

Occurrence, determinants and outcomes of multimorbidity in primary care

Citation for published version (APA):

Pati, S. (2023). *Occurrence, determinants and outcomes of multimorbidity in primary care: the Indian landscape*. [Doctoral Thesis, Maastricht University]. Maastricht University.
<https://doi.org/10.26481/dis.20230628sp>

Document status and date:

Published: 01/01/2023

DOI:

[10.26481/dis.20230628sp](https://doi.org/10.26481/dis.20230628sp)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

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Occurrence, Determinants and Outcomes of Multimorbidity in Primary Care: The Indian Landscape

Addendum

Summary

This thesis describes the prevalence, pattern and outcomes of multimorbidity, (i.e. the co-occurrence of two or more long-term medical conditions) among patients attending both public and private primary care settings in Odisha State of India. The entire thesis is organized across eight chapters out of which six are published in peer reviewed journals.

Chapter 1 first introduces the concept of multimorbidity, its emergence as a daunting public health challenge in low- and middle-income countries (LMICs) with special focus on potential burden in India. It then articulates the urgent need for epidemiological assessment of multimorbidity in primary care settings in Indian context. Commensurate with demographic, economic, social and cultural transition, the burden of chronic non-communicable and infectious diseases is steadily growing in LMICs. As a result, increasing number of populations in these settings are often found to have more than one long-term condition, known as multimorbidity. The presence of multimorbidity is associated with increased health service utilization, poorer health outcomes and reduced productivity. Individuals with multimorbidity register heightened risk of hospital admissions and mortality rate, incur greater healthcare cost, and experience inferior quality of life with lower functional capacity. Studies in different countries have shown that it is not chronic conditions by themselves that increase the resource cost; rather, it is the number of types of conditions, that is, multimorbidity which is responsible. Considering its incidence and socioeconomic impact, multimorbidity thus constitutes a daunting challenge to healthcare services in the 21st century.

However, most of the available evidence on the estimate of multimorbidity is from high income populations with minimal reports from low- and middle-income settings. Amongst LMICs, India, the second largest demography, is witnessing an unprecedented rise of chronic diseases, given the improved health care efficiency, increasing longevity, and changing lifestyle for the past two decades. Consequentially, the projected magnitude of multimorbidity could be substantial with its concomitant burden on health care resource use. However, till date, there is no sound epidemiological evidence to guide the formulation of appropriate strategies.

At the same time, caring for patients with multimorbidity poses a challenging task for physicians and practitioners, since most of the prevailing clinical practice guidelines are focused on single or stand-alone conditions and health services is

traditionally configured around acute episodic care and infectious disease management. This is compounded by clustering of chronic conditions (especially physical and mental) that imposes additional burdens to individuals and families as well as for health systems.

The major brunt is borne by primary care or general practice as most of these patients frequently present to these health care facilities. Thus, it is even more the important to study multimorbidity in primary care patient populations first. Moreover, as more than half of India's population avail of private care in parallel or addition to public health care, as private care practice caters to more than half of patients in India, it is equally important to consider both public and private primary care settings while studying for multimorbidity.

Against this background, the objectives of the study were to estimate the prevalence and correlates of multimorbidity among patients presenting to private and public primary care settings, identify the commonly occurring combinations (pattern), assess their severity and analyse their health care utilisation and quality of life in relation to multimorbidity. and investigate the relation of multimorbidity with health care utilisation and quality of life in these individuals.

To begin with, we undertook landscaping of epidemiological studies on the prevalence, patterns, and consequences of multimorbidity in South Asia. This systematic review detailed in **Chapter 2** aimed to map the breadth of multimorbidity research with special attention to the methodological aspects, estimates, measures. Articles documenting the presence of two or more chronic conditions, published between 2000-2015 in English language were included in the review. The review identified only 13 studies, confined to two countries, and with no study on multimorbidity in particular revealed a significant knowledge gap. Additionally, there was conspicuous lack of any uniformity or standardised procedures across definition to estimation of multimorbidity. The wide heterogeneity observed in our review insinuated the necessity for greater methodological rigour while studying multimorbidity. Thus, developing a contextualised and comprehensive tool to assess multimorbidity is warranted prior to undertaking epidemiological studies among primary care patient population in this region.

In view of unavailability of systematic patient records, and with no gold standard available to measure multimorbidity in India and South Asian region, we first developed and validated a structured tool to measure multimorbidity and its outcomes. **Chapter 3** describes the iterative process adopted towards designing multimorbidity assessment questionnaire for primary care (MAQ-PC), a first of its

kind tool for any South Asian country. The first phase involved the iterative development of the questionnaire, selecting the domains and their measurements, translating the questionnaire to local language for cultural adaptability, and testing its comprehensibility. The second phase entailed reliability and validity testing and piloting. The final version of MAQ-PC comprised four segments. The socio-demographic section elicited information on age, gender, place of birth, residence, ethnicity, religion, educational level, marital status, income status. Multimorbidity assessment component explored the presence of any of the 18 listed self-reported chronic diseases with three additional options of 'any other' as reported by the patients. The list of chronic conditions was prepared based upon the findings from our literature review, chart review of primary care, and expert consultations. To evaluate depression, along with physician-diagnosed self-report, we added the Patient Health Questionnaire (PHQ-9) already validated for the Indian population. To explore the impact of multimorbidity, we included self-reported severity, health related quality of life, and health care utilization. Regarding each of the reported chronic illnesses, severity was recorded by asking how much the condition gets in the way of their daily activities (e.g.: 0-not at all, a little, or 5- a great deal). To estimate health related quality of life (HRQoL), we used SF-12 (already validated for Indian population). To measure health care utilization, questions were asked about number of outpatient consultations and inpatient admissions at different health care facilities in the past twelve months and medication use for each reported chronic illness.

We carried out a cross-sectional study in Odisha, an Indian state (approximate population share of 4% of the total population of India) with average health indicators and comparable health system characteristics. We selected ten districts by stratified random sampling, in each district, two public and two private primary care facilities were selected randomly, thus making 40 i.e. 20 public and 20 private study settings. The data collection spanned over 18 months from October 2012 - March 2014 across these clinics. A total of 1675 patients attending these clinics were approached of which 1649 (98.4%) participated. Data was collected with the help of MAQ-PC tool, through exit interviews after obtaining informed consent. This sample size had 98% power for detecting a ten percent difference in multimorbidity prevalence among male and female patients. Data was analysed using STATA.

Chapter 4 describes the prevalence and associates of multimorbidity among 1649 primary care patients and their health care utilization. Multimorbidity was defined as having two or more chronic conditions. We calculated age- and sex adjusted prevalence across sociodemographic variables and used binary logistic regression analysis to estimate adjusted odds of association of various

sociodemographic correlates with multimorbidity. A trend test was performed to investigate whether the probability of having multiple chronic morbid conditions varied across the age-group and by sex. The overall age- and sex-adjusted prevalence of multimorbidity was 28.3% (95% CI, 24.3-28.6) ranging from 5.8% in patients aged 18 to 29 years to 45% in those aged older than 70 years. Older age, being female, higher education, and high income were associated with significantly higher odds of multimorbidity. After adjusting for age, sex, socioeconomic status (SES), education, and ethnicity, the addition of each chronic condition, as well as consultation at private hospitals, was associated with significant increase in the number of medicines consumption per person per day. Increasing age and higher educational status significantly raised the number of hospital visits per person per year for patients with multimorbidity.

Using a broad nosological spectrum, we found the prevalence of multimorbidity to be around 1/3rd similar to that reported for other high- and middle-income countries. This rate is higher than previous findings, which could be due to a difference in the number of conditions included to define multimorbidity. The higher likelihood of multimorbidity among older adults, females, and those with higher income level is congruent with findings from studies from South Asia. The observed inverse correlation between socioeconomic status and multimorbidity, contrasts with that of Western countries, where lower SES is linked to a greater morbidity burden.

Chapter 5 compares the prevalence and distribution of multimorbidity in patients attending public (n=849) versus private (n= 800) primary care practices and analyses their associated health services utilization. Nearly, one third of patients of public facilities and one fourth from private facilities had multimorbidity. Leading conditions among patients visiting public facilities included acid peptic diseases, arthritis and chronic back pain. No significant difference in reporting of hypertension and diabetes across the facilities was seen. Besides age, predictors of multimorbidity among patients attending public facilities were being females and non-aboriginal groups whereas, in private clinics they were better socioeconomic conditions and higher educational status. Increased number of hospital visits to public facilities were higher among lower educational status patients, in contrast to private, with average number of hospital visits being 1.7 times higher in upper educational status. The mean number of daily medicines was higher among patients attending private clinics. Our findings suggest that, multimorbidity is being more reported in public primary care facilities with higher health care utilisation in private care attendees.

The burden and outcomes of multimorbidity is further influenced by the

coexisting conditions and their interplay. Thus, there is a need to better appreciate which diseases cluster together more frequently and, which clusters have the greatest impact on important patient outcomes. **Chapter 6** identifies the most frequently occurring disease combinations (patterns) and measures the severity in the study participants.

Multimorbidity patterns (dyad and triad) were identified for the reported chronic conditions, functional limitation was assessed as a proxy measure of severity and the mean severity score for each combination, was determined after adjusting for age. The leading dyads in younger age group i.e. 18±29 years were acid peptic disease with arthritis/ chronic back ache/tuberculosis /chronic lung disease, while older age groups had more frequent combinations of hypertension + arthritis/ chronic lung disease/vision difficulty, and arthritis + chronic back ache. The triad of acid peptic disease + arthritis + chronic backache was common in men in all age groups. Tuberculosis and lung diseases were associated with significantly higher age-adjusted mean severity score (poorer functional ability). Among men, arthritis, chronic backache, chronic lung disease and vision impairment were observed to have highest severity) whereas women reported higher severity for combinations of hypertension, chronic back ache and arthritis. The variation in severity observed across different combination and counts, merits the assessment of quality of life in these multimorbidity patients and how it is modulated by the count as well as combinations. The different multimorbidity clusters observed have practice implications too for designing tailor-made care protocols to meet the patient needs.

Health-related quality of life (HRQoL) is a holistic concept that aims to capture a range of health status indices. **Chapter 7** describes the impact of multimorbidity on HRQoL in these patients and explores the potential contribution of social and economic determinants such as gender, education, income, employment, residence or place of living and ethnicity apart from count, typology and severity of conditions. As mentioned before, HRQoL was assessed by the 12-item short-form health survey (SF-12). Both physical (PCS) and mental components scores (MCS) were calculated. These scales have scores 0-100, with higher scores representing better HRQoL. Multiple regression analysis was performed to determine the association of HRQoL with socio-demographics, number, severity and typology of chronic conditions. Patients with multimorbidity reported poorer mean PCS and MCS compared to those without. After adjusting for other variables, severity score was found to be negatively associated with MCS whereas no significant association was seen with PCS. Hypertension and diabetes with arthritis were found to be negatively related with MCS.

These findings reaffirm the inverse relationship between multimorbidity and HRQoL in Indian population. They further indicate that apart from count, severity and typology of multimorbidity also affect HRQoL. Health care providers may consider severity as an outcome measure to improve QoL especially in individuals with physical multimorbidity. Moreover, musculoskeletal clusters need prioritised attention while designing multimorbidity care protocols.

Chapter 8 encompasses a critical analysis of our study findings against the global context and its implications for local policy and practice. The novel epidemiological evidence from a representative primary care patient population for one Indian state, while providing the maiden landscape of multimorbidity for a low- and middle-income country offers key insights for future action. The findings are deliberated from a contemporaneous viewpoint to identify the nodes of similarities and contrapositions embedded in regional locus of understanding.

Overall, our observations indicate multimorbidity to be a prevalent phenomenon among Indian primary care patient population. The magnitude and impact of multimorbidity on health care use has not previously been explored in such detail. Because of the methodology used, our prevalence estimates, even though from a single province, reflect closely the multimorbidity in Indian primary care. It also discusses the coexistence of chronic infectious diseases with NCDs which are typical to LMIC and thus may have to design their care plans as deemed appropriate to amalgamate both facets.

Knowledge about the patterns, specific diseases combinations, and common diseases of multimorbidity will provide essential information for guideline development, clinical management, and public intervention. Current clinical practice is increasingly specialist, with healthcare professionals often basing treatment decisions on relatively narrow aspects of an individual's health problems. Given the paucity of studies on multimorbidity patterns in low- and middle-income countries, future studies should seek to assess the reproducibility of our findings in other populations and settings. Another task is the potential implications of different multimorbidity clusters for designing care protocols, as currently the protocols are diseasespecific, hardly taking multimorbidity into account.

Further, with the advent of COVID-19 pandemic, management of multimorbidity has become even more critical given the fuelling of adverse outcomes. Thus, the organisation of health care system, especially primary care has to be configured to address the chronic slow-paced seamless care appropriate for multimorbidity and at the same time striving to reduce pandemic associated risk in

Addendum

these vulnerable populations. Accordingly, clinical guidelines have to blend the management of acute infectious diseases in these patients.

Our finding suggests redesigning the current national health programs that focus on single diseases to address multimorbidity more effectively, with particular attention to primary care strengthening and developing contextualized health care protocols. Presently, health care workers have limited guidance or experience as to how to approach care decisions for patients with multimorbidity. Medical training and clinical care have been largely informed by evidence and guidelines for single systems or diseases.

The findings further imply the potential inequities in public and private primary health care settings given the emerging burden of multimorbidity in Indian context. Targeted policies for health system planning should focus on workforce training, quality improvement strategies, development of clinical guidelines and quality indicators with regard to multimorbidity in primary care. Disadvantaged individuals with the same levels of multimorbidity require stronger financial protection. Investigating the occurrence of multimorbidity in deprived populations would lead to a better understanding of equity dimension of multimorbidity in future.