries in terms of overall health system performance, way behind countries like Colombia (22nd), Sri Lanka (76th) and Egypt (63rd).[17] Privatization coupled with decentralization as envisaged by the National Health Policy 2002 (10th Five year plan 2002–2007) further resulted in

increasing fragmentation of the health system and aggravated the dismal state of healthcare system in India. The healthcare reforms in India failed to achieve their stated goals because the government did not exercise the needed stewardship over the health system and indeed weakened it.[306] Inadequate government financing and neglect of public provision of health services often leads to excessive dominance of the private sector. This study found lower utilization of public health facilities compared with private facilities consistently across the three time points. Poor quality of public healthcare facilities was the dominant reason cited for resorting to private healthcare. Additionally, the use of public facility was disproportionately concentrated among the poor, more so for the older population compared with other age groups. The unavailability of quality services in the public sector mostly affects the poor people because they are the ones who are heavily reliant on public health facilities.[160] The countries with a dominant private sector have very high shares of out-of-pocket spending in total health expenditure.[319] In 2014, out-of-pocket payments in India accounted for 62.4% of the health expenditure and India was ranked 2nd next only to Bangladesh (67.0%) in the WHO South East Asian region in terms of OOP payments for healthcare. Even within a plethora of publicly funded health insurance schemes, such as RSBY and several state government sponsored insurance models, launched since 2005, the percentage of private hospitals networked by the schemes was in the range of 70-90%.[320] The reliance of older poor on the public health facility calls for increased government expenditure to strengthen the public health system and improve the quality of public health services in India.

Equity in access to healthcare is a central issue in public health policy and health services research. In many low- and middle- income countries including India, inequality in access to healthcare is a major health policy challenge. Wide inequalities in the utilization of health services as well as the presence of the inverse care law; those with the greatest need for health services are not getting a fair share from health services often contribute to and intensify disparities in health and quality of life.[321] In this study the older population who were poor were less likely to use inpatient and outpatient care, and were more likely to remain untreated in an event of illness.

Even after adjusting for differences in need, healthcare utilization was disproportionately concentrated among the rich. This inequality in the use of health services was higher for the older population compared with other age brackets. Apart from economic inequality, differentials in healthcare use also exist for gender, place of residence and states. Older

females, rural older residents and older population residing in less developed states were the disadvantaged groups when it comes to healthcare utilization. In India, though equity in access is extolled in government documents, evidence from this study suggests that those needing health services are not receiving their fair share. An economic inequality in access offers a relatively more recognized challenge to social justice than those that prevail across other groups.[322] Therefore, it is important for the policy maker to prioritise the poor in India that most closely relate to core societal values. Given the feminization and ruralization of aging in India, the policy should also target female and rural older adults who are disadvantaged in terms of economic resources and lack physical and financial accessibility to health services. India is a vast country with various states at different levels of sociodemographic and economic development, therefore looking just at the aggregate figures would mask the underlying differences across the less and more developed states in terms of healthcare utilization and expenditure burden. One-size-fits-all approach in framing health policies ignores the socioeconomic diversity across states and fails to meet the diverse needs of the states which are experiencing different levels of population aging and disease burden. Strategic response to the specific needs of the older population residing in less and more developed states is a key to insure healthy aging in India.

9.6 Conclusion

My thesis has assessed socioeconomic inequality in healthcare utilization and expenditure in India over two decades contrasting the older population with other age groups. I conclude that the older population suffers from higher morbidity, particularly NCDs, and consequently have higher demand for healthcare, both inpatient and outpatient. The older population incurs higher expenditure for healthcare and face financial catastrophe more often than the other ages. Socioeconomic inequality in the healthcare utilization and expenditure is higher for the older population than the younger population. In summary, my study showed inequality in utilization and weakness of healthcare system in financing and protecting older population, particularly the poor, women and rural populations and those residing in less developed states against the unwanted healthcare costs. These findings together underscore the importance of having dedicated health services and social security systems specifically targeting the most disadvantaged groups of older population such as poor, female, rural residents and those belonging to less developed states of India. Attention to this will be an important step towards achieving the SDG goals on equity.

References

1.   Bloom DE, Canning D. The health and wealth of nations. Science. 2000;287(5456):1207-9.

2.   Mackenbach J, Meerding WJ, Kunst A. Economic implications of socio-economic inequalities in health in the European Union. Luxembourg: European Commission Health & Consumer Protection Directorate-General; 2007.

3.   Bloom DE, Canning D, Sevilla J. The effect of health on economic growth: a production function approach. World Development. 2004;32(1):1-13.

4.   Strauss J, Thomas D. Health, nutrition, and economic development. Journal of Economic Literature. 1998;36(2):766-817.

5.   Van de Walle D. Assessing the welfare impacts of public spending. World Development. 1998;26(3):365-79.

6.   Well DN. Accounting for the effect of health on economic growth. The quarterly journal of economics. 2007;122(3):1265-306.

7.   WHO Commission on Macroeconomics and Health. Macroeconomics and health: Investing in health for economic development. Geneva: The World Health Organization, 2001.

8.   Sundman M-L. The Effects of the Demographic Transition on Economic Growth: Implications for Japan. Jönköping International Bussiness School: Jönköping University; 2011.

9.   Cervellati M, Sunde U. Health, Development, and the Demographic Transition. 2006 Meeting Papers No 645: Society for Economic Dynamics; 2006.

10.   WHO Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Final Report of the Commission on Social Determinants of Health. Geneva: World Health Organization, 2008.

11.   Solar O., Irwin A. A conceptual framework for action on the social determinants of health. Social Determinants of Health Discussion Paper 2 (Policy and Practice). Geneva: World Health Organization, 2010.

12.   Chan M. Eleventh Global Forum for Health Research, Beijing, China. Geneva: World Health Organization; 2007 [cited 2017 February 12]. Available from: http://www.who.int/dg/speeches/2007/20071029_beijing/en/.

13. World Health Organization. World Health Statistics 2016: monitoring health for the SDGs Geneva: WHO; 2016 [cited 2017 February 12]. Available from: http://www.who.int/gho/publications/world_health_statistics/2016/en/.

14. Xu K ED, Carrin G, Aguilar-Rivera AM,. Designing health financing systems to reduce catastrophic health expenditure. Technical brief for policy-makers, Number 2/2005. Geneva: World Health Organization, 2005.

15. World Health Organization. The World Health Report 2010- Health system financing: the path to universal coverage. Geneva, Switzerland: WHO, 2010.

16. Margaret Chan. Global Health Diplomacy: negotiating health in the 21st century Geneva: World Health Organization; 2008 [cited 2017 February 12]. Available from: http://www.who.int/dg/speeches/2008/20081021/en/.

17. World Health Organization. The World Health Report 2000- Health systems: improving performance [Internet]. Geneva, Switzerland: WHO; 2000 [cited 2016 April 4]. Available from: http://www.who.int/whr/2000/en/.

18. Yazbeck P, Peters D, editors. Health policy research in South Asia: Building capacity for reform Washington, DC: The World Bank; 2003.

19. World Health Organization. Making fair choices on the path to universal health coverage: final report of the WHO Consultative Group on Equity and Universal Health coverage Geneva: World Health Organization; 2014 [cited 2017 February 12]. Available from: http://www.who.int/choice/documents/making_fair_choices/en/.

20. Reddy KS, Patel V, Jha P, Paul VK, Kumar A, Dandona L. Towards achievement of universal health care in India by 2020: a call to action. The Lancet. 2011;377(9767):760-8.

21. Planning Commission of India. High level expert group report on universal health coverage for India New Delhi: Government of India; 2011 [cited 2016 April 4]. Available from: http://planningcommission.nic.in/reports/genrep/rep_uhc0812.pdf.

22. Planning Commission. Twelfth Five Year Plan (2012-2017) Social Sectors III. New Delhi: Goverment of India, 2013.

23. Ministry of Health and Family Welfare. Annual Report to the People on Health New Delhi: Government of India; 2011 [cited 2017 January 2]. Available from: http://www.mohfw.nic.in/showfile.php?lid=1049.

24. Getzen TE. Population aging and the growth of health expenditures. Journal of Gerontology. 1992;47(3):S98-S104.

25. Lubitz J, Greenberg LG, Gorina Y, Wartzman L, Gibson D. Three decades of health care use by the elderly, 1965–1998. Health Affairs. 2001;20(2):19-32.

26.   Norton EC. Long-term care. Handbook of health economics. 2000;1:955-94.

27.   Zweifel P, Felder S, Meiers M. Ageing of population and health care expenditure: a red herring? Health Economics. 1999;8(6):485-96.

28.   Yang Z, Norton EC, Stearns SC. Longevity and Health Care ExpendituresThe Real Reasons Older People Spend More. The Journals of Gerontology: Series B. 2003;58(1):S2-S10.

29.   Seshamani M, Gray A. Time to death and health expenditure: an improved model for the impact of demographic change on health care costs. Age and ageing. 2004;33(6):556-61.

30.   Lee JT, Hamid F, Pati S, Atun R, Millett C. Impact of Noncommunicable Disease Multimorbidity on Healthcare Utilisation and Out-Of-Pocket Expenditures in Middle-Income Countries: Cross Sectional Analysis. PloS one. 2015;10(7):e0127199. doi: 10.1371/journal.pone.

31.   Hansen AH, Halvorsen PA, Ringberg U, Førde OH. Socio-economic inequalities in health care utilisation in Norway: a population based cross-sectional survey. BMC health services research. 2012;12:336. doi: 10.1186/472-6963-12-336.

32.   Shin H, Kim J. Differences in income-related inequality and horizontal inequity in ambulatory care use between rural and non-rural areas: using the 1998-2001 U.S. National Health Interview Survey data. International Journal for Equity in Health. 2010;9:17. doi: 0.1186/475-9276-9-17.

33.   Dunlop S, Coyte PC, McIsaac W. Socio-economic status and the utilisation of physicians' services: results from the Canadian National Population Health Survey. Social Science & Medicine. 2000;51(1):123-33.

34.   Agerholm J, Bruce D, Ponce de Leon A, Burstrom B. Socioeconomic differences in healthcare utilization, with and without adjustment for need: an example from Stockholm, Sweden. Scandinavian Journal of Public Health. 2013;41(3):318-25.

35.   Liu L-F, Tian W-H, Yao H-P. Utilization of health care services by elderly people with National Health Insurance in Taiwan: The heterogeneous health profile approach. Health Policy. 2012;108(2):246-55.

36.   Peltzer K, Williams JS, Kowal P, Negin J, Snodgrass JJ, Yawson A, et al. Universal health coverage in emerging economies: findings on health care utilization by older adults in China, Ghana, India, Mexico, the Russian Federation, and South Africa. Global health action. 2014;7:25314.

37.   Luo J, Zhang X, Jin C, Wang D. Inequality of access to health care among the urban elderly in northwestern China. Health Policy. 2009;93(2-3):111-7.

38.   Blazer DG, Landerman LR, Fillenbaum G, Homer R. Health Services Access and Use among Older Adults in North Carolina: Urban vs Rural Residents. American Journal of Public Health. 1995;85(10):1384-90.

39.   Liu L-F. The Health Heterogeneity of and Health Care Utilization by the Elderly in Taiwan. International Journal of Environmental Research and Public Health. 2014;11(2):1660-4601.

40.   Hosseinpoor AR, Naghavi M, Alavian SM, Speybroeck N, Jamshidi H, Vega J. Determinants of seeking needed outpatient care in Iran: results from a national health services utilization survey. Arch Iran Med. 2007;10(4):439-45.

41.   M. Makinen, H. Waters, M. Rauch, N. Almagambetova, R. Bitran, L. Gilson, et al. Inequalities in health care use and expenditures: empirical data from eight developing countries and countries in transition. Bulletin of the world health organization. 2000;78(1):55-65.

42.   Mohammadbeigi A, Hassanzadeh J, Eshrati B, Rezaianzadeh A. Socioeconomic inequity in health care utilization, Iran. Journal of Epidemiology and Global Health. 2013;3(3):139-46.

43.   Saito E, Gilmour S, Yoneoka D, Gautam GS, Rahman MM, Shrestha PK, et al. Inequality and inequity in healthcare utilization in urban Nepal: a cross-sectional observational study. Health policy and planning. 2016;31(7):817-24.

44.   Gundgaard J. Income-related inequality in utilization of health services in Denmark: evidence from Funen County. Scandinavian Journal of Public Health. 2006;34(5):462-71.

45.   Van Doorslaer E, Wagstaff A, Van der Burg H, Christiansen T, De Graeve D, Duchesne I, et al. Equity in the delivery of health care in Europe and the US. Journal of Health Economics. 2000;19(5):553-83.

46.   Masseria C, Giannoni M. Equity in access to health care in Italy: a disease-based approach. Eur J Public Health. 2010;20(5):504-10.

47.   Mohammadbeigi A, Hassanzadeh J, Eshrati B, Rezaianzadeh A. Decomposition of inequity determinants of healthcare utilization, Iran. Public Health. 2013;127(7):661-7.

48.   Kim E, Kwon S, Xu K. Has income-related inequity in health care utilization and expenditures been improved? Evidence from the Korean National Health and Nutrition Examination Survey of 2005 and 2010. J Prev Med Public Health. 2013;46(5):237-48.

49.   Zhang X, Wu Q, Shao Y, Fu W, Liu G, Coyte PC. Socioeconomic inequities in health care utilization in China. Asia Pacific Journal of Public Health 2015;27(4):429-38.

50. Xie X, Wu Q, Hao Y, Yin H, Fu W, Ning N, et al. Identifying determinants of socioeconomic inequality in health service utilization among patients with chronic non-communicable diseases in China. PloS one. 2014;9(6):e100231.

51. Zhou Z, Su Y, Gao J, Campbell B, Zhu Z, Xu L, et al. Assessing equity of healthcare utilization in rural China: results from nationally representative surveys from 1993 to 2008. International Journal of Equity in Health. 2013;12:34. doi: 10.1186/475-9276-12-34.

52. Zhou Z, Gao J, Fox A, Rao K, Xu K, Xu L, et al. Measuring the equity of inpatient utilization in Chinese rural areas. BMC health services research. 2011;11:201. doi: 10.1186/472-6963-11-201.

53. Vasquez F, Paraje G, Estay M. Income-related inequality in health and health care utilization in Chile, 2000-2009. Pan American Journal of Public Health. 2013;33(2):98-106, 2 p preceding 98.

54. Dorjdagva J, Batbaatar E, Dorjsuren B, Kauhanen J. Income-related inequalities in health care utilization in Mongolia, 2007/2008-2012. International Journal of Equity in Health. 2015;14:57. doi: 10.1186/s12939-015-0185-8.

55. Regidor E, Martinez D, Calle ME, Astasio P, Ortega P, Dominguez V. Socioeconomic patterns in the use of public and private health services and equity in health care. BMC health services research. 2008;8:183. doi: 10.1186/472-6963-8-183.

56. Phiri J, Ataguba JE. Inequalities in public health care delivery in Zambia. International Journal for Equity in Health. 2014;13(1):1-9.

57. Vikum E, Krokstad S, Westin S. Socioeconomic inequalities in health care utilisation in Norway: the population-based HUNT3 survey. International Journal for Equity in Health. 2012;11:48. doi: 10.1186/475-9276-11-48.

58. Ghosh S, Arokiasamy P. Emerging patterns of reported morbidity and hospitalisation in West Bengal, India. Globle Public Health. 2010;5(4):427-40.

59. Singh C, Ladusingh L. Correlates of inpatient healthcare seeking behavior in India. Indian journal of public health. 2009;53(1):6-12.

60. Mukherjee S, Levesque J-F. Changing inequalities in utilisation of inpatient care in rural India: evidence from the NSS. Economic & Political Weekly. 2010;45(46):84-91.

61. Prinja S, Kanavos P, Kumar R. Health care inequities in north India: role of public sector in universalizing health care. The Indian journal of medical research. 2012;136(3):421-31.

62. Prinja S, Kumar M, Pinto A, Jan S, Kumar R. Equity in Hospital Services Utilization in India. Economic and Political Weekly. 2013;48(12):52-8.

63.   Dilip T. Utilization of inpatient care from private hospitals: trends emerging from Kerala, India. Health policy and planning. 2010;25(5):437-46.

64.   Levesque J-F, Haddad S, Narayana D, Fournier P. Outpatient care utilization in urban Kerala, India. Health policy and planning. 2006;21(4):289-301.

65.   Bose M, Dutta A. Inequity in hospitalization care: a study on utilization of healthcare services in West Bengal, India. International journal of health policy and management. 2015;4(1):29-38.

66.   Ghosh S. Health sector reforms and changes in prevalence of untreated morbidity, choice of healthcare providers among the poor and rural population in India. International journal of health policy and management. 2014;2(3):125-30.

67.   Mukherjee AN, Karmakar K. Untreated morbidity and the demand for healthcare in India: an analysis of national sample survey data. Economic & Political Weekly. 2008;XLIII(46):71-7.

68.   Su TT, Pokhrel S, Gbangou A, Flessa S. Determinants of household health expenditure on western institutional health care. The European Journal of Health Economics. 2006;7(3):199-207.

69.   Waweru LM, E. W. Kabiru, Mbithi JN, Some ES. Health status and health seeking behavior of the elderly persons in Dagoretti division, Nairobi. East African Medical Journal. 2003;80(2):63-7.

70.   Abdulraheem I. Health needs assessment and determinants of health-seeking behaviour among elderly Nigerians: A house-hold survey. Annals of African medicine. 2007;6(2):58-63.

71.   Elwell-Sutton TM, Jiang CQ, Zhang WS, Cheng KK, Lam TH, Leung GM, et al. Inequality and inequity in access to health care and treatment for chronic conditions in China: the Guangzhou Biobank Cohort Study. Health policy and planning. 2013;28(5):467-79.

72.   Wang Y, Wang J, Maitland E, Zhao Y, Nicholas S, Lu M. Growing old before growing rich: inequality in health service utilization among the mid-aged and elderly in Gansu and Zhejiang Provinces, China. BMC health services research. 2012;12:302.

73.   Terraneo M. Inequities in health care utilization by people aged 50+: evidence from 12 European countries. Social Science & Medicine. 2015;126:154-63.

74.   Dunlop DD, Manheim LM, Song J, Chang RW. Gender and ethnic/racial disparities in health care utilization among older adults. The Journals of Gerontology Series B: Psychological sciences and social sciences. 2002;57(4):S221-S33.

75.	Redondo-Sendino Á, Guallar-Castillón P, Banegas JR, Rodríguez-Artalejo F. Gender differences in the utilization of health-care services among the older adult population of Spain. BMC Public Health. 2006;6(1):155.

76.	Cameron KA, Song J, Manheim LM, Dunlop DD. Gender disparities in health and healthcare use among older adults. Journal of Women's Health. 2010;19(9):1643-50.

77.	Biswas P, Kabir ZN, Nilsson J, Zaman S. Dynamics of health care seeking behaviour of elderly people in rural Bangladesh. International Journal of ageing and later life. 2006;1(1):69-89.

78.	Murata C, Yamada T, Chen C-C, Ojima T, Hirai H, Kondo K. Barriers to healthcare among eldelry in Japan. International Journal of Environmental Research and Public Health. 2010;7(4):1330-41.

79.	Blazer DG, Landerman LR, Fillenbaum G, Homer R. Health services access and use among older adult in North California: urban Vs rural residents American Journal of Health Services. 1995;85:1384-90.

80.	Ladha A, Khan RS, Malik AA, Khan SF, Khan B, Khan IN, et al. The health seeking behaviour of elderly population in a poor-urban community of Karachi, Pakistan. The Journal of the Pakistan Medical Association. 2009;59(2):89-92.

81.	Kavosi Z, Mohammadbeigi A, Ramezani-Doroh V, Hatam N, Jafari A, Firoozjahantighi A. Horizontal inequity in access to outpatient services among Shiraz City residents, Iran. Journal of Research in Health Sciences. 2015;15(1):37-41.

82.	Crespo-Cebada E, Urbanos-Garrido RM. Equity and equality in the use of GP services for elderly people: the Spanish case. Health Policy. 2012;104(2):193-9.

83.	Hakmaosa A, Baruah KK, Baruah R, Hajong S. Health seeking behaviour of elderly in rani block, Kamrup (Rural) district, Assam: a community based cross sectional study. Int J Community Med Public Health. 2015;2(2):162-6.

84.	Joe W, Rudra S, Subramanian SV. Horizontal Inequity in Elderly Health Care Utilization: Evidence from India. Journal of Korean Medical Science. 2015;30 Suppl 2:S155-66.

85.	Sharma D, Mazta SR, Parashar A. Morbidity Pattern and Health-seeking Behavior of Aged Population residing in Shimla Hills of North India: A Cross-Sectional Study. Journal of Family Medicine and Primary Care. 2013;2(2):188-93.

86.	Agrawal G, Keshri K, Gaur K. Aging, disability and health care services among older persons in India. Middle East Journal of Age and Ageing. 2009;6(5):21-8.

87.	Agrawal G, Arokiasamy P. Morbidity prevalence and health care utilization among older adults in India. Journal of Applied Gerontology. 2009;29(2):155-79.

88.   Roy K, Chaudhuri A. Influence of socioeconomic status, wealth and financial empowerment on gender differences in health and healthcare utilization in later life: evidence from India. Social Science & Medicine. 2008;66(9):1951-62.

89.   Agrawal G, Keshri K. Morbidity patterns and health care seeking behavior among older widows in India. PloS one. 2014;9(4):e94295. doi: 10.1371/journal.pone.0094295.

90.   Hoeck S, Van der Heyden J, Geerts J, Van Hal G. Equity in GP and specialist contacts by older persons in Belgium. Int J Public Health. 2013;58(4):593-602.

91.   González-González C, Sánchez-García S, Juárez-Cedillo T, Rosas-Carrasco O, Gutiérrez-Robledo LM, García-Peña C. Health care utilization in the elderly Mexican population: expenditures and determinants. BMC Public Health. 2011;11:192. doi: 10.1186/471-2458-11-192.

92.   Mukherjee S, Levesque J-F. Morbidity and Outpatient Care for the Elderly in Kerala, South India: Evidence from a National Population based Survey. Journal of Population Ageing. 2012;5(3):177-92.

93.   Mukherjee S, Levesque J-F. The role of the public and private sectors in responding to older persons' needs for inpatient care: evidence from Kerala, India. Asia Pacific Population Journal. 2012;27(2):3-21.

94.   Macinko J, Lima-Costa MF. Horizontal equity in health care utilization in Brazil, 1998–2008. International Journal for Equity in Health. 2012;11:33. doi: 10.1186/475-9276-11-33.

95.   Channon AA, Andrade MV, Noronha K, Leone T, Dilip TR. Inpatient care of the elderly in Brazil and India: assessing social inequalities. Social Science & Medicine. 2012;75(12):2394-402.

96.   Blanchet N, Fink G, Osei-Akoto I. The effect of Ghana's National Health Insurance Scheme on health care utilisation. Ghana medical journal. 2012;46(2):76-84.

97.   Grasdal AL, Monstad K. Inequity in the use of physician services in Norway before and after introducing patient lists in primary care. International Journal for Equity in Health. 2011;10:25. doi: 10.1186/475-9276-10-25.

98.   Wang Y, Jiang Y, Li Y, Wang X, Ma C, Ma S. Health Insurance Utilization and Its Impact: Observations from the Middle-Aged and Elderly in China. PloS one. 2013;8(12):e80978. doi: 10.1371/journal.pone.0080978.

99.   Gnawali DP, Pokhrel S, Sié A, Sanon M, De Allegri M, Souares A, et al. The effect of community-based health insurance on the utilization of modern health care services: evidence from Burkina Faso. Health Policy. 2009;90(2):214-22.

100.   Paraje G, Vásquez F. Health equity in an unequal country: the use of medical services in Chile. International Journal for Equity in Health. 2012;11:81, doi: 10.1186/475-9276-11-81.

101.   Nunez A, Chi C. Equity in health care utilization in Chile. International Journal of Equity in Health. 2013;12:58. doi: 10.1186/475-9276-12-58.

102.   Hidayat B, Thabrany H, Dong H, Sauerborn R. The effects of mandatory health insurance on equity in access to outpatient care in Indonesia. Health policy and planning. 2004 September 1, 2004;19(5):322-35.

103.   Alguwaihes A, Shah BR. Educational attainment is associated with health care utilization and self-care behavior by individuals with diabetes. The Open Diabetes Journal. 2009;2:24-8.

104.   Kim J-H, Lee K-S, Yoo K-B, Park E-C. The Differences in Health Care Utilization between Medical Aid and Health Insurance: A Longitudinal Study Using Propensity Score Matching. PloS one. 2015;10(3):e0119939.

105.   Gibbons RD, Wilcox-Gok V. Health Service Utilization and Insurance Coverage: A Multivariate Probit Analysis. Journal of the American Statistical Association. 1998;93(44):63-72.

106.   Van Doorslaer E, Koolman X, Puffer F. Equity in the use of physician visits in OECD countries: has equal treatment for equal need been achieved? Measuring Up: Improving Health System Performance in OECD Countries. Paris: The Organization for Economic Co-operation and Development; 2002.

107.   Glorioso V, Subramanian SV. Equity in access to health care services in Italy. Health Services Research. 2014;49(3):950-70.

108.   Duy Kien V, Van Minh H, Bao Giang K, Weinehall L, Ng N. Horizontal inequity in public health care service utilization for non-communicable diseases in urban Vietnam. Glob Health Action. 2014;7:24919. doi: 10.3402/gha.v7.

109.   Engelgau MM, Karan A, Mahal A. The Economic impact of Non-communicable Diseases on households in India. Global Health. 2012;8:9. doi: 10.1186/744-8603-8-9.

110.   Bhojani U, Thriveni BS, Devadasan R, Munegowda CM, Devadasan N, Kolsteren P, et al. Out-of-pocket healthcare payments on chronic conditions impoverish urban poor in Bangalore, India. BMC Public Health. 2012;12:990. doi: 10.1186/471-2458-12-990.

111.   Brinda EM, Andres AR, Enemark U. Correlates of out-of-pocket and catastrophic health expenditures in Tanzania: results from a national household survey. BMC International Health and Human Rights. 2014;14:5. doi: 10.1186/472-698X-14-5.

112.   Mitra S, Findley PA, Sambamoorthi U. Health care expenditures of living with a disability: total expenditures, out-of-pocket expenses, and burden, 1996 to 2004. Archives of physical medicine and rehabilitation. 2009;90(9):1532-40.

113.   Saito E, Gilmour S, Rahman MM, Gautam GS, Shrestha PK, Shibuya K. Catastrophic household expenditure on health in Nepal: a cross-sectional survey. Bulletin of the world health organization. 2014;92(10):760-7.

114.   Wang Z, Li X, Chen M. Catastrophic health expenditures and its inequality in elderly households with chronic disease patients in China. International Journal of Equity in Health. 2015;14:8. doi: 10.1186/s12939-015-0134-6.

115.   Park E-J, Kwon J-W, Lee E-K, Jung Y-H, Park S. Out-of-pocket Medication Expenditure Burden of Elderly Koreans with Chronic Conditions. International Journal of Gerontology. 2015;9(3):166-71.

116.   Goeppel C, Frenz P, Grabenhenrich L, Keil T, Tinnemann P. Assessment of universal health coverage for adults aged 50 years or older with chronic illness in six middle-income countries. Bulletin of the world health organization. 2016;94(4):276-85c.

117.   Arsenijevic J, Pavlova M, Rechel B, Groot W. Catastrophic health care expenditure among older people with chronic diseases in 15 European countries. PloS one. 2016;11(7):e0157765. doi: 10.1371/journal.pone.

118.   O'Donnell O, Van Doorslaer E, Rannan-Eliya RP, Somanathan A, Adhikari SR, Akkazieva B, et al. Who pays for health care in Asia? Journal of Health Economics. 2008;27(2):460-75.

119.   Yu CP, Whynes DK, Sach TH. Equity in health care financing: The case of Malaysia. International Journal for Equity in Health. 2008;7:15. doi: 0.1186/475-9276-7-15.

120.   Wagstaff A, van Doorslaer E. Equity in the finance of health care: Some international comparisons. Journal of Health Economics. 1992;11(4):361-87.

121.   Castano RA, Arbelaez JJ, Giedion UB, Morales LG. Equitable financing, out-of-pocket payments and the role of health care reform in Colombia. Health policy and planning. 2002;17 Suppl:5-11.

122.   Cisse B, Luchini S, Moatti JP. Progressivity and horizontal equity in health care finance and delivery: What about Africa? Health Policy. 2007;80(1):51-68.

123.   Baji P, Pavlova M, Gulácsi L, Groot W. Changes in equity in out-of-pocket payments during the period of health care reforms: evidence from Hungary. International Journal of Equity in Health. 2012;11:36. doi: 10.1186/475-9276-11-36.

124.   Munge K, Briggs AH. The progressivity of health-care financing in Kenya. Health policy and planning. 2014;29(7):912-20.

125.   Sanwald A, Theurl E. Out-of-pocket payments in the Austrian healthcare system – a distributional analysis. International Journal for Equity in Health. 2015;14:94. doi: 10.1186/s12939-015-0230-7.

126.   Rezapour A, Ebadifard Azar F, Azami Aghdash S, Tanoomand A, Ahmadzadeh N, Sarabi Asiabar A. Inequity in household's capacity to pay and health payments in Tehran-Iran-2013. Medical Journal of the Islamic Republic of Iran. 2015;29:245.

127.   Kumara AS, Samaratunge R. Patterns and determinants of out-of-pocket health care expenditure in Sri Lanka: evidence from household surveys. Health policy and planning. 2016;31(8):970-83.

128.   Rezapour A, Arabloo J, Tofighi S, Alipour V, Sepandy M, Mokhtari P, et al. Determining Equity in Household's Health Care Payments in Hamedan Province, Iran. Arch Iran Med. 2016;19(7):480-7.

129.   Makinen M, Waters H, Rauch M, Almagambetova N, Bitran R, Gilson L, et al. Inequalities in health care use and expenditures: empirical data from eight developing countries and countries in transition. Bulletin of the world health organization. 2000;78(1):55-65.

130.   Akazili J, Gyapong J, McIntyre D. Who pays for health care in Ghana? International Journal for Equity in Health. 2011;10:26. doi: 10.1186/475-9276-10-26.

131.   Wagstaff A, Doorslaer Ev. Paying for health care: quantifying fairness, catastrophe, and impoverishment, with applications to Vietnam, 1993-98. Health Economics. 2003;12(11):921-34.

132.   Chaudhuri A, Roy K. Changes in out-of-pocket payments for healthcare in Vietnam and its impact on equity in payments, 1992–2002. Health Policy. 2008;88(1):38-48.

133.   Roy K, Howard DH. Equity in out-of-pocket payments for hospital care: Evidence from India. Health Policy. 2007;80(2):297-307.

134.   Mondal S. Health care services in India: A few questions on equity Health. 2013;5(1):53-61. doi: 10.4236/health.2013.51008. .

135.   Karan A, Selvaraj S, Mahal A. Moving to Universal Coverage? Trends in the Burden of Out-Of-Pocket Payments for Health Care across Social Groups in India, 1999–2000 to 2011–12. PloS one. 2014;9(8):e105162. doi: 10.1371/journal.pone.0105162.

136. Mohanty SK, Ladusingh L, Kastor A, Chauhan RK, Bloom DE. Pattern, growth and determinant of household health spending in India, 1993–2012. J Public Health (Oxf). 2016;24(3):215-29.

137. Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJ. Household catastrophic health expenditure: a multicountry analysis. The Lancet. 2003;362(9378):111-7.

138. O'Donnell O, van Doorslaer E, Rannan-Eliya RP, Somanathan A, Garg CC, Hanvoravongchai P, et al. Explaining the incidence of catastrophic expenditures on health care: Comparative evidence from Asia. EQUITAP Working Paper No. 5. 2005.

139. Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, et al. Catastrophic payments for health care in Asia. Health Economics. 2007;16(11):1159-84.

140. Lee W-Y, Shaw I. The Impact of Out-of-Pocket Payments on Health Care Inequity: The Case of National Health Insurance in South Korea. International Journal of Environmental Research and Public Health. 2014;11(7):7304-18.

141. Wagstaff A, van Doorslaer E. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993-1998. Health Economics. 2003;12(11):921-34.

142. Van Doorslaer E, O'Donnell O, Rannan-Eliya RP, Somanathan A, Adhikari SR, Garg CC, et al. Effect of payments for health care on poverty estimates in 11 countries in Asia: an analysis of household survey data. The Lancet. 2006;368(9544):1357-64.

143. Xu Y, Gao J, Zhou Z, Xue Q, Yang J, Luo H, et al. Measurement and explanation of socioeconomic inequality in catastrophic health care expenditure: evidence from the rural areas of Shaanxi Province. BMC health services research. 2015;15:256. doi: 10.1186/s12913-015-0892-2.

144. Boing AC, Bertoldi AD, Barros AJ, Posenato LG, Peres KG. Socioeconomic inequality in catastrophic health expenditure in Brazil. Revista de Saude Publica. 2014;48(4):632-41.

145. Pannarunothai S, Mills A. The poor pay more: Health-related inequality in Thailand. Social Science & Medicine. 1997;44(12):1781-90.

146. Tin Tin Su, Bocar Kouyaté, Flessa S. Catastrophic household expenditure for health care in a lowincome society: a study from Nouna District, Burkina Faso. Bulletin of the world health organization. 2006;84(1):21-7.

147. Somkotra T, Lagrada LP. Which households are at risk of catastrophic health spending: experience in Thailand after universal coverage. Health Aff (Millwood). 2009;28(3):w467-78.

148. Shi W, Chongsuvivatwong V, Geater A, Zhang J, Zhang H, Brombal D. Effect of household and village characteristics on financial catastrophe and impoverishment due to health care spending in Western and Central Rural China: A multilevel analysis. Health Res Policy Syst. 2011;9:16. doi: 0.1186/478-4505-9-16.

149. Kavosi Z, Rashidian A, Pourreza A, Majdzadeh R, Pourmalek F, Hosseinpour AR, et al. Inequality in household catastrophic health care expenditure in a low-income society of Iran. Health policy and planning. 2012;27(7):613-23.

150. Li Y, Wu Q, Liu C, Kang Z, Xie X, Yin H, et al. Catastrophic health expenditure and rural household impoverishment in China: what role does the new cooperative health insurance scheme play? PloS one. 2014;9(4):e93253. doi: 10.1371/journal.pone.0093253.

151. Mondal S, Lucas H, Peters D, Kanjilal B. Catastrophic out-of-pocket payment for healthcare and implications for household coping strategies: evidence from West Bengal, India. Economics Bulletin. 2014;34(2):1303-16.

152. Ghiasvand H, Abolghasem Gorji H, Maleki M, Hadian M. Catastrophic Health Expenditure Among Iranian Rural and Urban Households, 2013 - 2014. Iranian Red Crescent Medical Journal. 2015;17(9):e30974. doi: 10.5812/ircmj.

153. Bonu S, Bhushan I, DH. P. Incidence, intensity and correlates of catastrophic out-of-pocket health payments in India. ERD Working Paper No. 102. Asian Development Bank, Economic and Research Department, Manila: Philippines.2007.

154. Shahrawat R, Rao KD. Insured yet vulnerable: out-of-pocket payments and India's poor. Health policy and planning. 2012;27(3):213-21.

155. Selvaraj S, Karan AK. Deepening health insecurity in India: evidence from national sample surveys since 1980s. Economic & Political Weekly. 2009;XLIV(40):55-60.

156. Garg CC, Karan AK. Reducing out-of-pocket expenditures to reduce poverty: a disaggregated analysis at rural-urban and state level in India. Health policy and planning. 2009;24(2):116-28.

157. Shepherd-Smith A. Free drugs for India's poor. The Lancet. 2012;380(9845):874.

158. Sinha RK, Chatterjee K, Nair N, Tripathy PK. Determinants of out-of-pocket and catastrophic health expenditure: a cross-sectional study. British Journal of Medicine and Medical Research. 2016;11(8):1-11.

159. Jayakrishnan T, Jeeja M, Kuniyil V, Paramasivam S. Increasing out-of-pocket health care expenditure in India-due to dupply or demand? PharmacoEconomics. 2016;1(105):1-6.

160. Tripathy J, Prasad B, Shewade H, Kumar A, Zachariah R, Chadha S, et al. Cost of hospitalization for non-communicable diseases in India: are we pro-poor? Tropical Medicine & International Health. 2016;21(8):1019-28.

161. Saikia N, Bora JK. Gender Difference in Health-Care Expenditure: Evidence from India Human Development Survey. PloS one. 2016;11(7):e0158332. doi: 10.1371/journal.pone.

162. Peter Berman, Rajeev Ahuja, Bhandari L. The imporovising effect of healthcare payments in India: new methodology and findings. Economic & Political Weekly. 2010;15(16):65-71.

163. Kumar K, Singh A, Kumar S, Ram F, Singh A, Ram U, et al. Socio-economic differentials in impoverishment effects of out-of-pocket health expenditure in China and India: evidence from WHO SAGE. PloS one. 2015;10(8):e0135051. doi: 10.1371/journal.pone.

164. Bock J-O, Matschinger H, Brenner H, Wild B, Haefeli WE, Quinzler R, et al. Inequalities in out-of-pocket payments for health care services among elderly Germans–results of a population-based cross-sectional study. International Journal for Equity in Health. 2014;13:3. doi: 10.1186/475-9276-13-3.

165. Fazaeli AA, Ghaderi H, Abbas Fazaeli A, Lotfi F, Salehi M, Mehrara M. Main determinants of catastrophic health expenditures: a Bayesian logit approach on Iranian household survey data (2010). Glob J Health Sci. 2015;7(4):335-40.

166. Buigut S, Ettarh R, Amendah DD. Catastrophic health expenditure and its determinants in Kenya slum communities. International Journal for Equity in Health. 2015;14:46. doi: 10.1186/s12939-015-0168-9.

167. Baird K. High Out-of-Pocket Medical Spending among the Poor and Elderly in Nine Developed Countries. Health Services Research. 2016;51(4):1467-88.

168. Jacobs B, de Groot R, Fernandes Antunes A. Financial access to health care for older people in Cambodia: 10-year trends (2004-14) and determinants of catastrophic health expenses. International Journal for Equity in Health. 2016;15:94. doi: 10.1186/s12939-016-0383-z.

169. Rubin RM, Koelln K. Out-of-pocket health expenditure differentials between elderly and non-elderly households. Gerontologist. 1993;33(5):595-602.

170.   Kim SG, Yu SH, Park WS, Chung WJ. Out-of-pocket Health Expenditures by Non-elderly and Elderly Persons in Korea. Journal of Preventive Medicine and Public Health 2005;38(4):408-14.

171.   Desmond K, Rice T, Cubanski J, Neuman P. The burden of out-of-pocket health spending among older versus younger adults: analysis from the Consumer Expenditure Survey, 1998–2003. Medicare Issue Brief 7686. Menlo Park, CA: Kaiser Family Foundation 2007.

172.   Pal R. Out-of-pocket health expenditure: Pattern, determinants and policy implications. Artha Vijnana. 2010;LII(3):212-29.

173.   Mohanty SK, Chauhan RK, Mazumdar S, Srivastava A. Out-of-pocket expenditure on health care among elderly and non-elderly households in India. Social Indicators Research. 2013;115(3):1137-57.

174.   Brinda EM, Kowal P, Attermann J, Enemark U. Health service use, out-of-pocket payments and catastrophic health expenditure among older people in India: The WHO Study on global AGEing and adult health (SAGE). Journal of Epidemiology and Community Health. 2015;69(5):489-94.

175.   Adisa O. Investigating determinants of catastrophic health spending among poorly insured elderly households in urban Nigeria. International Journal for Equity in Health. 2015;14:79. doi: 10.1186/s12939-015-0188-5.

176.   Mondal S. Health Policy Changes and Their Impact on Equity in Health Financing in India. New Delhi: Institute for Studies in Industrial Development, 2015.

177.   Li Y, Wu Q, Xu L, Legge D, Hao Y, Gao L, et al. Factors affecting catastrophic health expenditure and impoverishment from medical expenses in China: policy implications of universal health insurance. Bulletin of the world health organization. 2012;90(9):664-71.

178.   Masiye F, Kaonga O, Kirigia JM. Does User Fee Removal Policy Provide Financial Protection from Catastrophic Health Care Payments? Evidence from Zambia. PloS one. 2016;11(1):e0146508. doi: 10.1371/journal.pone.

179.   Thompson WS. Population. American Journal Of Sociology. 1929;34(6):959-75.

180.   Notestein FW. Population—the long view. In Theodore W. Schultz, Ed., Food for the World. Chicago, IL, USA: University of Chicago Press; 1945.

181.   United Nations. World Population Ageing 2015. New York: Department of Economic and Social Affairs, Population Division, 2015 (ST/ESA/SER.A/390).

182. United Nations. World Population Prospects: The 2015 Revision, Key Findings and Advance Tables. Working Paper No. ESA/P/WP.241. New York: Department of Economic and Social Affairs, Population Division, 2015.

183. Office of Registrar General & Census Commissioner. Census of India (2011): Census Provisional Population Totals New Delhi: Ministry of Home Affairs, Government of India; 2015 [cited 2015 October 15]. Available from: http://www.censusindia.gov.in/2011-common/census_2011.html.

184. Verma R, Khanna P. National Program of Health-Care for the Elderly in India: A Hope for Healthy Ageing. Int J Prev Med. 2013;4(10):1103-7.

185. Mukherjee AN, Fan V. Fiscal Federalism and Intergovernmental Transfers for Financing Health in India. Working Group on Intergovernmental Transfers for Health in Populous, Federal Countries Center for Global Development,2014.

186. National Health Systems Resource Centre. National Health Accounts Estimates for India (2013-14). New Delhi: Ministry of Health and Family Welfare, Government of India, 2016.

187. Berman P, Ahuja R, Tandon A, Sparkes S, Gottret P. Government health financing in India: challenges in achieving ambitious goals. World Bank Human Nutrition and Population Discussion Paper 59886. Washington, DC.2010.

188. Debasis Barik, Tushar Agarwal, Desia S. After the Dividend: Caring for a Greying India. Economic & Political Weekly. 2015;50(24):108-12.

189. Hemamalini Ramakrishnan. Ageing population: policy responses and challenges. The Acutary India. 2011:11-5.

190. Visaria P. Demographics of ageing in India. Economic and Political Weekly. 2001;36(22):1967-75.

191. Dandekar K. The aged, their problems and social intervention in Maharashtra. Economic and Political Weekly. 1993;28(23):1188-94.

192. Susuman S. The health of aged in South India. Bold. 2006;16(4):17-26.

193. Population Reference Bureau. Today's Research on Aging. Washington, DC: Program and Policy Implications, Issue 25, 2012.

194. World Health Organization. Global Health Observatory data repository Geneva: The WHO; 2016 [cited 2017 February 2]. Available from: http://apps.who.int/gho/data/node.main.

195. HelpAge India. State of elderly in India- 2014. New Delhi: 2015.

196. National Sample Survey Organization. Social consumption: health - NSS 71st round, 2014 New Delhi: Ministry of Statistics and Programme Implementation,

Government of India; 2016 [cited 2016 September 28]. Available from: http://mail.mospi.gov.in/index.php/catalog/161.

197.   HelpAge International. Global AgeWatch Index 2013: Insight report London: HelpAge International; 2013 [cited 2017 February 12]. Available from: http://www.helpage.org/global-agewatch/reports/global-agewatch-index-2013-insight-report-summary-and-methodology/.

198.   Nayak DK. Changing Household Size in India: An Inter-State Comparison. Transactions. 2014;36(1):1-18.

199.   National Sample Survey Organization. Morbidity and treatment of ailments - NSS 52nd, 1995-96 New Delhi: Ministry of Statistics and Programme Implementation, Government of India; 1998 [cited 2016 September 28]. Available from: http://catalog.ihsn.org/index.php/catalog/3242/study-description.

200.   Bloom DE, Mahal A, Rosenberg L, Sevilla J. Economic security arrangements in the context of population ageing in India. International Social Security Review. 2010;63(3-4):59-89.

201.   Rajan IS, Kumar S. Living arrangements among Indian elderly: new evidence from national family health survey. Economic and Political Weekly. 2003;38(1):75-80.

202.   Robert Holzmann, Richard Hinz. Old-age income support in the 21st century: An international perspective on pension systems and reform. Washington, DC, USA: The World Bank, 2005.

203.   Goli S, Pandey A. Is India 'Getting Older before Getting Rich? Beyond demographic assessement. In: S. Anand, I. Kumar, A. Srivastava, editors. Challenges of Twenty-First Century-A Trans Disciplinary Perspective. New Delhi: Macmillan Advanced Research Series.; 2010. p. 116-39.

204.   Institute for Health Metrics and Evaluation (IHME). Global Health Data Exchange [Internet]. Seattle, WA: IHME, University of Washington; 2016 [cited 2017 February 12]. Available from: http://ghdx.healthdata.org/gbd-results-tool.

205.   Reddy PH. The health of the aged in India. Health Transition Review. 1996;6:233-44.

206.   Ghosh S, Arokiasamy P. Morbidity in India: levels, trends and differentials. Journal of Health Studies. 2009;II:136-48.

207.   Chatterji S, Paul K, Mathers C, Naidoo N, Verdes E, Smith JP, et al. The health of aging populations in China and India. Health Affairs. 2008;27(4):1052-63.

208.   Yadav S, Arokiasamy P. Understanding epidemiological transition in India. Global health action. 2014;7(23248).

209. Husain Z, Ghosh S. Is health status of elderly worsening in India: a comparison of successive rounds of National Sample Survey data. Journal Of Biosocial Science. 2011;43(2):211-31.

210. Alam M. Ageing in Indian society: a country profile. BOLD, Quarterly Journal of the International Institute on Ageing, United Nations, (Malta). 2000;10(3):5-22.

211. Gupta I, Sankar D. Health of the elderly in India: a multivariate analysis. World Health & Population. 2003;doi:10.12927/whp.2003.17603.

212. Paul Kowal, Sharon Williams, Yong Jiang, Wu Fan, P. Arokiasamy a, Chatterji S. Aging, health, and chronic conditions in China and India: results from the multinational Study on Global AGEing and Adult Health (SAGE). In: J.P. Smith, M. Majmundar, editors. Aging in Asia: Findings From New and Emerging Data Initiatives. Washington, DC: The National Academies Press: National Research Council; 2012.

213. Kumar V. Health status and health care services among older persons in India. Journal of Aging & Social Policy. 2003;15(2-3):67-83.

214. Mooij J, Dev SM. Social sector priorities: An analysis of budgets and expenditures in India in the 1990s Development Policy Review. 2004;22(1):97-120.

215. Ramani KV. The India healthcare sector: governance and managerial challenges. Advances in Social Sciences Research Journal. 2014;1(1):11-21.

216. World Health Organization. WHO Global Health Expenditure Data Base. Geneva: WHO; 2014 [cited 2017 January 2]. Available from: http://apps.who.int/nha/database.

217. Balarajan Y, Selvaraj S, Subramanian SV. Health care and equity in India. The Lancet. 2011;377(9764):505-15.

218. Sen B. Securing the right to health for all in India. The Lancet. 2011;377(9765):532-3.

219. Ministry of Social Justice and Empowerment. National policy on older persons. New Delhi: Government of India, 1999.

220. Rajan SI, Mishra US. The National Policy for Older Persons: Critical Issues in Implementation. Working paper: 5. United Nations Population Fund (UNFPA), New Delhi.2011.

221. Ministry of Social Justice and Empowerment. National Policy for Senior Citizens. New Delhi: Government of India, 2011.

222. Ministry of Rural Development. Annual Report 2013-14. New Delhi: Government of India.

223. Omran AR. The epidemiologic transition : a theory of the epidemiology of population change. Milbank Memorial Fund Quarterly. 1971;49(4):509-38.

224. Olshansky SJ, Ault AB. The fourth stage of the epidemiologic transition: the age of delayed degenerative diseases. The Milbank Quarterly. 1986:355-91.

225. Omran AR. Epidemiologic transition in the United States: the health factor in population change. Population Bulletin. 1977;32(2):1-42.

226. Omram A. The epidemiologic transition theory. A preliminary update. Journal of Tropical Pediatrics. 1983;29(6):305-16.

227. GBD 2013 DALYs and HALE Collaborators. Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries, 1990–2013: quantifying the epidemiological transition. The Lancet. 2015;386(10009):2145-91.

228. Nicholas J Kassebaum, Megha Arora, Ryan M Barber, Zulfi qar A Bhutta, Jonathan Brown, Austin Carter, et al. Global, Regional, and National Disability-adjusted Life Years (Dalys) for 315 Diseases and Injuries and Healthy Life Expectancy (Hale), 1990-2015: A Systematic Analysis for the Global Burden of Disease Study 2015. The Lancet. 2016;388(10053):1603-58.

229. Wang H, Naghavi M, Allen C, Barber RM, Bhutta ZA, Carter A, et al. Global, regional, and national life expectancy, all-cause mortality, and cause-specific mortality for 249 causes of death, 1980–2015: a systematic analysis for the Global Burden of Disease Study 2015. The Lancet. 2016;388(10053):1459-544.

230. World Health Organization. Noncommunicable diseases Fact Sheet Geneva: WHO; 2015 [cited 2017 February 12]. Available from: http://www.who.int/mediacentre/factsheets/fs355/en/.

231. Rao MG, Choudhury M. Health care financing reforms in India. National Institute of Public Finance and Policy, Working Paper No: 2012-100.2012.

232. Ministry of Finance. Economic Survey 2016-17 New Delhi: Department of Economic Affairs, Economic Division, Government of India, 2017.

233. Marten R, McIntyre D, Travassos C, Shishkin S, Longde W, Reddy S, et al. An assessment of progress towards universal health coverage in Brazil, Russia, India, China, and South Africa (BRICS). The Lancet. 2014;384(9960):2164-71.

234. National Sample Survey Organization. Morbidity, healthcare and the condition of the aged - NSS 60th, 2004 New Delhi: Ministry of Statistics and Programme Implementation, Government of India; 2006 [cited 2016 September 28]. Available from: http://catalog.ihsn.org/index.php/catalog/3230.

235. National Sample Survey Organization. Level and pattern of consumer expenditure - NSS 50th round, 1993-94 New Delhi: Ministry of Statistics and Programme

Implementation, Government of India 1996 [cited 2016 September 28]. Available from: http://catalog.ihsn.org/index.php/catalog/2622.

236.   National Sample Survey Organization. Level and pattern of consumer expenditure - NSS 55th round, 1999-2000. New Delhi: Ministry of Statistics and Programme Implementation, Government of India; 2001 [cited 2016 September 28]. Available from: http://catalog.ihsn.org/index.php/catalog/2606.

237.   National Sample Survey Organization. Level and pattern of consumer expenditure - NSS 61st round, 2004-05 New Delhi: Ministry of Statistics and Programme Implementation, Government of India; 2006 [cited 2016 September 28]. Available from: http://catalog.ihsn.org/index.php/catalog/1910.

238.   National Sample Survey Organization. Level and pattern of consumer expenditure - NSS 68th rounds, 2011-12 New Delhi: Ministry of Statistics and Programme Implementation, Government of India; 2014 [cited 2016 September 28]. Available from: http://catalog.ihsn.org/index.php/catalog/3281.

239.   United Nations. Vienna International Plan of Action on Ageing. New York The United Nations, 1982.

240.   Murray CJL, Theo Vos RL, Naghavi M, Flaxman AD, Michaud C, Ezzati M, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. The Lancet. 2012;380(9859):2197-223.

241.   Deaton A. The analysis of household surveys: a microeconometric approach to development policy. Washington, DC: The World Bank; 1997.

242.   Andersen RM. National health surveys and the behavioral model of health services use. Medical care. 2008;46(7):647-53.

243.   Salomon JA, Wang H, Freeman MK, Vos T, Flaxman AD, Lopez AD, et al. Healthy life expectancy for 187 countries, 1990-2010: a systematic analysis for the global burden of disease study 2010. The Lancet. 2012;380(9859):2144-62.

244.   Alam M, Karan A. Elderly health in India: dimensions, differentials, and determinants. BKPAI working paper 3. New Delhi: The United Nations Population Fund (UNFPA), 2011.

245.   Prasad S. Does hospitalization make elderly households poor? an examination of the case of Kerala, India. Social Policy & Administration. 2007;41(4):355-71.

246.   Gao J, Raven JH, Tang S. Hospitalisation among the elderly in urban China. Health Policy. 2007;84(2):210-9.

247.   Nowossadeck E. Population aging and hospitalization for chronic disease in Germany. Dtsch Arztebl Int. 2012;109(9):151-7.

248.   Prusty RK, Kumar A, Gogoi M. Pattern of self-perceived health, immobility and hospitalization among older adults in India. Middle East Journal of Age and Ageing. 2011;8(6):8-17.

249.   Martin TC, Njogu W. A decade of change in contraceptive behaviour in Latin America: a multivariate decomposition analysis. Population Bulletin of United Nations. 1994;36:81-109.

250.   Pillai KV, Teboh C. A decade of contraceptive use in Cameroon: influences of structural changes. Open Access Journal of Contraception. 2011;2:5-11.

251.   Diwedi LK. Contraceptive use in India: a multivariate decomposition and related simulation analysis. Demography India. 2006;35(2):291-302.

252.   Njogu W. Trends and determinants of contraceptive use in Kenya. Demography. 1991;28(1):83-99.

253.   Fernandez E, Schiaffino A, Rajmil L, Badia X, Segura A. Gender inequalities in health and health care services use in Catalonia (Spain). Journal of Epidemiology and Community Health. 1999;53(4):218-22.

254.   Arokiasamy P, Yadav S. Changing age patterns of morbidity vis-a-vis mortality in India. J Biosoc Sci. 2014;46(4):462-79.

255.   Dilip TR. Utilization of inpatient care from private hospitals: trends emerging from Kerala, India. Health policy and planning. 2010;25(5):437-46.

256.   Prinja S, Kanavos P, Kumar R. Health care inequities in north India: role of public sector in universalizing health care. Indian Journal of Medical Research. 2012;136(3):421-31.

257.   World Health Assembly. Sustainable health financing, universal coverage and social health insurance Geneva, Switzerland: WHO; 2005 [cited 2016 April 4]. Available from: http://www.who.int/health_financing/documents/cov-wharesolution5833/en/.

258.   Wagstaff A, van Doorslaer E. Measuring and testing for inequity in the delivery of health care. Journal of Human Resources. 2000;35(4):716-33.

259.   Wagstaff A, Paci P, van Doorslaer E. On the measurement of inequalities in health. Social Science & Medicine. 1991;33:545-57.

260.   Doorslaer Ev, Koolman X, Jones AM. Explaining income-related inequalities in doctor utilisation in Europe. Health Economics. 2004;13(7):629-47.

261.	O'Donnell OA, Wagstaff A. Analyzing health equity using household survey data: a guide to techniques and their implementation. Washington, DC: The World Bank Institute; 2008.

262.	Kakwani N, Wagstaff A, Van Doorslaer E. Socioeconomic inequalities in health: measurement, computation, and statistical inference. Journal of econometrics. 1997;77(1):87-103.

263.	Ahmed SM, Tomson G, Petzold M, Kabir ZN. Socioeconomic status overrides age and gender in determining health-seeking behaviour in rural Bangladesh. Bulletin of the world health organization. 2005;83(2):109-17.

264.	Bourne PA. Socio-demographic determinants of health care-seeking behaviour, self-reported illness and self-evaluated health status in Jamaica. International Journal of Collaborative Research on Internal Medicine & Public Health. 2009;1(4):101-30.

265.	Malhotra C, Do YK. Socio-economic disparities in health system responsiveness in India. Health policy and planning. 2013;28(2):197-205.

266.	David H Peters, Abdo S Yazbeck, Rashmi R Sharma, G N V Ramana, Lant H. Pritchett, Wagstaff A. Better health system for India's poor: findings, analysis and options. Washington DC: World Bank; 2001.

267.	Ghosh S. Equity in the utilization of healthcare services in India: evidence from National Sample Survey. International journal of health policy and management. 2014;2(1):29-38.

268.	Pang EC, Jordan-Marsh M, Silverstein M, Cody M. Health-seeking behaviors of elderly Chinese Americans: shifts in expectations. The Gerontologist. 2003;43(6):864-74.

269.	Abegunde DO, Mathers CD, Adam T, Ortegon M, Strong K. The burden and costs of chronic diseases in low-income and middle-income countries. The Lancet. 2007;370(9603):1929-38.

270.	Wallace SP, Gutiérrez VF. Equity of access to health care for older adults in four major Latin American cities. Pan American Journal of Public Health. 2005;17(5/6):394-409.

271.	Ministry of Health and Family Welfare. National programme for the healthcare of elderly: an approach towards active and healthy ageing New Delhi: Directorate General of Health Services, Government of India; 2011 [cited 2016 April 4]. Available from: http://www.health.bih.nic.in/Docs/Guidelines‑NPHCE.pdf

272.	Sen A. Health: perception versus observation. British Medical Journal. 2002;324(7342):860-1.

273. Prinja S, Jeyashree K, Rana S, Sharma A, Kumar R. Wealth related inequalities in self reported morbidity: Positional objectivity or epidemiological transition? Indian Journal of Medical Research. 2015;141(4):438-45.

274. Sen A. Positional objectivity. Philosophy & Public Affairs. 1993;22(2 (Spring 1993)):126-45.

275. Dilip TR. Understanding levels of morbidity and hospitalization in Kerala, India. Bulletin of the world health organization. 2002;80(9):746-51.

276. Prinja S, Jeet G, Kumar R. Validity of self-reported morbidity. Indian Journal of Medical Research. 2012;136(5):722-24.

277. Srivastava A, Mohanty SK. Poverty among elderly in India. Social Indicators Research. 2012;109(3):493-514.

278. Mahal A, Singh J, Afridi F, Lamba V, Gumber A, Selvaraju V. Who benefits from public health spending in India. New Delhi: National Council for Applied Economic Research. 2001.

279. Mahal A, Yazbeck AS, Peters DH, Ramana G. The poor and health service use in India. Washington, DC: World Bank. 2001.

280. Xu K, Evans DB, Carrin G, Aguilar-Rivera AM, Musgrove P, Evans T. Protecting households from catastrophic health spending. Health Aff (Millwood). 2007;26(4):972-83.

281. World Health Organization. WHO Global Health Expenditure Atlas. Geneva: Department of Health Systems Financing Health Systems Services, WHO, 2014.

282. Bloom DE, Chatterji S, Kowal P, Lloyd-Sherlock P, McKee M, Rechel B, et al. Macroeconomic implications of population ageing and selected policy responses. The Lancet. 2015;385(9968):649-57.

283. Bonu S, Bhushan I, Rani M, Anderson I. Incidence and correlates of 'catastrophic'maternal health care expenditure in India. Health policy and planning. 2009;24(6):445-56.

284. Goli S, Moradhvaj, Rammohan A, Shruti, Pradhan J. High spending on maternity care in India: what are the factors explaining It? PloS one. 2016;11(6):e0156437. doi: 10.1371/journal.pone.

285. Raban MZ, Dandona R, Dandona L. Variations in catastrophic health expenditure estimates from household surveys in India. Bulletin of the world health organization. 2013;91(10):726-35.

286. Ranson MK. Reduction of catastrophic health care expenditures by a community-based health insurance scheme in Gujarat, India: current experiences and challenges. Bulletin of the world health organization. 2002;80(8):613-21.

287. Selvaraj S, Karan AK. Why publicly-financed health insurance schemes are ineffective in providing financial risk protection. Economic & Political Weekly. 2012;47(11):61-8.

288. International Monetary Fund. World Economic Outlook Database [Internet]. Washington: IMF; 2016 [cited 2017 January 2]. Available from: http://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx.

289. International Monetary Fund. Enhanced Principal Global Indicators (PGI) [Internet]. Washington: IMF; 2016 [cited 2017 January 2]. Available from: http://www.principalglobalindicators.org/?sk=E30FAADE-77D0-4F8E-953C-C48DD9D14735.

290. Government of India. National Health Policy 2015 Draft. New Delhi: Ministry of Health and Family Welfare, 2014.

291. Priyanka Saksena KX, Durairaj V. The drivers of catastrophic expenditure: outpatient services, hospitalization or medicines? World Health Report (2010) Background Paper, No 21. Geneva, Switzerland: World Health Organization, 2010.

292. Anbari Z, Mohammadbeigi A, Mohammadsalehi N, Ebrazeh A. Health expenditure and catastrophic costs for inpatient- and out-patient care in Iran. International journal of preventive medicine. 2014;5(8):1023-8.

293. Gotsadze G, Zoidze A, Rukhadze N. Household catastrophic health expenditure: evidence from Georgia and its policy implications. BMC health services research. 2009;9:69. doi: 10.1186/472-6963-9-69.

294. Pradhan M, Prescott N. Social risk management options for medical care in Indonesia. Health Economics. 2002;11(5):431-46.

295. Xu K, Ravndal F, Evans DB, Carrin G. Assessing the reliability of household expenditure data: results of the World Health Survey. Health Policy. 2009;91(3):297-305.

296. Lu C, Chin B, Li G, Murray CJ. Limitations of methods for measuring out-of-pocket and catastrophic private health expenditures. Bulletin of the world health organization. 2009;87(3):238-44D.

297. World Health Organization. The World Health Report, Health systems financing: the path to universal coverage Geneva: WHO; 2010. Available from: http://www.who.int/whr/2010/en/.

298. Manning WG, Basu A, Mullahy J. Generalized modeling approaches to risk adjustment of skewed outcomes data. Journal of Health Economics. 2005;24(3):465-88.

299. Papke LE, Wooldridge JM. Panel data methods for fractional response variables with an application to test pass rates. Journal of econometrics. 2008;145(1):121-33.

300. Papke LE, Wooldridge J. Econometric methods for fractional response variables with application to 401 (k) plan participation rates. Journal of Applied Econometrics. 1996;11(6): 619-32.

301. Gallani S, Krishnan R, Wooldridge J. Applications of Fractional Response Model to the Study of Bounded Dependent Variables in Accounting Research. Working Paper 16-016. Harvard Business School Accounting & Management Unit 2015.

302. Prinja S, Aggarwal AK, Kumar R, Kanavos P. User charges in health care: Evidence of effect on service utilization & equity from north India. The Indian journal of medical research. 2012;136(5):868-76.

303. Sen G, Iyer A, George A. Structural reforms and health equity: a comparison of NSS surveys, 1986-87 and 1995-96. Economic and Political Weekly. 2002;37(4):1342-52.

304. Gupt A, Kaur P, Kamraj P, Murthy BN. Out of Pocket Expenditure for Hospitalization among Below Poverty Line Households in District Solan, Himachal Pradesh, India, 2013. PloS one. 2016;11(2):e0149824. doi: 10.1371/journal.pone.

305. Planning Commission of India. High Level Expert Group Report on Universal Health Coverage for India. New Delhi: Government of India; 2011 [cited 2016 April 4]. Available from: http://planningcommission.nic.in/reports/genrep/rep_uhc0812.pdf.

306. Bali AS, Ramesh M. Health care reforms in India: Getting it wrong. Public Policy and Administration. 2015;30(3-4):300-19.

307. Bhat R, Jain N. Analysis of public and private healthcare expenditures. Economic and Political Weekly. 2006;41(1):57-68.

308. Chandra R, Singh A, Mukherjee S. A disaggregated analysis of change in household out-of-pocket expenditure on healthcare in India, 1995-2004. International Journal of Public Health Research. 2013;3(1):257-66.

309. Chaudhuri A. Socio-economic inequity in health care utilization & expenditures in richer States in India. The Indian journal of medical research. 2012;136(3):368-9.

310. Rao KD, Bhatnagar A, Murphy A. Socio-economic inequalities in the financing of cardiovascular & diabetes inpatient treatment in India. The Indian journal of medical research. 2011;133:57-63.

311.   Ritter PL, Stewart AL, Kaymaz H, Sobel DS, Block DA, Lorig KR. Self-reports of health care utilization compared to provider records. Journal of Clinical Epidemiology. 2001;54(2):136-41.

312.   Reijneveld S, Stronks K. The impact of response bias on estimates of health care utilization in a metropolitan area: the use of administrative data. International Journal of Epidemiology. 1999;28(6):1134-40.

313.   World Health Organization. The impact of universal insurance program on catastrophic health expenditure: simulation analysis for Kenya. 2006.

314.   Flores G, Krishnakumar J, O'Donnell O, Van Doorslaer E. Coping with health-care costs: implications for the measurement of catastrophic expenditures and poverty. Health Economics. 2008;17(12):1393-412.

315.   Elkan R, Kendrick D, Dewey M, Hewitt M, Robinson J, Blair M, et al. Effectiveness of home based support for older people: systematic review and meta-analysis. BMJ. 2001;323(7315):719-25.

316.   Tao H, McRoy S. Caring for and keeping the elderly in their homes. Chinese Nursing Research. 2015;2(2–3):31-4.

317.   The World Bank. Health expenditure, public (% of GDP). Washington, DC: World Bank; [cited 2015 July 2]. Available from: http://www.worldbank.org/.

318.   Ministry of Health and Family Welfare. National Health Policy 2017. New Delhi: Government of India, 2017.

319.   Mackintosh M, Channon A, Karan A, Selvaraj S, Cavagnero E, Zhao H. What is the private sector? Understanding private provision in the health systems of low-income and middle-income countries. The Lancet. 2016;388(10044):596-605.

320.   Reddy KS, Selvaraj S, Rao KD, Chokshi M, Kumar P, Arora V, et al. A critical assessment of the existing health insurance models in India. New Delhi: Planning Commission of India, 2011.

321.   Cutler DM, Lleras-Muney A, Vogl T. Socioeconomic status and health: dimensions and mechanisms. w14333. National Bureau of Economic Research,2008.

322.   Oliver A, Mossialos E. Equity of access to health care: outlining the foundations for action. Journal of Epidemiology and Community Health. 2004;58(8):655-8.

Chapter 10. Appendices

Appendix A-1 Ethics approval from the Institutional Ethics Committee of Public Health Foundation of India

Institutional Ethics Committee

Public Health Foundation of India

Plot No. 47, Sector 44, Institutional Area Gurgaon – 122002

Form VIII
Communication of Decision on Request for Exemption from IEC Review

TRC-IEC No:	TRC-IEC-247/15		Date:	February 23, 2015	
Project title:	Socio-economic inequality in health status, health care and health expenditure in the older population of India				
Principal Investigator:	Anamika Pandey (PhD Student under Wellcome Trust Capacity Building Programme Strategic Award to PHFI)				
Decision on request for exemption:	**Exempted from IEC review**			☒	
	Not exempted from full IEC review	☐	**Recommended for:**	**Expedited review**	☐
				Full IEC review	☐
Comments:	Study meets the criteria for exemption category 3 The study is approved for the duration of 24 months. The PI is studying under the guidance of Prof Lalit Dandona (PHFI), Dr George B. Ploubidis (University of London) and Ms Lynda Clarke (London School of Hygiene & Tropical Medicine). The PI is requested to inform the secretariat of the start of study and upon completion or any changes to the study design and methodology. The PI will submit a final report to the PHFI-IEC after study completion				

Prof. Ramanan Laxminarayan
Name and Signature of Member Secretary
APPROVED
CHAIRMAN / MEMBER SECRETARY
PUBLIC HEALTH FOUNDATION OF INDIA

It is the investigators responsibility to notify the IEC, if any changes or modifications are made in the study's design, procedures, etc which may affect the exemption.

Appendix A-2 Ethics approval from the Observational/Interventions Research Ethics Committee of London School of Hygiene and Tropical Medicine

London School of Hygiene & Tropical Medicine
Keppel Street, London WC1E 7HT
United Kingdom
Switchboard: +44 (0)20 7636 8636

www.lshtm.ac.uk

Observational / Interventions Research Ethics Committee

LSHTM

10 March 2015

Dear Ms Pandey

Study Title: Socio-economic inequality in health status, health care and health expenditure in the older population of India

LSHTM Ethics Ref: 8938

Thank you for responding to the Observational Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

Approval is dependent on local ethical approval having been received, where relevant.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type	File Name	Date	Version
Protocol / Proposal	140512 Upgrading document AP final	27/01/2015	1
Investigator CV	150115 CV_AP	27/01/2015	1
Local Approval	Details of the data	05/02/2015	1
Covering Letter	150302 Covering letter	02/03/2015	ver1
Local Approval	LASI ethics clearence	09/03/2015	ver1
Local Approval	SAGE ethics clearence	09/03/2015	ver1

After ethical review

The Chief Investigator (CI) or delegate is responsible for informing the ethics committee of any subsequent changes to the application. These must be submitted to the Committee for review using an Amendment form. Amendments must not be initiated before receipt of written favourable opinion from the committee.

The CI or delegate is also required to notify the ethics committee of any protocol violations and/or Suspected Unexpected Serious Adverse Reactions (SUSARs) which occur during the project by submitting a Serious Adverse Event form.

At the end of the study, the CI or delegate must notify the committee using an End of Study form.

All aforementioned forms are available on the ethics online applications website and can only be submitted to the committee via the website at: http://leo.lshtm.ac.uk

Additional information is available at: www.lshtm.ac.uk/ethics

Yours sincerely,

Professor John DH Porter
Chair

ethics@lshtm.ac.uk

Page 1 of 2

223

Improving health worldwide

224

Appendix C-1 Estimated and projected population of India between 1950 and 2100 by United Nations
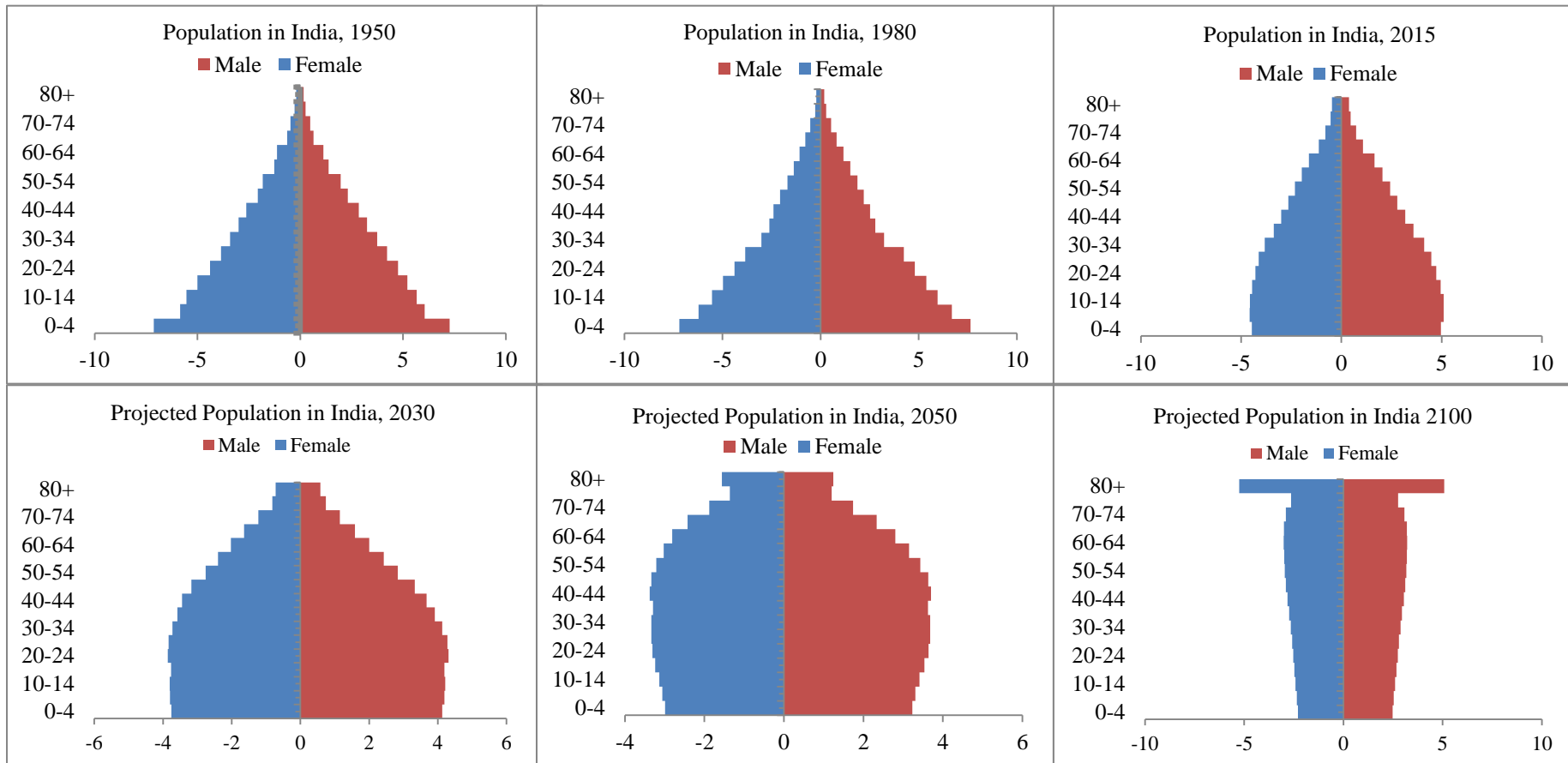
Appendix E-1 Percent distribution of missing and deceased samples in NSS 1995–96, NSS 2004 and NSS 2014, India

Background characteristics	NSS 1995–96		NSS 2004		NSS 2014	
	N	%	N	%	N	%
	All ages					
Age	55	0.00	38	0.01	0	0.00
Sex	2	0.00	0.00	0.00	0	0.00
Place of residence	0	0.00	0.00	0.00	0	0.00
States	0	0.00	0.00	0.00	0	0.00
Economic status	0	0.00	0.00	0.00	0	0.00
N (including deceased persons)	633,405		385,055		335,499	
	60 years or more					
Marital status	27	0.12	0	0.00	0	0.00
Caste	21	0.05	9	0.01	0	0.00
Education	41	0.12	16	0.04	0	0.00
Economic dependency	780	2.29	602	1.45	11	0.01
Living arrangement	334	0.85	727	1.72	0	0.00
Physical mobility status	658	1.93	786	1.93	11	0.01
Self-rated health (SRH)	510	1.52	1,650	3.95	11	0.01
SRH compared to previous year	542	1.58	1,650	3.94	11	0.01
N (excluding deceased persons)	33,990		34,831		27,245	
% of hospitalized persons who died in 365 days reference period	1,284	3.05	736	2.32	1,152	2.18
N (including deceased persons)	35,274		35,567		28,397	

Appendix E-2 List of diseases grouped according to Global Burden of Disease (GBD) study categorization of diseases, 2013

Communicable diseases and nutritional disorders (CDs)	Non-communicable diseases and injuries (NCDs)
Tuberculosis	Neoplasms
STDs including HIV/AIDs	o Cancer and other tumours
Diarrhoeal diseases	Cardiovascular and circulatory diseases
o Cholera	o Heart disease, Hypertension
o Diarrhoea/dysentery/gastro-enteritis	o Rheumatic fever
o Amoebiosis	Chronic respiratory diseases
Respiratory infections and other common infectious disease	o Bronchial Asthma and related conditions
o Dengue/Influenza	Digestive diseases
o Pneumonia	o Gastrointestinal bleeding/piles
o Respiratory (including ear/nose/throat) ailments	o Gastritis/gastric/peptic ulcer
o Cough and acute bronchitis	o Cirrhosis/hydrocele
o Pleurisy	o Food poisoning
o Meningitis and viral encephalitis	Neurological disorder:
o Diptheria	o Cerebral stroke
o Pertussis/whooping cough	o Other diseases of nerves
o Tetanus	o Epilepsy/headache
o Measles/chicken pox/mumps/eruptive	o Nervous and general debility
Neglected tropical diseases and malaria	o Cerebral haemorrhage, thrombosis
o Filariasis	Mental and behavioural disorders
o Trachoma	Diabetes, urogenital, blood and endocrine diseases
o Worm infestation/Guinea worm	o Diabetes
o Leprosy	o Disease of kidney/urinary system/prostrate disorders
Neonatal and maternal disorders	o Gynaecological disorders
Nutritional deficiencies:	o Goiter/Thyroid disorders
o Anemia/bleeding disorders	Musculoskeletal disorders
o Under-nutrition	o Disorders of joints and bones
o Scurvy	o Locomotor disability
o Other malnutrition diseases (Beri-Beri , Ricket)	Other non-communicable diseases
Other communicable diseases and nutrition disorders:	Skin and subcutaneous diseases
o Hepatitis/Jaundice/diseases of liver	Sense organ diseases
o Fever of unknown origin/fever of short duration/malaria/typhoid	o Glucoma
	o Cataracts
	o Hearing loss, adult onset
	o Vision disorders, age related
	o Diseases of ear/nose/throat
	o Speech disability
	Oral disorders
	Accidents/injury/burns/fractures/poisoning
	Congenital anomalies

Appendix E-3 Hospitalization rates per 1000 (95% CI) for the older population by disease groups in the major states in NSS 1995–96, NSS 2004 and NSS 2014, India

| States | Hospitalization rates per 1000 (95% CI) | | | | | | | | |
| | NSS 1995–96 | | | NSS 2004 | | | NSS 2014 | | |
	All diseases	NCDs	CDs	All diseases	NCDs	CDs	All diseases	NCDs	CDs
Less developed	25.1 (22.3-27.9)	13.6 (12.1-15.1)	5.8 (4.0-7.6)	41.6 (38.4-44.9)	28.6 (25.8-31.4)	7.3 (6.2-8.4)	78.4 (71.3-85.5)	61.2 (54.6-67.8)	15.0 (12.7-17.2)
Assam	28.9 (20.4-37.3)	16.3 (10.1-22.4)	6.2 (2.2-10.2)	35.7 (24.0-47.5)	26.6 (15.4-37.7)	5.3 (3.0-7.7)	37.0 (24.0-50.0)	29.3 (16.6-42.0)	5.9 (3.3-8.5)
Bihar	15.4 (10.7-20.1)	8.1 (5.2-11.0)	4.4 (1.0-7.9)	28.1 (24.1-32.2)	19.4 (16.2-22.7)	4.7 (3.1-6.4)	52.6 (37.2-68.1)	44.9 (29.9-59.9)	6.5 (2.9-10.1)
Madhya Pradesh	29.7 (24.4-35.0)	16.7 (12.8-20.5)	7.4 (4.6-10.2)	47.2 (39.2-55.3)	34.7 (27.3-42.2)	9.4 (6.6-12.3)	101.2 (72.9-129.5)	80.0 (53.0-106.9)	18.9 (10.4-27.4)
Odisha	44.1 (21.2-66.9)	12.0 (7.9-16.1)	14.8 (-1.0-30.5)	42.0 (32.2-51.9)	21.0 (15.7-26.4)	14.6 (6.8-22.4)	79.6 (63.3-95.8)	57.7 (42.7-72.8)	20.2 (14.3-26.2)
Rajasthan	34.3 (25.6-43.1)	21.6 (14.5-28.8)	4.6 (2.5-6.7)	56.7 (45.9-67.5)	37.0 (30.0-44.0)	6.4 (3.5-9.3)	101.9 (88.6-115.2)	75.4 (64.0-86.8)	25.2 (18.5-31.9)
Uttar Pradesh	18.6 (15.1-22.0)	11.8 (9.5-14.2)	3.4 (1.2-5.6)	38.6 (32.0-45.2)	27.7 (21.6-33.8)	5.5 (4.1-6.9)	78.5 (65.5-91.4)	62.5 (50.8-74.2)	12.7 (8.6-16.7)
Jammu & Kashmir	34.3 (15.8-52.9)	19.4 (4.6-34.1)	8.7 (-1.8-19.3)	48.5 (36.4-60.6)	39.0 (28.0-50.0)	6.3 (1.9-10.7)	68.5 (50.4-86.7)	55.9 (39.8-71.9)	11.2 (2.9-19.6)

(…continues)

States	Hospitalization rates per 1000 (95% CI)								
	NSS 1995–96			NSS 2004			NSS 2014		
	All diseases	NCDs	CDs	All diseases	NCDs	CDs	All diseases	NCDs	CDs
More developed	70.9	41.7	12.7	104.6	74.6	17.1	134.3	109.7	21.1
	(66.1-75.8)	(37.7-45.8)	(10.8-14.6)	(99.8-109.4)	(70.4-78.7)	(15.1-19.1)	(128.0-140.7)	(103.9-115.5)	(18.8-23.5)
Andhra Pradesh	47.0	30.8	6.2	65.9	54.4	5.8	111.2	94.1	12.9
	(36.5-57.6)	(21.7-40.0)	(3.2-9.2)	(57.2-74.5)	(46.3-62.5)	(3.6-8.0)	(96.4-126.0)	(80.6-107.6)	(8.1-17.7)
Gujarat	45.9	18.4	19.3	102.5	64.6	27.3	123.7	98.0	24.9
	(36.2-55.6)	(13.9-22.9)	(11.3-27.3)	(86.7-118.2)	(52.5-76.8)	(18.4-36.2)	(105.8-141.7)	(83.4-112.5)	(14.4-35.3)
Haryana	79.6	51.5	20.9	81.8	61.0	13.7	89.2	75.3	13.1
	(57.0-102.1)	(33.4-69.6)	(9.1-32.7)	(57.2-106.5)	(38.5-83.5)	(5.4-22.0)	(71.5-106.8)	(58.7-91.9)	(7.1-19.1)
Karnataka	52.5	30.5	8.0	80.4	54.0	10.5	110.3	89.2	19.8
	(37.8-67.2)	(18.4-42.6)	(2.6-13.3)	(68.2-92.6)	(44.7-63.3)	(5.7-15.3)	(96.9-123.7)	(76.9-101.4)	(14.6-25.1)
Kerala	200.5	110.5	39.0	279.1	190.5	47.0	281.3	216.2	51.5
	(175.8-225.1)	(94.2-128.6)	(27.9-50.2)	(251.7-306.5)	(168.3-212.6)	(34.9-59.0)	(249.1-313.5)	(189.5-243.0)	(36.2-66.7)
Maharashtra	70.4	42.9	10.9	96.6	76.0	11.1	119.9	103.0	14.4
	(60.3-80.5)	(35.0-50.9)	(7.6-14.2)	(85.0-108.2)	(65.1-86.8)	(8.0-14.1)	(103.1-136.7)	(86.5-119.4)	(11.1-17.7)
Punjab	45.6	21.7	4.7	80.7	58.8	12.5	103.7	89.5	12.7
	(34.0-57.2)	(14.0-29.3)	(1.7-7.7)	(63.2-98.2)	(43.7-73.8)	(5.1-19.8)	(80.0-127.5)	(66.6-112.5)	(6.8-18.6)
Tamil Nadu	72.7	52.3	7.7	105.6	71.9	23.1	138.1	115.3	22.1
	(52.7-92.7)	(32.8-71.8)	(5.2-10.2)	(92.0-119.2)	(60.9-82.9)	(15.8-30.4)	(118.5-157.7)	(96.6-134.0)	(16.3-27.8)
West Bengal	41.5	22.1	8.0	68.5	46.7	11.5	109.4	86.3	18.7
	(33.0-50.1)	(17.4-26.9)	(2.3-13.7)	(59.5-77.4)	(38.8-54.6)	(8.4-14.6)	(98.1-120.7)	(76.0-96.6)	(14.3-23.1)
India	49.7	28.7	9.5	76.4	54.0	12.7	109.9	88.5	18.4
	(46.8-52.6)	(26.5-31.0)	(8.2-10.8)	(73.4-79.4)	(51.4-56.5)	(11.5-13.9)	(105.2-114.5)	(84.2-92.8)	(16.8-20.1)

CI, confidence intervals.

Appendix E-4 Hospitalization rates per 1000 (95% CI) in public hospitals among the older population in the major states in NSS 1995–96, NSS 2004 and NSS 2014, India

| | Hospitalization rates per 1000 (95% CI) in public hospitals | | | | | | | | |
| | NSS 1995–96 | | | NSS 2004 | | | NSS 2014 | | |
States	Non-poor	Poor	Total	Non-poor	Poor	Total	Non-poor	Poor	Total
Less developed	53.3	64.8	57.1	38.7	59.5	48.9	36.0	55.0	45.2
	(45.6-60.8)	(56.0-72.7)	(51.3-62.6)	(33.6-44.2)	(54.9-63.9)	(45.0-52.9)	(30.4-41.9)	(48.9-60.9)	(40.9-49.6)
Assam	78.8	67.2	76.0	47.7	83.8	64.4	78.3	86.6	82.3
	(61.2-89.8)	(33.3-89.4)	(60.1-86.9)	(25.4-70.9)	(66.7-93.0)	(44.9-80.1)	(65.3-87.4)	(72.0-94.2)	(72.3-89.2)
Bihar	35.5	22.9	31.3	14.3	27.5	21.3	20.5	42.8	28.8
	(19.6-55.4)	(9.1-46.7)	(18.4-48.0)	(9.5-20.9)	(19.2-37.7)	(16.0-27.6)	(11.9-33.0)	(32.6-53.6)	(20.3-39.1)
Madhya Pradesh	43.6	72.0	51.4	35.1	67.0	51.6	24.5	48.1	37.2
	(33.3-54.4)	(56.5-83.6)	(42.2-60.5)	(26.8-44.4)	(53.1-78.4)	(43.1-60.0)	(14.8-37.7)	(31.3-65.3)	(26.2-49.8)
Odisha	92.6	93.4	92.9	74.6	86.9	81.1	71.0	85.8	79.2
	(81.6-97.3)	(84.5-97.3)	(85.5-96.6)	(61.2-84.6)	(76.3-93.2)	(72.6-87.5)	(58.8-80.8)	(76.9-91.6)	(72.5-84.7)
Rajasthan	60.7	44.7	55.6	52.7	70.9	59.9	48.8	66.5	58.9
	(44.1-75.1)	(23.7-67.7)	(42.1-68.4)	(39.0-66.0)	(60.3-79.7)	(50.0-69.1)	(40.5-57.2)	(57.2-74.7)	(52.4-65.0)
Uttar Pradesh	30.9	54.2	38.6	24.7	44.7	34.3	26.8	30.8	28.4
	(22.8-40.4)	(38.2-69.4)	(30.2-47.8)	(17.4-33.9)	(36.7-53.0)	(27.7-41.5)	(18.5-37.0)	(23.0-39.9)	(22.4-35.3)
Jammu & Kashmir	94.5	99.6	97.7	92.6	85.9	89.1	87.1	94.9	92.6
	(82.7-98.4)	(97.1-100.0)	(93.6-99.2)	(84.6-96.6)	(71.3-93.8)	(80.7-94.0)	(73.9-94.1)	(86.7-98.1)	(86.2-96.1)

(....continues)

(....continued)

States	Hospitalization rates per 1000 (95% CI) in public hospitals								
	NSS 1995–96			NSS 2004			NSS 2014		
	Non-poor	Poor	Total	Non-poor	Poor	Total	Non-poor	Poor	Total
More developed	27.2	52.4	38.5	28.1	42.6	36.1	20.7	41.1	31.6
	(23.6-31.1)	(46.9-57.8)	(35.0-42.1)	(25.0-31.3)	(39.4-45.8)	(33.9-38.4)	(18.0-23.6)	(38.2-44.1)	(29.5-33.8)
Andhra Pradesh	16.3	42.2	24.6	24.1	38.8	32.0	14.6	29.9	22.6
	(10.0-25.5)	(27.9-57.9)	(17.6-33.2)	(15.9-34.7)	(30.8-47.4)	(26.2-38.5)	(8.7-23.3)	(22.8-38.0)	(17.7-28.3)
Gujarat	27.2	64.9	40.6	17.7	33.6	25.4	16.7	33.6	24.9
	(15.9-42.5)	(47.1-79.3)	(30.0-52.2)	(11.2-26.8)	(24.4-44.3)	(19.5-32.3)	(10.3-26.0)	(26.0-42.0)	(19.5-31.2)
Haryana	39.8	25.2	33.3	20.8	18.2	19.6	6.9	52.9	29.7
	(24.7-57.0)	(10.8-48.4)	(22.0-46.8)	(11.5-34.6)	(9.2-33.0)	(12.5-29.2)	(3.8-12.4)	(39.0-66.3)	(21.3-39.8)
Karnataka	33.0	46.3	35.1	20.8	51.4	35.4	26.5	28.5	27.8
	(19.6-49.9)	(27.5-66.3)	(23.1-49.5)	(12.9-31.6)	(40.6-62.0)	(28.3-43.2)	(16.3-40.1)	(22.4-35.5)	(22.1-34.2)
Kerala	21.1	55.1	42.0	26.9	41.0	35.6	20.3	49.5	33.8
	(14.4-29.9)	(47.2-62.8)	(35.9-48.4)	(20.2-34.9)	(35.0-47.3)	(31.0-40.5)	(14.4-27.8)	(42.3-56.7)	(28.8-39.3)
Maharashtra	15.2	35.8	25.1	22.7	36.2	30.7	9.3	29.7	20.5
	(9.9-22.8)	(26.3-46.5)	(19.4-31.9)	(15.6-31.7)	(29.0-44.1)	(25.4-36.5)	(6.2-13.7)	(22.3-38.2)	(15.7-26.3)
Punjab	35.8	41.8	38.3	32.4	25.2	29.4	22.3	24.8	23.6
	(22.9-51.1)	(22.7-63.7)	(27.0-51.0)	(20.0-47.9)	(14.4-40.2)	(20.4-40.3)	(7.5-50.6)	(16.1-36.2)	(13.8-37.3)
Tamil Nadu	21.5	69.4	43.2	16.7	43.5	33.6	13.6	40.7	30.8
	(14.1-31.5)	(49.7-83.9)	(29.3-58.2)	(11.6-23.3)	(34.8-52.6)	(27.7-40.1)	(9.2-19.7)	(32.9-49.1)	(25.7-36.4)
West Bengal	62.3	83.0	69.0	60.2	82.1	69.0	49.8	72.1	61.0
	(51.5-72.0)	(65.1-92.7)	(59.6-77.1)	(51.6-68.3)	(75.0-87.5)	(63.2-74.2)	(43.2-56.4)	(63.4-79.4)	(55.9-65.9)
India	34.1	54.6	42.7	30.9	46.3	39.2	25.8	45.2	35.9
	(30.4-37.9)	(49.9-59.2)	(39.7-45.8)	(28.3-33.6)	(43.6-49.1)	(37.3-41.2)	(23.2-28.4)	(42.5-47.9)	(33.9-37.8)

CI, confidence intervals.

Appendix F-1 Distribution of need variables by MPCE* quintiles for the population under 60 years and 60 years or more in India, NSS 1995–96 and NSS 2014

Need variables	Under 60 years									
	NSS 1995–96					NSS 2014				
Age (years)	Poorest	Poor	Middle	Rich	Richest	Poorest	Poor	Middle	Rich	Richest
0–14	35.3	40.6	42.2	39.7	36.0	28.7	32.6	26.9	27.0	19.2
15–29	23.1	20.0	18.6	20.4	20.5	18.0	18.0	17.2	15.9	13.6
30–44	20.5	20.7	20.8	21.8	23.5	22.1	23.4	25.9	26.1	24.9
45–59	21.1	18.8	18.4	18.1	20.0	31.2	26.0	29.9	31.1	42.3
Gender										
Male	50.1	48.6	48.1	49.3	50.2	45.5	44.0	43.8	44.9	43.6
Female	49.9	51.4	51.9	50.7	49.8	54.5	56.0	56.2	55.1	56.5
Number of days ill in the 15 days reference period										
1–11 days	75.6	76.1	72.8	70.1	64.6	62.6	59.1	51.1	51.0	38.9
12–15 days	24.4	23.9	27.2	29.9	35.4	37.4	40.9	49.0	49.0	61.2
Whether confined to bed in the 15 days reference period										
No	60.2	63.8	64.3	66.9	68.4	78.5	80.9	86.1	84.9	90.4
Yes	39.8	36.2	35.8	33.1	31.6	21.5	19.1	13.9	15.2	9.7
Whether having a pre-existing disease										
No	64.4	65.3	61.8	62.1	54.5	53.7	53.0	46.8	45.9	35.5
Yes	35.6	34.7	38.2	37.9	45.5	46.3	47.1	53.2	54.1	64.5

(continues....)

Need variables	60 years or more									
	NSS 1995–96					NSS 2014				
Age (years)	Poorest	Poor	Middle	Rich	Richest	Poorest	Poor	Middle	Rich	Richest
60–69	61.0	56.4	59.0	53.3	58.3	58.5	57.2	59.9	63.0	63.1
70–79	28.5	32.8	28.8	31.9	30.8	27.5	34.9	31.9	27.6	27.2
80+	10.5	10.8	12.2	14.9	10.9	14.0	7.9	8.1	9.4	9.8
Gender										
Male	50.1	49.5	48.8	52.7	49.9	45.2	47.3	47.7	45.9	49.5
Female	49.9	50.5	51.2	47.3	50.2	54.9	52.7	52.3	54.1	50.6
Number of days ill in the 15 days reference period										
1–11 days	43.3	39.4	44.0	33.3	24.9	33.1	19.8	15.2	12.5	9.7
12–15 days	56.7	60.6	56.0	66.7	75.1	66.9	80.2	84.8	87.5	90.4
Whether confined to bed in the 15 days reference period										
No	72.0	73.6	63.6	70.0	71.8	83.8	85.5	89.0	91.6	93.0
Yes	28.0	26.5	36.4	30.0	28.2	16.2	14.5	11.0	8.4	7.0
Whether having a pre-existing disease										
No	30.4	34.1	37.9	27.6	21.2	26.6	15.8	11.9	10.7	8.7
Yes	69.6	66.0	62.1	72.4	78.8	73.4	84.2	88.1	89.3	91.3

* Monthly per capita consumption expenditure.

Appendix F-2 Determinants of outpatient care, untreated morbidity and the use of public facilities for outpatient care for the population under 60 years in India, NSS 1995–96 and NSS 2014

Background characteristics	Outpatient care		Untreated morbidity		Use of public facilities for outpatient care	
	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014	NSS 1995–96	NSS 2014
Age (Ref. = 0–14 years)						
15–29	0.84 (0.70, 1.01)	0.64 (0.51, 0.81)	1.18 (0.97, 1.43)	1.50 (1.14, 1.97)	1.09 (0.90, 1.32)	1.16 (0.89, 1.52)
30–44	0.77 (0.61, 0.97)	0.64 (0.50, 0.83)	1.30 (1.02, 1.66)	1.89 (1.41, 2.54)	1.27 (1.01, 1.60)	1.33 (0.99, 1.79)
45–59	0.76 (0.61, 0.94)	0.84 (0.66, 1.08)	1.32 (1.06, 1.64)	1.46 (1.10, 1.95)	1.43 (1.16, 1.77)	2.02 (1.53, 2.66)
Gender (Ref. = Male)						
Female	0.89 (0.79, 1.00)	1.12 (0.98, 1.27)	1.12 (0.99, 1.26)	0.90 (0.77, 1.06)	1.00 (0.88, 1.13)	1.16 (1.00, 1.34)
Duration of illness (Ref. = less than 11 days)						
12 days or more	0.81 (0.69, 0.95)	0.95 (0.76, 1.20)	1.10 (0.93, 1.29)	0.64 (0.48, 0.84)	0.99 (0.85, 1.14)	1.06 (0.82, 1.37)
Whether confined to bed (Ref. = No)						
Yes	2.21 (1.93, 2.54)	1.03 (0.86, 1.23)	0.43 (0.37, 0.50)	0.57 (0.45, 0.72)	1.10 (0.96, 1.26)	1.01 (0.82, 1.23)
Whether suffering from a pre-existing disease (Ref. = No)						
Yes	1.12 (0.97, 1.29)	1.48 (1.19, 1.84)	0.86 (0.74, 0.99)	0.57 (0.44, 0.73)	1.01 (0.88, 1.16)	1.04 (0.81, 1.33)
MPCE quintiles (Ref. = Richest)						
Poorest	0.30 (0.24, 0.37)	0.65 (0.52, 0.81)	3.40 (2.74, 4.23)	2.15 (1.64, 2.81)	1.34 (1.06, 1.71)	1.74 (1.34, 2.26)
Poor	0.38 (0.31, 0.47)	0.69 (0.56, 0.85)	2.55 (2.07, 3.15)	1.98 (1.53, 2.55)	1.33 (1.05, 1.69)	1.79 (1.41, 2.27)
Middle	0.49 (0.40, 0.60)	0.80 (0.66, 0.97)	2.14 (1.74, 2.62)	1.55 (1.22, 1.98)	1.14 (0.92, 1.43)	1.43 (1.13, 1.80)
Rich	0.67 (0.55, 0.81)	0.86 (0.71, 1.03)	1.52 (1.24, 1.87)	1.36 (1.06, 1.74)	0.97 (0.80, 1.17)	1.22 (0.98, 1.51)
Marital status (Ref. = Currently married)						
Single	0.73 (0.61, 0.88)	0.96 (0.80, 1.15)	1.40 (1.16, 1.69)	1.24 (1.00, 1.53)	1.27 (1.07, 1.50)	1.39 (1.13, 1.72)
Caste (Ref. = Non SC/STs)						
SC/STs	1.11 (0.97, 1.26)	0.89 (0.77, 1.03)	0.93 (0.82, 1.07)	1.06 (0.89, 1.26)	1.28 (1.10, 1.48)	1.65 (1.40, 1.94)
Place of residence (Ref. = Urban)						
Rural	0.70 (0.61, 0.79)	0.83 (0.73, 0.95)	1.49 (1.30, 1.70)	1.22 (1.04, 1.43)	0.99 (0.86, 1.14)	1.17 (1.00, 1.36)
Education (Ref. = Literate)						
Illiterate	0.90 (0.80, 1.02)	0.92 (0.79, 1.07)	1.14 (1.00, 1.29)	1.01 (0.84, 1.21)	0.82 (0.72, 0.94)	0.81 (0.68, 0.96)
States (Ref. = More developed states)						
Less developed states	0.82 (0.73, 0.92)	0.83 (0.72, 0.96)	1.30 (1.15, 1.47)	1.30 (1.10, 1.53)	0.86 (0.76, 0.98)	1.29 (1.10, 1.52)
Constant	20.18 (15.42, 26.41)	5.96 (4.55, 7.80)	0.04 (0.03, 0.06)	0.12 (0.08, 0.16)	0.16 (0.12, 0.21)	0.10 (0.07, 0.13)
N	29,214	26,888	29,214	26,888	24,202	19,205

Appendix G-1 Items used in household consumer expenditure surveys to assess out-of-pocket payments for outpatient and inpatient care, India

Survey	Type of care	Recall period	Recorded items paid OOP
NSS-CES 1993–94	Outpatient	1 month	Medicine
			Family planning appliances[*]
			X-ray/ECG, pathological tests etc
			Doctor's fees
			Nurse/midwife
			Other medical expenses
			Spectacles
			Hearing aids
			Glass eyes, artificial limbs, orthopaedic braces & supports
			Surgical belts, trusses & supports
			Clinical thermometer
			Orthopaedic appliances & equipment
	Inpatient	1 year	Medicine
			X-ray, ECG, pathological test etc.
			Doctor's/surgeon fee
			Nurse/midwife
			Hospital charges
			Nursing home/polyclinic charges
			Other medical expenses
NSS-CES 1999–2000	Outpatient	1 month	Medicine
			X-ray, ECG, pathological test etc.
			Doctor's/surgeon's fee
			Family planning appliances[*]
			Other medical expenses
			Spectacles
		1 year	Glass eyes, hearing aids & orthopaedic equipment
			Other medical equipment
	Inpatient	1 year	Medicine
			X-ray, ECG, pathological test etc.
			Doctor's/surgeon fee
			Hospital & nursing home charges
			Other medical expenses

(*continues…*)

Survey	Type of care	Recall period	Recorded items paid OOP
NSS-CES 2004–05	Outpatient	1 month	Medicine
			X-ray, ECG, pathological test etc.
			Doctor's/surgeon's fee
			Family planning appliances[*]
			Other medical expenses
			Spectacles
		1 year	Contact lenses, hearing aids & orthopaedic equipment
			Other medical equipment
	Inpatient	1 year	Medicine
			X-ray, ECG, pathological test etc.
			Doctor's/surgeon's fee
			Hospital & nursing home charges
			Other medical expenses
NSS-CES 2011–12	Outpatient	1 month	Medicine
			X-ray, ECG, pathological test etc.
			Doctor's/surgeon fee
			Family planning appliances
			Other medical expenses
			Spectacles
		1 year	Contact lenses, hearing aids & orthopaedic equipment
			Other medical equipment
	Inpatient	1 year	Medicine
			X-ray, ECG, pathological test etc.
			Doctor's/surgeon fee
			Hospital & nursing home charges
			Other medical expenses

[*]Family planning appliances include intrauterine devices, oral pills, condoms, diaphragms, spermicides, etc; ECG, electrocardiogram; OOP, out-of-pocket.

Appendix G-2 Items used in household healthcare utilization surveys to assess out-of-pocket payments for outpatient and inpatient care, India

Survey	Type of care	Recall period	Recorded items paid OOP
NSS-HUS 1995–96	Outpatient	15 days	Medical expenditure
			Transport & lodging charges
			Personal medical appliances
			Other expenses
	Inpatient	1 year	Medical expenditure
			Transport (other than ambulance)
			Lodging charges of escorts
			Attendant charges
			Personal medical appliances
NSS-HUS 2004	Outpatient	15 days	Doctor's/surgeon's fee– hospital staff
			Doctor's/surgeon's fee– other specialists
			Medicines– from hospital
			Medicines– from outside
			Diagnostic tests
			Attendant charges
			Physiotherapy
			Personal medical appliances
			Food and other materials
			Blood, oxygen cylinder
			Services (e.g. ambulance)
			Expenditure not elsewhere reported
			Transport charges (other than ambulance)
			Lodging charges of ailing person and escort(s)
			Other expenses
		1 year	Vaccinations for children aged 0–4 years
			Prenatal care
			Childbirth (not in hospital)
			Postnatal care
	Inpatient	1 year	Doctor's/surgeon's fee– hospital staff
			Doctor's/surgeon's fee– other specialists
			Medicines– from hospital
			Medicines– from outside
			Diagnostic tests
			Bed charges
			Attendant charges
			Physiotherapy
			Personal medical appliances
			Food and other materials
			Blood, oxygen cylinder
			Services (e.g. ambulance)
			Expenditure not elsewhere reported

(*continues…*)

Survey	Type of care	Recall period	Recorded items paid OOP
NSS-HUS 2004	Inpatient	1 year	Transport (other than ambulance)
			Lodging charges of escort(s)
			Other expenses
			Child birth
NSS-HUS 2014	Outpatient	15 days	Doctor's/surgeon's fee (hospital staff/other specialists)
			Medicines: AYUSH[*]
			Medicines: other than AYUSH[*]
			Diagnostic tests
			Other medical expenses (attendant charges, physiotherapy, personal medical appliances, blood, oxygen, etc.)
			Transport for patient
			Other expenses (food, transport for others, expenditure on escort, etc.)
		1 year	Prenatal care
			Postnatal care
	Inpatient	1 year	Package components
			Doctor's/ surgeon's fee (hospital staff/other specialists)
			Medicines
			Diagnostic tests
			Bed charges
			Other medical expenses (attendant charges, physiotherapy, personal medical appliances, blood, oxygen, etc.)
			Transport for patient
			Other non-medical expenses (food, transport for others, expenditure on escort, lodging charges if any, etc.)
			Child birth

[*]Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homoeopathy; OOP, out-of-pocket.

Appendix H-1 Selected socio-economic characteristics by monthly per capita consumption expenditure quintiles for hospitalized population under 60 years in India, NSS 1995–96, NSS 2004 and NSS 2014

	Poorest	Poor	Middle	Rich	Richest	All
Characteristics				NSS 1995–96		
Female (%)	50.9	53.0	47.5	47.8	47.4	48.5
Illiterate (%)	63.2	54.7	47.5	42.1	27.3	41.1
Rural (%)	83.0	84.1	78.1	70.3	49.8	67.2
Less developed states (%)	36.0	30.9	32.2	32.0	25.7	29.9
Hospitalized for NCDs (%)	26.1	27.4	31.3	32.3	39.9	33.73
Used private hospital (%)	33.1	36.4	51.5	55.4	66.4	54.36
Mean annual OOP payments per hospitalized person (SD)	39 (54)	47 (168)	77 (111)	99 (140)	302 (692)	156 (442)
Mean annual household consumption expenditure per capita (SD)	185 (26)	246 (16)	306 (19)	389 (31)	697 (373)	450 (296)
Hospitalized (%)	0.52	0.83	1.06	1.51	2.34	1.25
				NSS 2004		
Female (%)	49.4	48.5	49.4	48.6	48.0	48.7
Illiterate (%)	56.3	49.3	42.8	35.6	22.7	38.6
Rural (%)	91.9	86.3	79.7	65.3	41.8	69.0
Less developed states (%)	45.2	38.0	34.8	31.3	23.3	32.9
Hospitalized for NCDs (%)	41.2	43.9	48.4	49.4	50.9	47.6
Used private hospital (%)	42.6	53.3	56.6	63.5	72.4	60.0
Mean annual OOP payments per hospitalized person (SD)	118 (202)	142 (249)	169 (318)	225 (529)	306 (776)	207 (516)
Mean annual household consumption expenditure per capita (SD)	167 (31)	236 (16)	300 (21)	395 (37)	749 (452)	413 (317)
Hospitalized (%)	1.5	1.7	2.0	2.4	3.0	2.1
				NSS 2014		
Female (%)	52.9	52.5	49.3	50.4	52.3	51.4
Illiterate (%)	46.1	40.6	37.6	32.8	21.2	34.1
Rural (%)	88.9	80.8	74.7	63.3	39.1	66.3
Less developed states (%)	63.9	51.0	38.1	32.1	21.4	38.5
Hospitalized for NCDs (%)	53.6	52.0	57.5	54.7	59.1	55.7
Used private hospital (%)	42.1	51.1	59.2	65.9	79.5	62.0
Mean annual OOP payments per hospitalized person (SD)	194 (383)	200 (433)	244 (620)	272 (522)	478 (1056)	294 (695)
Mean annual household consumption expenditure per capita (SD)	225 (43)	328 (27)	423 (29)	558 (55)	1042 (486)	564 (384)
Hospitalized (%)	1.81	2.15	2.6	3.03	3.83	2.6

OOP, out-of-pocket; NCDs, non-communicable diseases and injuries; SD, standard deviation.