

**A STUDY ON PATTERN OF HOUSEHOLD HEALTHCARE EXPENDITURE
AMONG RESIDENTS IN ARIYALUR DISTRICT, TAMIL NADU**

Dr D. VAISHNAVI

**Dissertation submitted in partial fulfilment of the requirements for the award of the
degree of Master of Public Health**



**ACHUTHA MENON CENTRE FOR HEALTH SCIENCE STUDIES
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND
TECHNOLOGY, TRIVANDRUM**

Thiruvananthapuram, Kerala. India – 695011

JUNE 2025

ACKNOWLEDGEMENTS

I express my deepest gratitude to my mentor, Dr. Biju Soman, for his unwavering support, insightful guidance, and constant encouragement throughout this journey. His mentorship has been instrumental in shaping my understanding and approach to public health.

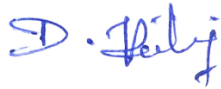
I am sincerely grateful to all my teachers - Dr. Rakhal Gaitonde, Dr. Jeemon P., Dr. Srikant, Dr. Manju Nair R., Dr. Srinivasan Kannan, Dr. Jissa V. T., Dr. Ravi Prasad Varma and Dr. Mala Ramanathan for imparting invaluable knowledge and for their consistent encouragement and guidance during my academic journey. I extend my heartfelt thanks to Dr. Aun Jose, Ph.D., for his generous support with statistical analysis; to Dr. Yuvaraj Krishnamoorthy for his valuable insights in tool development and data analysis; and to Dr. Sitanshu Sekhar Kar for his kind assistance in the construction of the study tool. I also thank Dr. M. Jeganathan, for his valuable guidance and thoughtful suggestions.

My sincere appreciation goes to the Multipurpose Health Workers and Anganwadi Workers for their cooperation and support in ensuring the smooth conduct of my study within the community. I am deeply thankful to all the respondents for their time, patience, and willingness to share their experiences.

A special note of thanks to my dear friends for their unconditional affection and moral support, and to my beloved batchmates for their constant support, camaraderie, and warmth throughout this journey.

DECLARATION

I hereby declare that this dissertation entitled “*A study on pattern of household healthcare expenditure among residents in Ariyalur District, Tamil Nadu*” is a Bonafide record of my original research work. This dissertation has not been submitted, either in part or in full, to any other university or institution for the award of any degree or diploma. All sources of information, including published and unpublished works of other authors, have been appropriately cited and acknowledged within the text.



Dr D. Vaishnavi (Student ID:50333)

Achutha Menon Centre for Health Science Studies

Sree Chitra Tirunal Institute for Medical Science and Technology, Trivandrum

Thiruvananthapuram, Kerala, India – 695011

June 2025

CERTIFICATE

This is to certify that the dissertation entitled “*A study on pattern of household healthcare expenditure among residents in Ariyalur District, Tamil Nadu*” is a Bonafide record of the research work conducted by Dr. D. Vaishnavi under my guidance and supervision.

This dissertation is submitted in partial fulfilment of the requirements for the award of the *Master of Public Health* degree.

**BIJU
SOMAN**

Digitally signed by
BIJU SOMAN
Date: 2025.06.27
09:08:46 +05'30'

Guide: ***Dr. Biju Soman***

Professor and Head of the Department

Achutha Menon Centre for Health Science Studies

Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum

Thiruvananthapuram, Kerala. India -695011

June 2025

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
DECLARATION	ii
CERTIFICATE	iii
TABLE OF CONTENTS	iv
LIST OF TABLES.....	viii
LIST OF FIGURES	x
GLOSSARY OF ABBREVIATION.....	xi
ABSTRACT	xii
CHAPTER 1. INTRODUCTION	1
1.1 Background	1
1.2. Rationale	4
1.3. Objectives	5
1.4. Research Question:	6
CHAPTER 2. REVIEW OF LITERATURE.....	7
2.1. Introduction.....	7
2.2. Human Capital And Economic Growth	7
2.3. Health And Economic Development	7
2.4. Healthcare Financing And Household Expenditure.....	8
2.5. Out-Of-Pocket Expenditure (Oope): Concepts And Drivers	9
2.6. Catastrophic Health Expenditure (Che): Measurement And Implications	9
2.7. Global, National, And State-Level Trends In Oope.....	9
2.8. Global, National, And State-Level Trends In Catastrophic Health Expenditure	10
2.9. Income Inequality And Health Inequity.....	10
2.10. Financial Risk Protection: Role Of Health Insurance.....	11
2.11. Medical Poverty And Impoverishment Due To Health Costs	11
2.12. Determinants Of Healthcare Spending	11
2.13. Socioeconomic Determinants Of Healthcare Expenditure	11
2.14. Commercial Determinants Of Health And Their Impact On Spending	12

2.15. Environmental Determinants Of Health	12
CHAPTER 3. MATERIALS AND METHODS	13
3.1 Study Design.....	13
3.2 Study Setting.....	13
3.3 Sample Size.....	13
3.4 Sample Selection.....	14
3.5 Household Selection	14
3.6 Data Collection	15
3.7 Data Collection Tool	15
3.8 Data Entry And Storage	16
3.9 Ethical Consideration.....	17
3.10 Data Analysis	17
3.11 Variables.....	20
3.11.1 Outcome Variables	20
3.11.2 Independent Variables	23
3.12 Operational Definitions.....	27
CHAPTER 4. RESULTS	28
4.1 Sample Covered	28
4.2 Baseline Characteristics Of Sample	28
4.2.1 Household Profile	28
4.2.2 Individual Profile	30
4.2.3 Morbidity Profile	31
4.3 Healthcare Utilization	32
4.3.1 Individual Level.....	32
4.3.2 Household Level	34
4.4 Healthcare Expenditure.....	35
4.4.1 Out Of Pocket Expenditure	35
4.4.2 Distress Financing.....	36
4.4.3 Factors Associated With Out Of Pocket Expenditure	38
4.4.4. Factors Associated With Catastrophic Health Expenditure	44
4.5 Pollution Adatation Strategy And Corresponding Cost	49
4.5.1 Perceived Pollution	49
4.5.2 Perceived Effects Of Pollution.....	50

4.5.3 Perceived Effects Of Presence Of Factory/ Mining Area	51
4.5.4 Adaptation Measures And Related Cost	51
CHAPTER 5. DISCUSSION AND CONCLUSION	52
5.1. Introduction.....	52
5.2. Findings Of The Study	52
5.2.1. Household Level	54
5.2.2. Community Level	57
5.2.3. Institutional Level	58
5.2.4. Environmental Elvel	59
5.3. Strengths Of Study.....	60
5.4. Limitations Of Study.....	61
5.5. Recommendations.....	63
5.6. Conclusion	63
BIBLIOGRAPHY	64
ANNEXURE I	68
Participant Information Sheet – English	68
ANNEXURE II.....	71
Informed Consent – English	71
ANNEXURE III	72
Interview Schedule – English	72
ANNEXURE IV	91
Participant Information Sheet – Tamil	91
ANNEXURE V	94
Informed Consent – Tamil	94
ANNEXURE VI.....	95
Interview Schedule – Tamil	95
ANNEXURE VII.....	120
Supplementary Tables	120
ANNEXURE VIII	123
Supplementary Figures	123
ANNEXURE IX	125

Iec Approval Certificate.....	125
ANNEXURE X.....	127
Originality Report	127



LIST OF TABLES

Table 1. Sociodemographic Characteristics of Household	29
Table 2. Sociodemographic Characteristics of Household members.....	30
Table 3. Health Profile of Households	31
Table 4. Healthcare Seeking Behaviour of Individuals.....	32
Table 5. Hospitalization Characteristics of Individuals (1 Year)	33
Table 6. Non-Hospitalization Characteristics of Individuals (1 Month).....	34
Table 7. Proportion of Out of Pocket Expenditure in Household for 1 Year	35
Table 8. Annual Out of Pocket Expenditure of Household (INR)	36
Table 9. Financial Options Employed to Manage Healthcare Expenditure	37
Table 10. Rearrangements in Household Financing	37
Table 11. Bivariate Analysis: Log OOPE and Sociodemographic Characteristics	40
Table 12. Bivariate Analysis for Log OOPE and Economic Characteristics	41
Table 13. Bivariate Analysis: for Log OOPE and Morbidity Characteristics	42
Table 14. Multivariable Analysis: Factors Associated with Increased Out of Pocket Expenditure	43
Table 15. Bivariate Analysis: Association of Catastrophic Health Expenditure with Sociodemographic Characteristics	44
Table 16. Bivariate Analysis: Association of Catastrophic Health Expenditure with Economic Characteristics.....	46
Table 17. Bivariate Analysis: Association of Catastrophic Health Expenditure with Morbidity Characteristics.....	46
Table 18. Multivariable Analysis: Factors Associated with Catastrophic Health Expenditure	48
Table 19. Perceived Effect on Routine Activity	50
Table 20. Adaptation Measures to Perceived Pollution	51
Table 21. Proportion of Tobacco and Alcohol Users by Gender.....	120
Table 22. Healthcare Seeking Behaviour Based on Gender	120
Table 23. Insurance of Individuals	121
Table 24. Household Modifications for Health Condition.....	121
Table 25. Financially Driven Adjustments in Healthcare	121
Table 26. Perceived Effects of Air Pollution.....	122
Table 27. Perceived Effects of Water Pollution	122

Table 28. Coping with Perceived Air Pollution	122
Table 29. Coping with Perceived Water Pollution	122



LIST OF FIGURES

Fig. 1. Sampling frame.....	14
Fig. 2. Original Out of Pocket Expenditure Distribution.....	19
Fig. 3. Log transformed Out of Pocket Expenditure Distribution	19
Fig. 4. Distribution of original Out of Pocket Expenditure	38
Fig. 5. Distribution of Log transformed Out of Pocket Expenditure	38
Fig. 6. Distribution of OOPE by household income	43
Fig. 7. Proportion of CHE by household income.....	49
Fig. 8. Proportion of CHE in the presence of pollution related disease.....	49
Fig. 9. Residual plots (Original distribution - residuals)	123
Fig. 10. Residual plots (Log transformed distribution - residuals)	124

GLOSSARY OF ABBREVIATION

- **CDB** – Community Development Block
- **CHE** – Catastrophic Health Expenditure
- **CKD** – Chronic Kidney Disease
- **CMCHIS** – Chief Minister’s Comprehensive Health Insurance Scheme
- **COPD** – Chronic Obstructive Pulmonary Disease
- **CTP** – Capacity To Pay
- **GDP** – Gross Domestic Product
- **INR** – Indian Rupee
- **LMIC** – Low and Middle Income Country
- **NHA** – National Health Estimate
- **NSSO** – National Sample Survey Organization
- **OOPE** – Out Of Pocket Expenditure
- **PMJAY** – Pradhan Mandri Jan Arogya Yojana
- **SDG** – Sustainable Development Goals
- **SDH** – Social Determinants of Health
- **THE** – Total Health Expenditure
- **UHC** – Universal Health Coverage
- **WHO** – World Health Organization

ABSTRACT

INTRODUCTION:

India's rapid industrialization has significantly contributed to sustained economic growth. However, this progress has intensified environmental degradation, leading to a rise in disease burden across the country. These developments have placed upward pressure on health spending (Bloom et al., 2004). Catastrophic Health Expenditure is rising on the rate of double the global average (Pandey et al., 2018). This study was conducted to estimate household out-of-pocket expenditure (OOPE) on healthcare, identify its determinants, and assess the extent of catastrophic health expenditure (CHE) in the Ariyalur district, Tamil Nadu, a prominent industrial area. Given the environmental pollution, the study also explored household perceptions of pollution-related health risks and preventive expenditures.

METHODS:

A community-based cross-sectional study was conducted between January and February 2025. Using multistage cluster sampling, 329 households were surveyed. Data were collected through a structured questionnaire capturing socio-demographic profiles, healthcare utilization, health expenditure, coping strategies, and perceptions of environmental pollution. Statistical analyses included descriptive statistics, bivariate and multivariable regressions to identify factors associated with OOPE and CHE.

RESULTS:

Annual median out of pocket expenditure: INR 14,900 (IQR INR 1258 – INR 57,200). Proportion of households incurred any OOPE at the point of receiving healthcare was 88 percentage and proportion of households incurred Catastrophic Health Expenditure was found to be 18 percentage (CI: 14% - 23%). Pregnancy and childbirth, multimorbidity, low

per capita income of household, household size and higher inpatient visits were the determining factors health expenditure. Despite high health insurance enrolment, actual utilization was low. The study also found that approximately 37 percentage of the households had to rely on distress sources of financing meet healthcare expenses. Nearly half of the households perceived environmental pollution as a health concern, and most of them spent on installing water purifiers to overcome water pollution effects.

CONCLUSION:

To conclude one in six households incurred catastrophic health expenditure in the studied period and almost every household had to spend some amount to avail healthcare service. Annual median per capita health expenditure was found to be INR 3950 which is higher than national and state estimate. Strengthening public healthcare infrastructure, enhancing insurance coverage effectiveness, and addressing environmental health risks are crucial steps towards achieving better financial protection and health equity

CHAPTER 1. INTRODUCTION

1.1 BACKGROUND

Human capital is a crucial factor in driving economic growth. Elements such as education, health, and training are intangible economic assets that contribute to the development of human capital (Iuliana- Claudia, 2019). Mushkin highlights that "the return on investment in healthcare is often attributed to education"(Mushkin, 1962), indicating that health plays a more vital role in human capital than education. Economic growth manifests as increased productivity, which stems from investments in health (Bleakley, 2010; Bloom et al., 2004). Globally, health expenditure varies significantly based on a country's development level.

Despite a rise in public healthcare funding over the years, India remains among the developing nations with the lowest per capita health expenditure (Mohanty et al., 2016). Public sources account for about 15 percentage of funding, while out-of-pocket expenses make up 80 percentage, social insurance four percentage, and private insurance one percentage (Krishnamoorthy et al., 2023). India has undergone rapid industrialization, continuous economic growth, environmental degradation, in addition to demographic changes, and a surge in non-communicable diseases. These factors, along with concerns about meeting healthcare needs, have also increased the financial strain on health spending (Bloom et al., 2004). The National Health Authority (NHA) reported that Total Health Expenditure (THE) as a percentage of GDP was 4 percentage in 2014 and 3.8 percentage in 2022; government health expenditures as a percentage of THE were 28.6 percentage in 2014 and 48 percentage in 2022; OOPE as a percentage of THE was 64.2 percentage in 2014 and 39.4 percentage in 2022 (NHA 2024).

Although there has been an increase in public health investment and progress in the health sector, the proportion of out-of-pocket expenditure (OOPE) remains high - among the

highest worldwide (Parmar et al., 2023). This persistence is linked to the rapid privatization of healthcare over the last two decades, during which the government's role shifted from service provision to service purchasing following the neo-liberal reforms of 1991. The commercialization of the health sector (Lacy-Nichols et al., 2023), coupled with a growing disease burden (Kastor and Mohanty, 2018; Yadav et al., 2021) and increasing income inequality (Chowdhury et al., 2018), has led to the emergence of "Medical Poverty," exacerbating health disparities. While out-of-pocket spending by the general population has decreased in absolute terms, its proportion relative to income has not shown a similar decline (Wagstaff et al., 2018), resulting in Catastrophic Health Expenditure and impoverishment, particularly among low-income households.

India is experiencing a significant rise in catastrophic health expenditure (CHE), with the rate of increase nearly double the global average (Pandey et al., 2018). According to the Comprehensive Annual Modular Survey (July 2022–June 2023), the average OOOPE per household for hospitalization over the past year was ₹4,129 in rural areas and INR 5,290 in urban areas. For non-hospitalization expenses in the last 30 days, the figures were INR 539 for rural households and INR 606 for urban households. In Tamil Nadu, the average OOOPE per household on hospitalization during the last 365 days was INR 17,570, while for non-hospitalization during the last 15 days, it stood at INR 562 (MoSPI, 2017).

The impact of illnesses and injuries on families can be profound, often resulting in financial difficulties and forcing households to implement various strategies, such as redistributing household labor or finding alternative financial resources. To provide financial protection to at-risk populations, the Government of India launched the Pradhan Mantri Jan Arogya Yojana (PMJAY) in 2018, aiming to offer health insurance to 50 crore disadvantaged individuals. Similarly, Tamil Nadu introduced the Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS) to bolster financial security for its citizens (Reshmi et al.,

2021; Sivarchaka and Mamgain, 2024). Despite these efforts, initiatives like Ayushman Bharat primarily focus on inpatient care, leaving outpatient services largely neglected. This gap often results in higher out-of-pocket expenses and poorer health outcomes, particularly for those lacking regular healthcare access.

From the "Health for All by 2000" vision to the "Millennium Development Goals (2015)" and now the "Sustainable Development Goals (2030)," the ongoing emphasis has been on achieving healthcare equity. Healthcare equity is defined as ensuring equal access to available services for equal needs, equal utilization for equal needs, and equal quality of care for all individuals (Ghosh et al., 2023). This concept is deeply embedded in the Sustainable Development Goals, especially SDG 3.8, which seeks to achieve universal health coverage (UHC) by 2030 and protect households from financial hardship due to high out-of-pocket expenditure (OOPE). Financial distress related to health expenses often leads to reduced consumption of other essential goods and services, decreased affordability for healthcare use, diminished quality of life, and pushes nearly 55 million people into poverty each year (Chowdhury et al., 2018; Parmar et al., 2023). Although India is a single country, there are significant disparities within and between states in terms of development, socio-economic status, demographics, geography, and healthcare access - all of which can greatly influence health outcomes and health spending. Rapid urbanization, driven by economic growth and often unregulated industrialization, while improving socioeconomic status, has also severely degraded environmental quality in many developing countries. Nations like India, China, and Bangladesh now rank among the most polluted globally. Poor environmental conditions have led to substantial losses in human health and productivity and have significantly increased healthcare costs. It is estimated that about 25 percent of the global disease burden today can be attributed to poor environmental quality (Public health and environment). In India alone, air pollution was responsible for approximately

1.67 million deaths in 2019, accounting for 17.8 percentage of the total deaths that year (Collaborators, 2020; TOI, 2021).

1.2. RATIONALE:

India's healthcare system remains heavily reliant on out-of-pocket (OOP) payments, which account for almost 40 percentage of the nation's total health expenditure (NHA 2024). This dependence places households, particularly those with lower incomes, at risk of severe financial strain. The situation is worsened by India's increasing disease burden, which is fuelled by the dual challenges of ongoing communicable diseases and a rapid increase in non-communicable diseases (NCDs). Tamil Nadu reflects these national patterns, with NCD prevalence rates exceeding the national average. For example, the prevalence of diabetes among adults in Tamil Nadu is 26 percentage, compared to the national average of 15 percentage (Anjana et al., 2023; MoHFW). Despite policy measures like the Pradhan Mantri Jan Arogya Yojana (PMJAY) and the Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS), catastrophic health expenditure (CHE) remains a significant issue, pushing nearly 55 million Indians into poverty annually (Parmar et al., 2023). Although Tamil Nadu is relatively better equipped in terms of healthcare infrastructure, it is not exempt from this problem. Households in the state report an average annual expenditure of ₹17,570 on hospitalization and ₹562 on non-hospitalization care (MoSPI, 2017), underscoring the ongoing vulnerability of financial protection mechanisms and the urgent need for more comprehensive healthcare reforms.

Ariyalur district in Tamil Nadu, a major industrial centre known for its cement factories and mining activities, faces additional risks from the environmental impacts of industrialization, particularly air and water pollution, which have increased health risks. This results in frequent medical consultations, long-term treatments, and hospitalizations, thereby increasing household healthcare needs and costs. However, existing literature often

overlooks the economic burden of healthcare expenses in industrial regions and its determining factors. Therefore, this study primarily aims to estimate the OOPE in these households and determine the proportion of households experiencing CHE and its associating factors. Given the district's industrial profile, the study also seeks to explore community perceptions of environmental pollution and the associated costs of adaptive measures residents undertake to protect their health from pollution-related risks.

1.3. OBJECTIVES

Primary objective:

- To estimate Out of Pocket Expenditure for healthcare in the study population

Secondary objective:

- To identify the factors associated with OOPE in the study population
- To identify the coping strategies for OOPE in the study population.
- To understand the perceptions regarding the local environmental pollution among the households and the preventive expenditure incurred for protection of health in response to it.

1.4. RESEARCH QUESTION:

What is the average out-of-pocket expenditure for healthcare among households in the study population over the past year?

- What socio-demographic, economic and health-related factors are associated with higher out-of-pocket expenditure for healthcare among households in the study population?
- What are the common coping strategies adopted by households in response to out-of-pocket healthcare expenditures?
- How do households perceive local environmental pollution, and what preventive expenditures incurred to protect their health in response to it?

CHAPTER 2. REVIEW OF LITERATURE

2.1. INTRODUCTION

Health and economic systems are deeply interlinked. Good health enhances human capabilities and productivity, drives economic progress, and reduces societal inequities. As recognized globally, achieving Universal Health Coverage (UHC) and reducing Out-of-Pocket Expenditure (OOPE) are vital for sustainable development (WHO 2024). The interrelationship between health and socioeconomic development forms a core component of health policy planning. Improvements in public health indicators are often paralleled by improvements in economic stability. Poor health outcomes, conversely, create a significant burden on national economies. Therefore, investing in health is not just a social imperative but an economic strategy.

2.2. HUMAN CAPITAL AND ECONOMIC GROWTH

Health improvements contribute significantly to human capital formation by increasing life expectancy, cognitive development, and workforce productivity (Bloom et al., 2004). Good health enhances individuals' capacity to engage in productive activities and to pursue educational goals. Healthier children experience better cognitive development, directly influencing future labour market outcomes. Adult workers with better health tend to have higher earnings and reduced absenteeism. Thus, investments in health translate into substantial macroeconomic returns. Healthy populations also stimulate savings and investments. In sum, health serves as both an input and an output of economic development.

2.3. HEALTH AND ECONOMIC DEVELOPMENT

Investments in public health catalyse broader economic development. In LMICs, efforts to control infectious diseases and reduce maternal and child mortality are key drivers of GDP growth (Bleakley, 2010; Jamison et al., 2013). Improved health conditions foster

demographic transitions conducive to economic growth. Healthier populations contribute to labour market expansion and increased productivity. Public health initiatives yield positive externalities, such as improved educational outcomes and social stability. A healthier society also attracts foreign investments by signalling stability. Therefore, health interventions should be considered integral to development strategies.

2.4. HEALTHCARE FINANCING AND HOUSEHOLD EXPENDITURE

Healthcare financing underpins health system performance and determines access to services (World Health Organization, 2010b). In India, public health expenditure remains low, necessitating significant OOPe by households (NHSRC, 2024). Government financing, insurance mechanisms, and external aid form the key sources of healthcare funding. Inequitable distribution of financial resources exacerbates health disparities. 78 percentage of global spending on health care is in high-income countries; despite containing only 16 percentage of the world's population and only about 12 percentage of the total was spent in low and middle-income countries, which account for 84 percentage of the global population and 90 percentage of the global disease burden. The SDG goal of UHC explicitly calls for equitable and sustainable financing models. The World Economic Forum's Health and Survival Index 2021 ranked India's health system 155th out of 156 economies, compared to its 101st ranking in 2007 and 2008, indicating a decline in healthcare system performance over decades and a need for improvement in healthcare performance (World Economic Forum, 2023). Strengthening public financing mechanisms is critical to reducing financial hardship. Evidence suggests that well-designed health financing systems contribute directly to improved population health.

2.5. OUT-OF-POCKET EXPENDITURE (OOPE): CONCEPTS AND DRIVERS

OOPE refers to direct payments made by individuals for healthcare services at the point of use, excluding prepaid schemes. Major drivers include low public health funding, high private healthcare utilization, and inadequate insurance coverage (Wagstaff et al., 2018; Xu et al., 2003). Pharmaceutical expenses constitute a significant share of OOPE in LMICs. Poor regulation of private health sectors often leads to unnecessary and expensive interventions. Informal payments further aggravate the financial burden. OOPE is a regressive form of healthcare financing, disproportionately affecting low-income groups. Effective risk pooling mechanisms are necessary to mitigate OOPE.

2.6. CATASTROPHIC HEALTH EXPENDITURE (CHE): MEASUREMENT AND IMPLICATIONS

CHE is defined as healthcare spending that exceeds a critical threshold of household income, often 40 percentage of non-subsistence expenditure (Xu et al., 2003). CHE can lead to severe financial distress and poverty. In many LMICs, a significant portion of households face CHE annually. The burden of CHE falls disproportionately on the poorest households. CHE negatively impacts living standards, educational attainment, and future economic prospects. Thus, reducing CHE is an essential target of UHC initiatives. Health financing reforms focused on reducing OOPE can significantly lower CHE rates.

2.7. GLOBAL, NATIONAL, AND STATE-LEVEL TRENDS IN OOPE

Globally, OOPE constitutes about 18 percentage of health spending, but this figure varies across income groups (WHO 2024). High-income countries have lower OOPE due to extensive insurance coverage. India has one of the highest OOPE in the world. In India, although OOPE has declined from 62.6 percentage to 39.4 percentage, it remains high compared to global averages (NHSRC, 2024). OOPE as a proportion of income has not

declined pushing many households into medical poverty trap. Inequity in healthcare is evident from changing trend in the incidence and intensity of OOPE and CHE from NSSO survey. Kerala, despite high health indicators, reports high OOPE levels. Tamil Nadu demonstrates better control over OOPE due to strong public health interventions. Regional disparities in OOPE reflect systemic inequities in health service availability. Addressing OOPE is crucial for financial risk protection in healthcare systems.

2.8. GLOBAL, NATIONAL, AND STATE-LEVEL TRENDS IN CATASTROPHIC HEALTH EXPENDITURE

Global CHE rates have seen a modest decline, but inequities persist (WHO, 2021). In India, CHE incidence shifted from pro-rich to pro-poor, indicating increased financial vulnerability among marginalized groups (Gaddam and Rao, 2023). Tamil Nadu reports lower CHE rates due to public insurance schemes like CMCHIS. However, states with weak public health systems continue to experience high CHE. Tracking CHE trends helps assess the effectiveness of health financing reforms. Policies aimed at improving financial protection are central to reducing CHE. Continuous monitoring and evaluation are required for sustainable improvements.

2.9. INCOME INEQUALITY AND HEALTH INEQUITY

Income inequality is a significant determinant of health inequities. Poor households face greater barriers to healthcare access and financial protection (Chowdhury et al., 2018; Wagstaff, 2002). Health outcomes are markedly worse among lower-income groups. Inequities in health financing exacerbate poverty cycles. Social determinants like caste, gender, and rural-urban divides compound inequities. Health policies must prioritize marginalized populations to bridge the equity gap. Redistribution through progressive health financing is essential for inclusive health systems.

2.10. FINANCIAL RISK PROTECTION: ROLE OF HEALTH INSURANCE

Insurance-based health financing can significantly reduce OOPE and CHE. In India, schemes like PMJAY have demonstrated reductions in financial hardship (Parmar et al., 2023). However, gaps in awareness, enrolment, and service coverage remain. Tamil Nadu's CMCHIS provides a model for effective insurance-driven risk protection (Reshmi et al., 2021). Health insurance improves access to healthcare services and enhances equity. Public-private partnerships can help expand insurance coverage. Strengthening insurance schemes is vital for achieving UHC targets.

2.11. MEDICAL POVERTY AND IMPOVERISHMENT DUE TO HEALTH COSTS

Medical poverty occurs when health spending pushes households below the poverty line. In India, medical impoverishment remains a significant concern despite economic growth (Berman, 2010). Health shocks are a leading cause of sudden poverty transitions. OOPE remains the primary driver of medical impoverishment. Poor households often resort to borrowing or asset sales to finance healthcare. Reducing medical poverty requires comprehensive health financing reforms. Focused interventions are needed for vulnerable and marginalized populations.

2.12. DETERMINANTS OF HEALTHCARE SPENDING

Studies have shown that demographic transition such as increasing elderly population coupled with double burden of disease i.e. communicable and non-communicable disease, have accounted for high OOPE (Bloom et al., 2004; Hooda, 2020; Kastor and Mohanty, 2018). Regional disparities in service availability also influence OOPE.

2.13. SOCIOECONOMIC DETERMINANTS OF HEALTHCARE EXPENDITURE

Healthcare spending patterns are heavily influenced by social determinants. Education, occupation, caste, and gender play crucial roles (Drèze and Drèze, 2002; Open Knowledge

Repository). Lower-educated households spend a higher share of income on health. Rural populations face higher healthcare costs due to limited access. Discrimination and social exclusion further increase financial barriers. Disproportionate distribution of income in India have also contributed to higher OOPE among poor households (Chowdhury et al., 2018). Addressing social determinants is essential for equitable health financing. Multisectoral policies are required to tackle social determinants effectively.

2.14. COMMERCIAL DETERMINANTS OF HEALTH AND THEIR IMPACT ON SPENDING

Commercial determinants, including corporate influence on healthcare markets, drive unnecessary healthcare spending (Kickbusch et al., 2016). Aggressive marketing of pharmaceuticals inflates healthcare costs. Privatization of health services often leads to cost escalation and inefficiencies. Regulatory failures allow exploitative practices in healthcare delivery. Commercialization compromises equity in access to health services. Strengthening regulatory frameworks is crucial to counter commercial determinants. Public health advocacy must address commercial influences on healthcare systems.

2.15. ENVIRONMENTAL DETERMINANTS OF HEALTH

Environmental degradation is a major contributor to disease burden and healthcare costs. In India, air pollution-related diseases account for significant economic losses (Collaborators, 2020). Contaminated water sources contribute to a high burden of infectious diseases. Environmental health risks are disproportionately borne by marginalized populations. Addressing environmental determinants is essential for reducing healthcare costs. Investments in environmental health yield substantial public health and economic returns. Cross-sectoral coordination is necessary to tackle environmental health risks effectively.

CHAPTER 3. MATERIALS AND METHODS

3.1 STUDY DESIGN

This study investigates the healthcare expenses in an industrial area in Tamil Nadu. The objectives include estimating the out-of-pocket healthcare expenditure, rates of catastrophic health expenditure, its determining factors. This being an industrial area, the community perceptions of environmental pollution, and the associated costs of adaptive measures undertaken by residents to protect their health are also being studied as secondary objectives. For this purpose, a cross-sectional study was done in the Ariyalur district in Tamil Nadu, during January 2025 - February 2025.

3.2 STUDY SETTING

This study was conducted in Ariyalur district, an industrial hub in Tamil Nadu, particularly known for its concentration of cement factories and mining activities. Despite the district's rapid industrial growth, limited research exists on the health-related financial vulnerability faced by residents in such regions. The environmental consequences of industrialization, including air and water pollution, have also contributed to disease burden in the region, making Ariyalur an ideal setting for examining the often-overlooked economic burden of healthcare expenses in an industrial region.

3.3 SAMPLE SIZE

The sample size for this study was determined using OpenEpi (version 3.01), an open-source software. Based on findings from (Krishnamoorthy et al., 2023), the proportion of households incurring Out-of-Pocket Expenditure (OOPE) in Tamil Nadu was assumed to be 82.8 percentage (95%CI: 81.2%–84.3%) and Catastrophic Health Expenditure was 26.9 percentage (95%CI: 25.1%–28.7%). Applying an absolute precision of 5 percentage and a design effect of 1.5, the estimated sample size was calculated to be 329 households for

anticipated proportion of 82.8 percentage. Accounting for a 5 percentage non-response rate, the final sample size was adjusted to 346 households.

3.4 SAMPLE SELECTION

A multistage cluster sampling technique was employed for the study. Ariyalur district comprises six Community Development Blocks (CDBs), out of which two blocks were randomly selected. In the Second stage, five village panchayats were randomly chosen from each selected block, yielding a total of ten village panchayats. From each village panchayat, two wards were randomly selected, resulting in a total of 20 wards. Within each ward, five consecutive households were visited, and information was collected (Fig. 1).

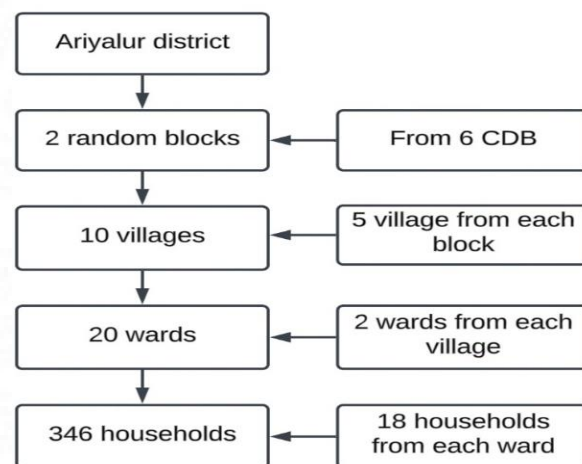


Fig. 1. Sampling frame

3.5 HOUSEHOLD SELECTION

Inclusion criteria: Households with residents who had been living in Ariyalur district for at least one year.

Exclusion criteria: Households where none of the members can communicate in Tamil or English.

3.6 DATA COLLECTION

Recruitment was carried out by the Principal Investigator (PI). Community-level stakeholders such as Multi-Purpose Health Workers (MPW)/ Anganwadi Workers (AWW)/ ward representatives were informed verbally prior to data collection. With the assistance of a community health worker, a prominent landmark or the main junction of each ward was identified. A household was as directed by community health worker/ AWW, and from that starting point, five consecutive households were visited.

Participants were provided with an information sheet and an informed consent form in Tamil. I explained the details of the study to each participant, addressed any queries, and obtained informed consent before proceeding with data collection. Data were collected either from the head of the household or, in their absence, from another available household member who was knowledgeable about household finances. In cases where a selected household was locked or unoccupied, the next nearest household was visited.

3.7 DATA COLLECTION TOOL

Initially I planned to use Open Data Kit (ODK), an open-source utility tool for data collection but due to practical difficulties, as entering data in mobile, during field level interviews was a bit inconvenient, I had to use paper and pen. Each interview schedule took approximately 30 minutes to complete.

The structured questionnaire used for the survey was developed in English, drawing from the “Household Consumption Expenditure Survey 2022–2023” and “Household Social Consumption: Health 2017–2018,” and was subsequently translated into Tamil.

The survey questionnaire was organized into four sections:

Section 1: Household and Individual Characteristics

Information on type of household, ration card type, social group, income, and individual-level data such as age, gender, education, occupation, and presence of morbidity was collected.

Section 2: Health-Related Expenditures

This included data on hospitalizations in the past year and associated expenses, outpatient visits in the past month and their costs, pregnancy and immunization-related expenditures, income loss due to illness, and any coping mechanisms or financial arrangements made to manage the burden.

Section 3: General Household Expenditures

Data on monthly or recurring expenses such as food expenditure and non-food expenditure other than medical expenditure were collected.

Section 4: Adaptation Strategies and Preventive Expenditures

This section captured participants' perceptions of local environmental pollution (air, water, noise), adaptation strategies to overcome perceived pollution along with the related expenditures.

3.8 DATA ENTRY AND STORAGE

Collected data was entered into ODK and then exported as csv for analysis. All data including the consent forms were used with extreme care. All completed interview schedules, consent forms and notes would be destroyed upon completion of three years from the date of acceptance of the thesis in keeping with regulatory requirements (ICMR, 2006).

3.9 ETHICAL CONSIDERATION

The study was conducted only after obtaining approval from the Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology. Informed consent was obtained from each participant prior to their inclusion in the study. The questionnaire did not include any personal identifiers apart from the participant's name initials, and the consent form contained the contact details of the Principal Investigator as well as the Member Secretary of the Institutional Review Board.

Participants were informed about the voluntary nature of their participation and were assured that they had the right to decline or withdraw from the study at any point without providing a reason and without facing any consequences. The objectives of the study, along with the potential risks and benefits, were clearly explained to all participants.

Utmost importance was given to maintaining the privacy and confidentiality of participants. The collected information was not shared with anyone outside the research team. To ensure anonymity, each questionnaire was assigned a unique identification number, and the identity of the participants was not disclosed at any stage of the study.

Participants were also given the opportunity to ask questions and clarify any doubts related to the study before providing their consent.

3.10 DATA ANALYSIS

Data was cleaned and analysed using open-source statistical software R version 4.3.1.

Descriptive analysis was done at individual level and household level to understand sociodemographic and economic characteristics of the study population, occurrence of acute and chronic illness events, healthcare seeking pattern, healthcare utilization of the households, distress financing in the households, perception of pollution, its perceived effects and adaptation strategy adopted to maintain health. All the categorical variables

were summarized using frequency and percentage; mean, standard deviation, median, interquartile range were reported for continuous variables based on skewness of the distribution. The main outcome variables, Out of Pocket Expenditure, Catastrophic Health Expenditure were computed from obtained data.

Out of Pocket Expenditure (OOPE) –

The outcome variable, Out of Pocket Expenditure (OOPE) was a continuous variable. Due to the right-skewed distribution of OOPE, a natural logarithmic transformation was applied to the variable

$$\text{Log_oope} = \ln(\text{oope})$$

to approximate normality and meet the assumptions of linear regression.

- Normality of residuals. The residual errors are assumed to be normally distributed. (Coefficient of skewness of residuals = -0.2)
- Homogeneity of residuals variance.
- Presence of influential values in the data.

After meeting assumptions of linear regression (Supplementary plot 1&2), the model was performed to assess the factors associated with increased magnitude of Out-of-Pocket Expenditure among the households reported having OOPE. Bivariate linear regression was carried out to calculate the unadjusted effect of each variable while keeping others constant. Finally, the variables that showed significance within 95 percentage confidence intervals were included in a multivariable linear regression model to adjust for the influence of other factors.

Regression coefficients were exponentiated and interpreted as percentage changes in OOPE associated with one-unit changes in predictor variables.

$$\text{Percentage change in OOPE} = \text{Exp}(\beta) - 1 \times 100 (\%)$$

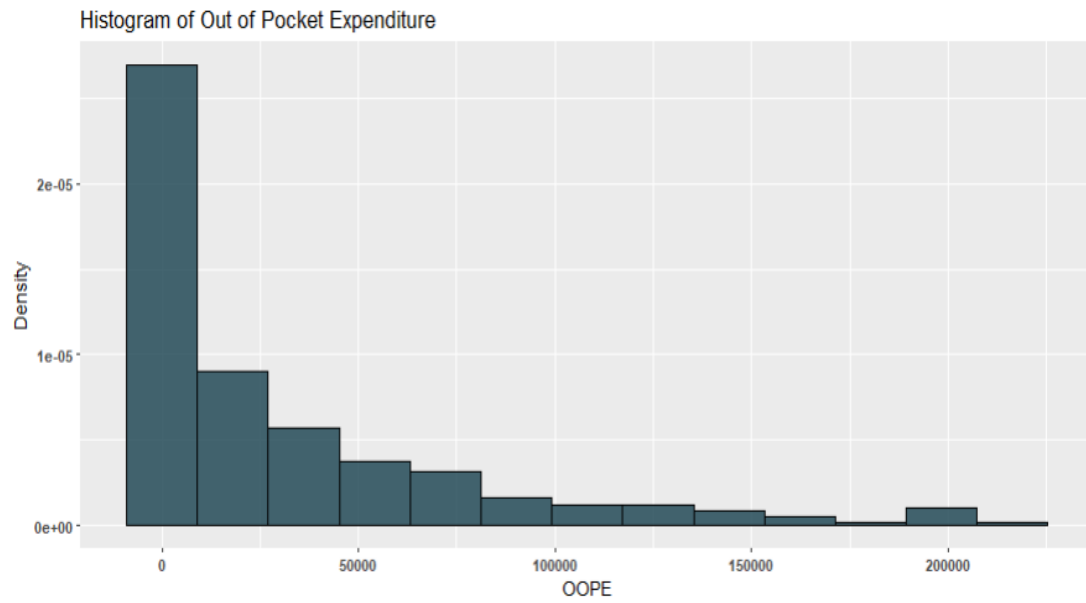


Fig. 2. Original Out of Pocket Expenditure Distribution

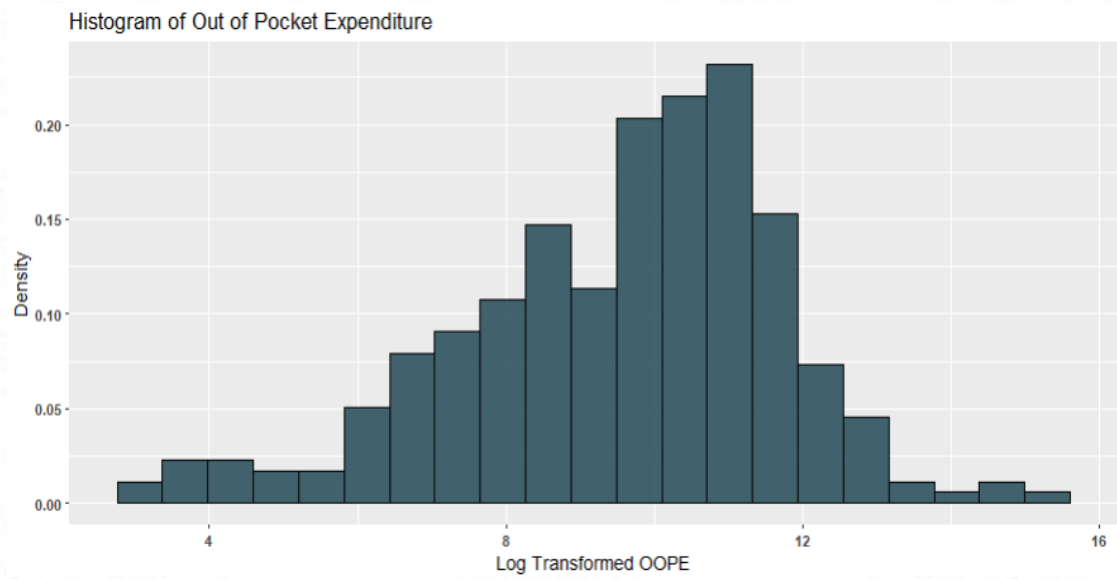


Fig. 3. Log-transformed Out of Pocket Expenditure Distribution

Catastrophic Health Expenditure (CHE) –

The outcome variable Catastrophic Health Expenditure was binary (CHE = Yes / No).

To assess the determining factors of Catastrophic Health Expenditure, bivariate analysis was done using Chi-squared test to find the variables associated with CHE. The ones that showed association were then tested using bivariate binary logistic regression to get unadjusted odds. To adjust to the effect of other factors - multivariable binary logistic regression model was performed.

3.11 VARIABLES

3.11.1 OUTCOME VARIABLES

- Healthcare utilization: Utilization of Inpatient and Outpatient service, utilization of insurance, type of hospital, nature of treatment, reason for not seeking healthcare for chronic disease was studied.
- Out of Pocket Expenditure: Annual average and median Out of Pocket Expenditure was calculated using sum of expenditure on hospitalization in the last one Year , non-hospitalization in the last one Month, routine medication for one Month, pregnancy and childbirth in the last one Year, vaccination in the last one Year and indirect cost in the last one Year as reported by the households. Indirect cost includes cost of food, transportation, wage loss of diseased and caregiver. Annual mean and median per capita OOPE were calculated using,

Per Capita OOPE of household = Total OOPE of household / Total members in the Household

- Catastrophic Health Expenditure: Calculated using two approaches:

Budget Share Method: Household was considered catastrophic if OOPE exceeded a 10 percentage of the total household consumption expenditure

Construction of CHE variable for Capacity To Pay method:

WHO has given a detailed methodology on the calculation of CHE based on the CTP of a household. Building on the WHO methodology, the following are the steps involved in computing catastrophic health expenditure:

Step 1. Generation of Essential expenditure share of the household (EES):

The Essential Expenditure include unavoidable expenditure of households like food; electricity, phone, water bills; and monthly consumable toiletries expenditure.

Essential Expenditure Share (EES)

$$EES = \text{Essential expenditure of the household} / \text{Total household expenditure (EEH/THE)}$$

Step 2. Generation of household equivalent size (HES):

$$HES = hhsz\text{ize}^{\beta}$$

Whereas hhszize is the size of the household and β is the coefficient value of the equivalence scale. We made use of β value 0.56 which is the most commonly used household scale multiplier and estimated from regression equation based on 69 countries.

Step 3. Generation of equivalent Essential expenditure (EEE):

$$EEE = EEH/HES$$

Step 4. Identification of 45th and 55th percentile of EEE in the sample

Step 5. Calculation of average of EEE of households within the 45th and 55th percentile of EES and that value is used to define poverty line (PL)

Step 6. Calculation of subsistence expenditure for each of the households in the sample (SEH):

$$SEH = PL * HES$$

Step 7. Calculation of household's capacity to pay (CTP):

The household's capacity to pay (ctph) is defined as the non-subsistence effective income of the household. However, some households may report essential expenditure that is lower than subsistence spending ($seh > essentialh$). This indicates that the household's food expenditure is less than the estimated poverty standard for that country. If the household's food expenditure is less than the subsistence expenditure, non-food expenditure is considered as non-subsistence spending.

$$CTP = THE - SEH \text{ if } EEH \geq SHE, CTP = THE - EEH \text{ if } EEH < SHE$$

Step 8. Calculation of catastrophic health expenditure (CHE):

Catastrophic health expenditure occurs when a household's total out-of-pocket health payments equal or exceed 40 percentage of household's capacity to pay or non-subsistence spending. The threshold of 40 percentage could be changed according to countries' specific situation.

$$CHE = 1 \text{ (yes) if } OOPHE/CTP \geq 40, CHE = 0 \text{ (no) if } OOPHE/CTP < 40\%$$

- Distress Financing: This includes financial options employed to meet healthcare expenditure and financial rearrangements of the household.
- Perception of pollution and its perceived effects, adaptation measures undertaken to overcome and its corresponding cost.

3.11.2 INDEPENDENT VARIABLES

➤ Individual level:

- Age: In completed years as reported by the respondent
- Gender: Gender of the household members as reported by the respondent as Male, Female, Others or Refuse to reply was then categorized into Male or Female.
- Education: Initially it was collected as No education, Know how to sign, Informal education, Primary -Up to 5th, Middle -Up to 8th, Secondary -Up to 10th, Higher secondary -Up to 12th, Graduate/ postgraduate, Other. Then it was categorized into No Education, Early Childhood Education, Primary Level (Up to 5), Secondary Level (Up to 10), Higher Secondary Level / Diploma, Graduate/Postgraduate
- Job: Data was collected as Unemployed, Daily wage, Mine worker, Factory worker, Farmer, Retired, Home maker, Student, Self-employed, Private, Government, Others. It was then categorized as Self Employed / Regular Salary, Labour & Agriculture, No Job for the age group above 18 years.
- Current Tobacco user: Yes or No as reported by respondents.
- Current Alcohol user: Yes or No as reported by respondents
- Presence of multimorbidity in individual: If there were at least two chronic health conditions in the same individual
- Type of insurance: CMCHIS (State), PMJAY (Centre), ESIC / ECHS / CGHS (Employee), Private Premium, No Insurance Reported
- Whether sought medical advice for chronic condition present as reported.
- Reason for not seeking medical advice: Data was collected based on No facility available, Too expensive, Fear of losing wages, Not considered serious, Religious belief, Other (specify). All the specified variables were added.

➤ Household level:

- Location: Household was in rural or urban
- Social group: Data was collected for Other Backward Class, Scheduled Caste, Scheduled Tribe.
- Ration card type: Is the household Non Priority Household, Priority Household, No card was then categorized into Priority household, non-priority household.
- Household size: Total number of people in the household was collected then it was categorized onto ≤ 4 , > 4 members (Median = 4).
- Household type: Whether household was Nuclear family, Joint family, Single parent household.
- Education level of Household Head: created from education variable from individual level data collected. No Education, Primary Level (Up to 5), Secondary Level (Up to 10), Higher Secondary Level / Diploma, Graduate/Postgraduate. Early education was removed as it was not useful in this context.
- Job of Household Head: Self Employed / Regular Salary, Labour & Agriculture, No Job categorized from job variable calculated at individual level.
- Presence of under 5 children in the household: Whether any under 5 years old children present in the household.
- Presence of elder above 60 years in the household: Whether any above 60 years old aged person present in the household.
- Presence of both children and above 60 years in the household: Whether there was at least one child under 5 and one elderly above 60 years in the household.
- Presence of pregnant women in the household: Whether any pregnant women present in the household.
- Insurance status of the household: Computed from individual level data to household level. If the household had at least one insurance.

- Per capita monthly income was categorized based on tertiles (Low, Medium, High) of household total income.

Per capita income = Monthly total income of the household / Total members in Household

- Per capita monthly expenditure as low, medium, high based on tertiles from total household expenditure.
- Per capita earner in the household was computed from number of earners in the household using

Per capita earner in the household = Total number of earners in the household / Total members in the household

This was then categorized as less than 50 percentage earners and more than 50 percentage earners in the household. (Mean = 0.5).

- Non-medical expenditure category based on tertiles (Low, Medium, High) computed from nonmedical expenditure of the household.
- Direction of the household: Northeast, southwest, crosswind zone from the nearest cement factory as computed from address of household.
- Distance of household: Less than 6 Km and greater than 6 Km from the nearest cement factory based on median cut off for the study sample.
- Presence of multimorbidity household: At least one individual in the household has at least two chronic conditions.
- Presence of at least one chronic condition in the household computed from individual level data when at least one person in the household had at least one chronic condition.

- Number of Inpatient Visit in the household: Number of inpatients visit computed from individual level data, and then categorized into Zero visit, At least One Visit, More than One Visit.
- Number of Outpatient Visit in the household: Number of outpatients visit computed from individual level data, then categorized into Zero visit, At least One Visit, At least Two visits, More than Two Visits.
- Illness Ratio of the household: Proportion of household members who had experienced chronic/acute illness in the last 1 year.

Illness Ratio (IR) = (Number of acute event / injury) + (Number of chronic condition) / Total Members in the household

It was categorized into Not All are Affected (IR <1), Each had At least One Illness (IR = 1), Some had More than One Illness (IR >1).

- Pollution illness: Household experiencing pollution related illness like Chronic Kidney Disease, COPD/ Asthma, Renal Calculi, Allergies (Dust, Skin, Eye irritation).
- Positive or Negative effects of presence of factory / mining area: It was categorized based the response received. For positive effect rural development, health camp initiative, education enhancement, sponsor local festival, employment opportunity, water resource, skill enhancement training, livelihood support. For negative effects loss in agriculture income, health effect, atmosphere covered with dust, dust deposit in the household, seasonal deposit of dust, deposit in water, foul smelling air, reduced ground water, frequent accidents had deaths, excessive noise from lorry horn were created.

3.12 OPERATIONAL DEFINITIONS

- Household: A group of persons normally living together, sharing their income and expenses; and taking food from a common kitchen, unless the exigencies of work prevent any of them from doing so. Even if someone is temporarily away (for work, study, etc.), they are considered part of the household if they usually live there.
- Out of Pocket Expenditure: Refers to the share of current health expenditure that is directly paid by households at the point of service use excluding any reimbursements or insurance coverage at the time of use.
- Catastrophic Health Expenditure:
 - Budget Share Approach: In this OOOPE was considered catastrophic if it exceeded a 10 percentage of the total household consumption expenditure
 - Capacity to Pay Approach: CHE was defined as OOOPE exceeding 40 percentage of the household's non-subsistence spending (i.e., total expenditure minus essential expenditure), representing the household's capacity to pay for health without compromising basic needs.
- Distress Financing: Refers to the coping mechanism households' resort to when they face financial hardship in meeting out-of-pocket healthcare expenses.

CHAPTER 4. RESULTS

4.1 SAMPLE COVERED

The study covered 329 households, exactly equal to the estimated sample size. During the planning phase it was planned to cover 346 households to account for a 5 percentage non-response rate. A total of 337 households were approached for the study. Among these, 5 households refused to participate and data from 3 households were incomplete, thus ensuring the completion of the required sample size. Approximately 13 households were covered per day to complete data collection.

4.2 BASELINE CHARACTERISTICS OF SAMPLE

4.2.1 HOUSEHOLD PROFILE

Table 1 provides sociodemographic details of households. Among the 329 households surveyed, 80 percentage were in rural areas. The study found that 88 percentage belong to Other Backward Class and remaining to Scheduled Caste communities. Around 63 percentage of households possessed a Priority Household ration card. The average household size was four members (Mean = 4, SD = 1.7). Approximately one in four households had at least one child under five years of age, while one in three had at least one elderly member aged 60 years or above. The median per capita monthly income was INR 8,000 (IQR: INR 4,857 – INR 13,165). Notably, 73 percentage of the households reported having at least one member covered by health insurance.

Table 1. Sociodemographic Characteristics of Household

Variable	N = 329^I
Location	
Rural	263 (80%)
Urban	66 (20%)
Social Group	
Other Backward Class	288 (88%)
Scheduled Caste	41 (12%)
Type of Ration Card	
Non-Priority Household	121 (37%)
Priority Household	208 (63%)
Type of Household	
Nuclear Family	205 (62%)
Joint Family	99 (30%)
Single Parent Household	25 (8%)
Total Members in the Household	
Household Size Category	
≤ 4 Members	220 (67%)
> 4 Members	109 (33%)
Education Level of Household Head	
No Education	46 (14%)
Primary Level (Up to 5)	44 (13%)
Secondary Level (Up to 10)	132 (40%)
Higher Secondary/Diploma	36 (11%)
Graduate/Postgraduate	71 (22%)
Job of Household Head	
No Job	49 (15%)
Self Employed / Regular Salary	151 (46%)
Labour & Agriculture	129 (39%)
Household with Children Under 5 Years	
Household with Elderly	
Household with Pregnant Women	
Household with Elderly and Children Under 5 Years	
Household with at Least One Insurance	
Monthly Per Capita Income of the Household (INR)	
Mean (SD)	13,878 (20,607)
Median (IQR)	8,000 (4,857, 13,165)
Monthly Per Capita Expenditure (INR)	
Mean (SD)	8,560 (7,550)
Median (IQR)	6,607 (4,700, 9,669)

Table 1. Sociodemographic Characteristics of Household Contd.	
Variable	N = 329¹
Direction of Household	
Crosswind Zone	124 (38%)
Northeast	96 (29%)
Southwest	109 (33%)
Distance to Nearest Cement Factory	
< 6 Kms	180 (55%)
> 6 Kms	149 (45%)

¹ n (%); Mean (SD); Median (IQR)

4.2.2 INDIVIDUAL PROFILE

Table 2 provides sociodemographic details of household members. The study sample comprised 1,356 individuals from 329 households, with a median age of 31 years (IQR: 17–49).

Table 2. Sociodemographic Characteristics of Household members

Variable	N = 1,356¹
Age	31 (17, 49)
Gender	
Female	673 (50%)
Male	683 (50%)
Education Level	
No Education	144 (11%)
Early Childhood Education	20 (1.6%)
Primary Level (Up to 5)	201 (16%)
Secondary Level (Up to 10)	366 (29%)
Higher Secondary Level / Diploma	154 (12%)
Graduate/Postgraduate	368 (29%)
Primary Occupation	
Self Employed / Regular Salary	345 (37%)
Variable	N = 1,356¹
Labour & Agriculture	352 (37%)
No Job	242 (26%)
Current Tobacco User	98 (7.2%)
Current Alcoholic	138 (10%)

¹ Median (IQR); n (%)

There was equal representation of men and women in the population. Among individuals in the working-age group (19 to 60 years), 39 percentage were engaged in regular salaried employment, and same proportion reported labour or agriculture as their primary occupation. It was observed that 12 percentage of male and 2.4 percentage female currently use tobacco in any form while 20 percentage male and 0.1 percentage female reported current use of alcohol (Supplementary Table. 21).

4.2.3 MORBIDITY PROFILE

Table 3 depicts health profile of the households. Among 329 households, 44% of households reported having at least one chronic illness while 45 percentage of the households had at least one person with multimorbidity in the household. Average number of acute illness/injuries of a household was found to be 1.8 and average number of chronic illnesses was 2.2. After combining both acute and chronic illnesses, average household illness ratio was 1.1.

Table 3. Health Profile of Households

Variable	N = 329¹
At least one chronic condition in the household	
<= 1 Chronic condition	144 (44%)
> 1 Chronic condition	185 (56%)
Household with At least One Multimorbidity	148 (45%)
Average Number of Acute Illness / Injury (1Year)	1.8 (1.7)
Average Number of Chronic Illness (1Year)	2.20 (1.80)
Average Number of Total Illness (1Year)	3.96 (2.69)
Average Household Total Illness Ratio	1.1 (0.9)
Household Illness Category	
Not All are Affected	154 (47%)
Each has At least One Illness	36 (11%)
Some has Multiple Illness	139 (42%)

¹ n (%); Mean (SD)

4.3 HEALTHCARE UTILIZATION

4.3.1 INDIVIDUAL LEVEL

Table 4. shows healthcare seeking behaviour of household members. Among the 1356 sample survey, 13 percentage suffered from multimorbidity. Only 75 percentage of male and female received medical attention among those who required care. While 2.6 percentage female felt expensive, 1 percentage male felt expensive. Also, 1.5 percentage male adopted dietary modification whereas 0.3 percentage female adopted for dietary modification. Around 66 percentage of individuals had at least one insurance mostly covered by government insurance and only 0.1 percentage had private medical insurance. It is notable that, around 34 percentage of study population was not protected by any insurance (Supplementary Table 22 & 23).

Table 4. Healthcare Seeking Behaviour of Individuals

Variable	N = 1,356¹
Presence of Multimorbidity	179 (13%)
Average Number of Inpatient Visit (1Year)	1.18 (0.48)
Average Number of Outpatient Visit (1Month)	1.19 (0.51)
Those require medical attention	N = 466
Sought Healthcare	350 (75%)
Reason for Not Seeking Healthcare	
Not Considered Serious	76 (16%)
Medication Not Advised by Doctor	16 (3.4%)
Felt Expensive	9 (1.9%)
Dietary Modification	4 (0.8%)
Health Condition Under Control	3 (0.6%)
Home Remedy	2 (0.4%)
No Belief in Medicine	2 (0.4%)
Fear of Medicine	2 (0.4%)
Stopped Medicine Intake	1 (0.2%)

¹ n (%); Mean (SD)

In the last one year, 156 individuals had history of hospitalization (Table 5). The study revealed that an average stay of 6 days for each hospitalization. Allopathic care was predominant, used by 95 percentage of patients, with 62 percentage admissions occurring in private hospitals and nearly 93 percentage received support from a caregiver during their hospital stay.

Table 5. Hospitalization Characteristics of Individuals (1 Year)

Variable	N = 156¹
Duration of Hospitalization	6 (10)
Nature of Treatment	
Allopathy	148 (95%)
AYUSH	6 (3.8%)
Both	2 (1.3%)
Type of Hospital	
Private Hospital	96 (62%)
Government Hospital	54 (35%)
Trust/Charity Hospital	6 (3.8%)
Type of Ward	
Free	55 (35%)
Paid General	101 (65%)
Place of Hospitalization	
Same District	120 (77%)
Different District in the Same State	36 (23%)
Proportion of Hospitalization Received Caregiver Attention	145 (93%)

¹ Mean (SD); n (%)

During the last one month prior to data collection, 484 individuals had any ailment and sought outpatient care (Table 6). Around 87 percentage consulted healthcare workers or doctors, while 94 percentage received allopathic treatment, with 63% attending private hospitals.

Table 6. Non-Hospitalization Characteristics of Individuals (1 Month)

Variable	N = 484¹
Consultation	
Healthcare Worker/Doctor	409 (87%)
Medical Shop	38 (8.1%)
Self-Medication	13 (2.8%)
Other Household Member/Friend	6 (1.3%)
Leftover Medicine	2 (0.4%)
Traditional Practitioner	1 (0.2%)
Nature of Treatment	
Allopathy	445 (94%)
AYUSH	6 (1.3%)
Both	1 (0.2%)
Home Remedy	19 (4.0%)
Type of Hospital	
Private Hospital	296 (63%)
Government Hospital	108 (23%)
ESIS Hospital	3 (0.6%)
Pharmacy (OTC)	38 (8.1%)
Other	26 (5.5%)
Place of Hospital	
Same District	395 (97%)
Different District in the Same State	13 (3.2%)
Different State	1 (0.2%)
Proportion of Non-Hospitalization Received Caregiver Attention	309 (73%)

¹ n (%)

4.3.2 HOUSEHOLD LEVEL

During the study period, 88 percentage of households incurred out of pocket expenditure at the point of healthcare service utilized as described in Table 7. One in three households had at least one inpatient visit in the last one year and one in two households had at least one outpatient visit in the last one month prior to data collection. Around 19 percentage of the households incurred indirect cost (wage loss) in the study period.

Table 7. Proportion of Out of Pocket Expenditure in Household for 1 Year

Variable	N = 329 ¹	95% CI ²
Proportion of Households Incurred Out of Pocket Expenditure	289 (88%)	84% - 91%
Proportion of Households with At least One Inpatient Visit	98 (30%)	25% - 35%
Number of Inpatient Visit in the Household		
Zero Visit	221 (67%)	62% - 72%
At least One Visit	75 (23%)	18% - 28%
More than One Visit	33 (10%)	7.1% - 14%
Proportion of Households with At least One Outpatient Visit	186 (57%)	51% - 62%
Number of Outpatient Visit in the Household		
Zero Visit	124 (38%)	32% - 43%
At least One Visit	96 (29%)	24% - 34%
At least Two Visits	53 (16%)	12% - 21%
More than Two Visits	56 (17%)	13% - 22%
Proportion of Households with At least One Regular Medication	182 (55%)	50% - 61%
Proportion of Households Incurred Indirect Cost	61 (19%)	15% - 23%

¹ n (%); ² CI = Confidence Interval

4.4 HEALTHCARE EXPENDITURE

4.4.1 OUT OF POCKET EXPENDITURE

Table 8 depicts that Annual median Out of Pocket Expenditure of the study populated was calculated as INR 14,900 (IQR INR 1258 – INR 57,200). Annual mean OOPE was INR 77,078 (SD 308,624). Annual median per capita health expenditure for the study period was INR 3950 (IQR INR 419 – INR 13680). Annual mean per capita OOPE was INR 17,430 (SD 57,443). Healthcare expenditure was more than 10 percentage of total household consumption expenditure in 36 percentage of the households. Around 18

percentage of the households had healthcare expenditure more than 40 percentage of their capacity to pay.

Table 8. Annual Out of Pocket Expenditure of Household (INR)

Variable	N = 313¹
Out of Pocket Expenditure of the Household	
Median (IQR)	14,900 (1,258, 57,200)
Annual Per Capita Health Expenditure	
Median (IQR)	3,950 (419, 13,680)
Out of Pocket Expenditure of the Household (3 +/- IQR)	
Median (IQR)	12,600 (1,130 - 45,050)
Annual Per Capita Health Expenditure (3 +/- IQR)	
Median (IQR)	3,280 (333 - 11,600)
Expenditure on Hospitalization	8,038 (23,070)
Expenditure on Non-Hospitalization	1,838 (5,099)
Expenditure on Regular Medication	15,661 (25,421)
Expenditure on Pregnancy and Childbirth	2,619 (14,866)
Expenditure on Vaccination	19 (252)
Indirect Medical Expenditure	4,226 (17,291)
Budget Share of Out of Pocket Expenditure	
<= 10% of Consumption Expenditure	210 (64%)
> 10% of Consumption Expenditure	119 (36%)
Households Incurring Catastrophic Health Expenditure (Capacity To Pay)	
No	269 (82%)
Yes	60 (18%)

¹ Mean (SD); n (%)

4.4.2 DISTRESS FINANCING

Financial options employed to manage healthcare expenses and coping mechanism to address the financial strain if any by the households was studied. Table 9 shows that nearly 97 percentage households relied on their own savings, 5.9 percentage mortgaged jewellery, 4.8 percentage used health insurance, and 3.1 percentage borrowed from banks or money lenders. To cope financially, households also adjusted in spending (Table 10). The most

common cutbacks were on social activities and utility expenses (both 9%). Reductions in spending on essentials like food (2.1%) were also reported. From this, it is observed that around 37 percentage employed distressed source of financing for healthcare expenditure.

Table 9. Financial Options Employed to Manage Healthcare Expenditure

Variable¹	N = 289²
Own Savings	281 (97%)
Borrowed from Friends/Relatives	66 (23%)
Mortgaged Jewellery	17 (5.9%)
Health Insurance	14 (4.8%)
Borrowed from Bank/Money Lender	9 (3.1%)

¹ Multiple response; ² Among households reported OOPE

Table 10. Rearrangements in Household Financing

Variable¹	N = 289²
Reduced Expenditure on Social Activities	26 (9.0%)
Reduced Expenditure on Utility	26 (9.0%)
Reduced Expenditure on Clothes	21 (7.3%)
Reduced Expenditure on Durable Goods	15 (5.2%)
Reduced Expenditure on Medicine	14 (4.8%)
Reduced Expenditure on Daily Goods	8 (2.8%)
Reduced Expenditure on Food	6 (2.1%)
Reduced Other Expenditure	3 (1.0%)

¹ Multiple response; ² Among households reported OOPE

It was observed that around 9 percentage modified their diet, while a few made infrastructure changes. Financial constraints led 9.3 percentage to opt for less expensive alternatives, and 8.7 percentage to refuse treatment altogether. Around 1.4 percentage postponed recommended treatments due to cost (Supplementary Table 24 & 25).

4.4.3 FACTORS ASSOCIATED WITH OUT OF POCKET EXPENDITURE

To identify predictors of increased Out of Pocket Expenditure among households reported any OOPE (N=289), bivariate and multivariable analyses were conducted.

4.4.3 a BIVARIATE ANALYSIS

Since Out of Pocket Expenditure variable is right skewed (Fig. 4), it was transformed into natural logarithmic form (Fig. 5) to approximate normality and meet the assumptions of linear regression.

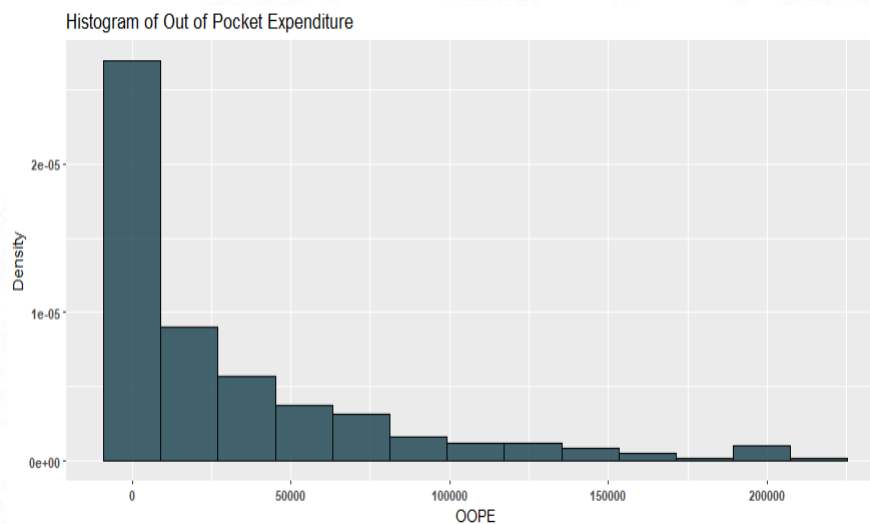


Fig. 4. Distribution of original Out of Pocket Expenditure

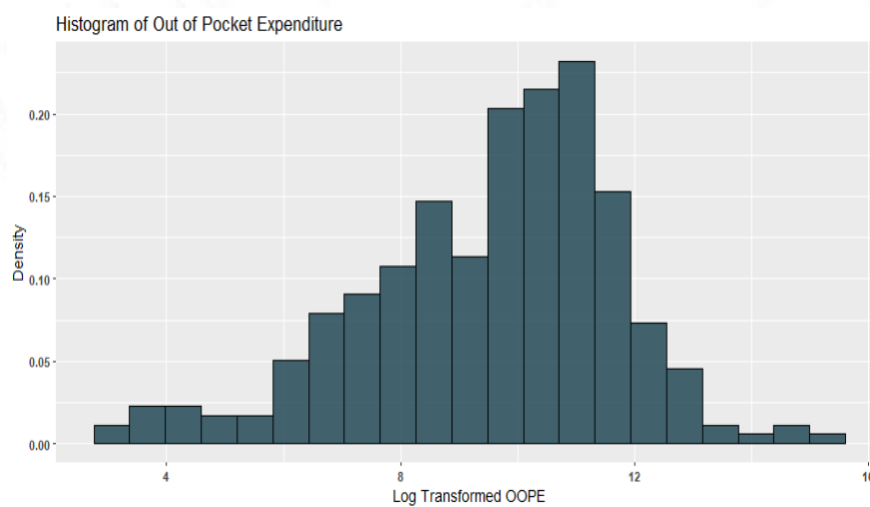


Fig. 5. Distribution of Log transformed Out of Pocket Expenditure

Bivariate linear regression models were conducted with log-transformed OOPE as the dependent variable and each predictor separately as the independent variable to estimate the unadjusted effects of each variable, while holding other variables constant.

Regression coefficients were exponentiated and interpreted as percentage changes in OOPE associated with one-unit changes in predictor variables.

$$\text{Percentage change in OOPE} = \text{Exp}(\beta) - 1 \times 100 (\%)$$

Bivariate analysis between log OOPE and sociodemographic variables (Table 11) indicated that each additional household member was significantly associated with 23 percentage increase in OOPE ($\beta = 0.21, p = 0.005$). Household with unemployed head spent 106 percentage more on healthcare than those with regular salaried / self-employed head ($\beta = 0.72, p = 0.05$). Household where the head had attained a higher secondary or diploma-level education incurred significantly higher OOPE, spending 185 percentage more than those with no formal education ($\beta = 1.0, p = 0.036$). Household having both children under 5 years and elderly member above 60 years had significantly higher OOPE, spending approximately 380 percentage more than a household without both age groups ($\beta = 1.6, p = 0.001$). Each additional elderly member (aged above 60 years) in a household was significantly associated with 71 percentage increase in OOPE ($\beta = 0.54, p = 0.003$). Household with at least one pregnant woman had significantly higher OOPE, spending approximately 599 percentage more than a household without a pregnant woman ($\beta = 1.9, p = < 0.001$). Household located in the southwest direction incurred significantly higher OOPE, spending approximately 105 percentage more than a household situated in the crosswind direction.

Table 11. Bivariate Analysis: Log OOE and Sociodemographic Characteristics

Variable	Log (β)	95% CI ¹	p-value	Percentage change
Location				
Rural	0.00	—		
Urban	0.53	(-0.08 - 1.15)	0.088	+71%
Total Members in the Household	0.21	(0.06 - 0.36)	0.005	+23%
Type of Ration card				
Non-Priority Household	0.00	—		
Priority Household	-0.06	(-0.57 - 0.46)	0.832	-35%
Job of Household Head				
Self Employed / Regular Salary	0.00	—		
No Job	0.72	(0.00 - 1.45)	0.050	+106%
Labour & Agriculture	-0.26	(-0.81 - 0.29)	0.346	-23%
Education Level of Household Head				
No Education	0.00	—		
Primary Level (Up to 5)	0.03	(-0.95 - 1.0)	0.958	+3%
Secondary Level (Up to 10)	0.26	(-0.52 - 1.0)	0.512	+30%
Higher Secondary Level / Diploma	1.0	(0.07 - 2.0)	0.036	+185%
Graduate/Postgraduate	0.72	(-0.12 - 1.6)	0.093	+106%
Household with Elderly and Children <5				
No	0.00	—		
Yes	1.6	(0.61 - 2.5)	0.001	+380%
Number of Children Under 5 Years	0.22	(-0.15 - 0.59)	0.236	+25%
Number of Elders above 60 Years	0.54	(0.18 - 0.89)	0.003	+71%
Household with Pregnant Women				
No	0.00	—		
Yes	1.9	(1.1 - 2.8)	<0.001	+599%
Direction of Household				
Crosswind Zone	0.00	—		
Northeast	0.37	(-0.25 - 0.99)	0.243	+44%
Southwest	0.72	(0.12 - 1.3)	0.018	+105%

¹ CI = Confidence Interval

Bivariate analysis between log OOPE and economic variables (Table 12) showed that on an average, medium per capita income household spent 46 percentage less on healthcare than high per capita income household ($\beta = -0.63$, $p = 0.04$) while low per capita income household spent 69 percentage less on healthcare than high per capita income household ($\beta = -1.2$, $p = < 0.001$). On average, medium spending household had 57 percentage lower OOPE than high spending household ($\beta = -0.83$, $p = 0.007$), while low spending household had 62 percentage reduced healthcare expenditure than high spending household ($\beta = -0.98$, $p = 0.002$).

Table 12. Bivariate Analysis for Log OOPE and Economic Characteristics

Variable	Log (β)	95% CI ¹	p-value	Percentage change
Per Capita Income Category (INR)				
High Income	0.00	—		
Medium Income	-0.63	(-1.2 -0.03)	0.040	-47%
Low Income	-1.2	(-1.8 - -0.58)	<0.001	-69%
Per Capita Earner of the Household	0.39	(-0.56 - 1.30)	0.419	+47%
Household Nonmedical Expenditure Category (INR)				
High	0.00	—		
Medium	-0.83	(-1.4 -0.23)	0.007	-56%
Low	-0.98	(-1.6 -0.37)	0.002	-62%

¹ CI = Confidence Interval

Bivariate analysis between log OOPE and health morbidity related variables (Table 13) showed that each additional inpatient visit of household was significantly associated with 210 percentage higher OOPE spending per visit ($\beta = 1.1$, $p = < 0.001$). Household with at least one member with multimorbidity spent 448 percentage more on healthcare than those without multimorbidity ($\beta = 1.7$, $p = < 0.001$).

Table 13. Bivariate Analysis: for Log OOPE and Morbidity Characteristics

Variable	Log (β)	95% CI ¹	p-value	Percentage change
Number of Inpatient Visit in Household	1.10	(0.87 - 1.40)	<0.001	+210%
Number of Outpatient visit in Household	0.01	(-0.16 - 0.18)	0.943	+1%
Household with At least One Multimorbidity				
No	0.00	—		
Yes	1.7	(1.2 - 2.2)	<0.001	+448%
Pollution Related Illness				
No	0.00	—		
Yes	0.68	(-0.01 - 1.4)	0.053	+98%

¹ CI = Confidence Interval

4.4.3 b MULTIVARIABLE ANALYSIS

Variables significantly associated in the bivariate analysis were included in the multivariable linear regression (Table 14) to estimate adjusted marginal effects of predictor variables in OOPE. Since, education of household head was associated with per capita income ($\chi^2 = 16.03$, $p = 0.042$), and job of household head was associated with per capita income ($\chi^2 = 19.24$, $p = < 0.001$), per capita income was included in the model. The model explains 41.2% of variation in OOPE (Adjusted $R^2 = 0.412$).

The analysis showed that each additional member in household was significantly associated with 19 percentage increase in OOPE ($\beta = 0.17$, $p = 0.005$), while each addition of elderly above 60 years was significantly associated with 35 percentage increase on healthcare ($\beta = 0.3$, $p = 0.037$). Household with a pregnant woman spent 488 percentage more on healthcare ($\beta = 1.8$, $p = < 0.001$) more than those household without a pregnant woman. Household with medium per capita income spent 57 percentage less than a high per capita income household ($\beta = -0.85$, $p < 0.001$), while those with low per capita income spent 64 percentage less on healthcare (Fig. 6) than a high per capita income household ($\beta = -1.0$, p

< 0.001). Presence of at least one multimorbidity in the household significantly increases OOPE by 331 percentage than household without multimorbidity ($\beta = 1.5$, $p < 0.001$). Further, each additional inpatient visit in a household significantly increased OOPE by approximately 137 percentage per additional visit ($\beta = 0.86$, $p < 0.001$).

Table 14. Multivariable Analysis: Factors Associated with Increased Out of Pocket Expenditure

Variable	Log (β)	95% CI ¹	p-value	Percentage change
Total Members in the Household	0.17	(0.05, 0.29)	0.005	+19%
Number of Elders above 60 Years	0.30	(0.02, 0.58)	0.037	+35%
Household with pregnant Women				
No	0.00	—		
Yes	1.8	(1.1, 2.5)	<0.001	+488%
Per Capita Income Category (INR)				
High Income	0.00	—		
Medium Income	-0.85	(-1.3, -0.37)	<0.001	-57%
Low Income	-1.0	(-1.5, -0.55)	<0.001	-64%
Household with At least One Multimorbidity				
No	0.00	—		
Yes	1.5	(1.1, 1.9)	<0.001	+331%
Number of Inpatient Visit in Household	0.86	(0.63, 1.1)	<0.001	+137%

$R^2 = 0.426$; Adjusted $R^2 = 0.412$ ¹ CI = Confidence Interval

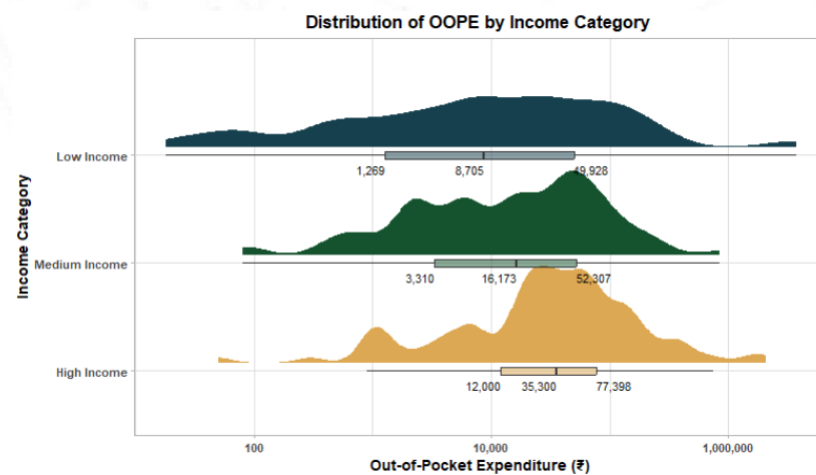


Fig. 6. Distribution of OOPE by household income

4.4.4. FACTORS ASSOCIATED WITH CATASTROPHIC HEALTH EXPENDITURE

In this bivariate and multivariable analysis was done to assess the factors associated with the incurrence of Catastrophic Health Expenditure (Capacity To Pay Approach) among the households (N = 60).

4.4.4a BIVARIATE ANALYSIS

Bivariate analysis using the Chi-square test was conducted to assess associations with catastrophic health expenditure (Yes / No). Variables found to be significant were included in a binary logistic regression to estimate unadjusted effects while controlling for other factors. The bivariate analysis between catastrophic health expenditure (CHE) and sociodemographic variables (Table 15) showed that households with priority ration card, educated head, employed head, household with vulnerable population like elderly above 60 years, children under 5 years and pregnant woman were associated with CHE.

Table 15. Bivariate Analysis: Association of Catastrophic Health Expenditure with Sociodemographic Characteristics

Variables	No, N = 269 ¹	Yes, N =60 ¹	Pearson χ^2	p-value ²
Location			1.589	0.2
Rural	211 (81%)	52 (20%)		
Urban	58 (89%)	8 (12%)		
Social Group			<0.001	0.8
Other Backward Class	235 (83%)	53 (18%)		
Scheduled Caste	34 (83%)	7 (17%)		
Type of Ration Card			6.434	0.007
Non-Priority Household	108 (90%)	13 (11%)		
Priority Household	161 (79%)	47 (23%)		
Household Size Category			0.013	0.8
≤ 4 Members	179 (81%)	41 (19%)		
> 4 Members	90 (86%)	19 (17%)		
Education Level of Household Head			14.056	0.007
No Education	31 (67%)	15 (33%)		
Primary Level (Up to 5)	38 (86%)	6 (14%)		

Table 15. Bivariate Analysis: Association of Catastrophic Health Expenditure with Sociodemographic Characteristics Contd.

Variables	No, N = 269¹	Yes, N =60¹	Pearson χ^2	p-value²
Secondary Level (Up to 10)	116 (89%)	16 (12%)		
Higher Secondary Level / Diploma	25 (71%)	11 (31%)		
Graduate/Postgraduate	59 (84%)	12 (17%)		
Job of Household Head			20.915	<0.001
No Job	29 (64%)	20 (41%)		
Self Employed / Regular Salary	133 (88%)	18 (12%)		
Labour & Agriculture	107 (83%)	22 (17%)		
Household with Children Under 5 Years			0.404	0.4
No	206 (83%)	43 (17%)		
Yes	63 (81%)	17 (21%)		
Household with Elderly			10.790	<0.001
No	192 (88%)	29 (13%)		
Yes	77 (72%)	31 (29%)		
Household with Elderly and Children Under 5 Years			<0.001	>0.9
No	251 (83%)	56 (18%)		
Yes	18 (82%)	4 (18%)		
Household with Pregnant Women			8.413	0.004
No	253 (85%)	49 (16%)		
Yes	16 (62%)	11 (41%)		
Direction of Household			2.479	0.3
Crosswind Zone	105 (85%)	19 (15%)		
Northeast	80 (84%)	16 (17%)		
Southwest	84 (79%)	25 (23%)		

¹ n (%); ² Pearson's Chi-squared test / Fisher's exact test

The bivariate analysis between catastrophic health expenditure (CHE) and economic variables (Table 16) showed that per capita income of the household and nonmedical expenditure was associated with CHE.

Table 16. Bivariate Analysis: Association of Catastrophic Health Expenditure with Economic Characteristics

Variables	No, N =269 ¹	Yes, N = 60 ¹	Pearson χ^2	p-value ²
Per Capita Household Income (INR)			9.154	0.010
High Income	94 (85%)	16 (15%)		
Medium Income	95 (87%)	14 (13%)		
Low Income	80 (73%)	30 (27%)		
Per Capita Earners in the Household			0.104	0.6
Less than 50% Earners	148 (81%)	35 (19%)		
More than 50% Earners	121 (83%)	25 (17%)		
Household Nonmedical Expenditure Category (INR)			30.615	<0.001
High	102 (93%)	8 (7.3%)		
Medium	95 (87%)	14 (13%)		
Low	72 (65%)	38 (35%)		

¹ n (%); ² Pearson's Chi-squared test

The bivariate analysis between catastrophic health expenditure (CHE) and morbidity characteristics (Table 17) showed that the presence of at least one member with multimorbidity, pollution related illness (Fig. 8) and number of inpatient visits in a household were significantly associated with CHE.

Table 17. Bivariate Analysis: Association of Catastrophic Health Expenditure with Morbidity Characteristics

Variables	No, N =269 ¹	Yes, N = 60 ¹	Pearson χ^2	p-value ²
Household with At Least One Multimorbidity			9.097	0.002
No	159 (88%)	22 (12%)		
Yes	110 (74%)	38 (26%)		
Pollution Related Illness			6.923	0.005
No	236 (84%)	44 (16%)		
Yes	33 (67%)	16 (33%)		
Number of Inpatient Visits			29.255	<0.001
Zero Visit	197 (89%)	24 (11%)		
At least One Visit	54 (72%)	21 (28%)		
More than One Visits	18 (55%)	15 (45%)		
Number of Outpatient Visits			2.030	0.6
Zero visit	101 (81%)	23 (19%)		
At least One Visit	81 (84%)	15 (16%)		
At least Two Visits	40 (75%)	13 (25%)		
More than Two Visits	47 (84%)	9 (16%)		

4.4.4b MULTIVARIABLE ANALYSIS

Variables significantly associated in the bivariate analysis were included in the multivariable logistic regression to estimate adjusted effects. Education of the household head and non-medical expenditure were excluded due to sparse data (cells with <10 events), which could lead to unreliable estimates. As the job of the household head and per capita income were highly correlated ($\chi^2 = 19.22$, $p < 0.001$), only per capita income was retained in the model, reflecting the combined earning capacity of all household members. Since household with multimorbidity, pollution related illness is correlated, household with multimorbidity is retained.

The multivariable analysis (Table 18) between CHE and predictor variables showed that households with a priority ration card had 2.4 times higher odds of experiencing CHE compared to non-priority households (AOR = 2.4; 95% CI: 1.13–5.21; $p = 0.026$). Households with elderly members had 2.9 times higher adjusted odds of facing CHE compared to those without elderly members (AOR = 2.9; 95% CI: 1.50–5.61; $p = 0.002$). Similarly, households with pregnant women had 5.6 times higher odds of incurring CHE compared to households without pregnant women (AOR = 5.6; 95% CI: 2.03–15.1; $p < 0.001$). Households with at least one member with multimorbidity had 2.2 times higher odds of CHE than households without multimorbid members (AOR = 2.2; 95% CI: 1.14–4.39; $p = 0.021$). Households in the low per capita income had 2.4 times higher odds of experiencing CHE (Fig. 7) compared to those in the high per capita income households (AOR = 2.4; 95% CI: 1.12–5.46; $p = 0.027$). Households with at least one inpatient visit had 2.9 times higher odds of experiencing CHE (AOR = 2.9; 95% CI: 1.37–5.97; $p = 0.005$), while those with more than one visit had 5.2 times higher odds (AOR = 5.2; 95% CI: 2.10–13.2; $p < 0.001$) compared to those with no inpatient visits.

Table 18. Multivariable Analysis: Factors Associated with Catastrophic Health Expenditure

Variable	COR ¹	AOR ²	95% CI	p-value
Type of Ration card				
Non-Priority Household	1.0	1.0	—	0.026
Priority Household	2.43 (1.29 - 4.87)	2.4 (1.13 - 5.21)		
Household with Elderly				
No	1.0	1.0	—	0.002
Yes	2.67 (1.51 - 4.74)	2.9 (1.50 - 5.61)		
Household with Pregnant Women				
No	1.0	1.0	—	<0.001
Yes	3.55 (1.52 - 8.06)	5.6 (2.03 – 15.1)		
Household with At least One Multimorbidity				
No	1.0	1.0	—	0.021
Yes	2.5 (1.41- 4.51)	2.2 (1.14 - 4.39)		
Per Capita Income Category (INR)				
High Income	1.0	1.0	—	0.4
Medium Income	0.9 (0.40 - 1.88)	0.7 (0.28 - 1.60)		
Low Income	2.2 (1.13 - 4.42)	2.4 (1.12 - 5.46)		
Number of Inpatient Visit Category				
Zero Visit	1.0	1.0	—	0.005
At least One Visit	3.2 (1.65 - 6.18)	2.9 (1.37 - 5.97)		
More than One Visit	6.8 (3.04 - 15.4)	5.2 (2.10 - 13.2)		
				<0.001

¹AOR = Odds Ratio; ²CI = Confidence Interval

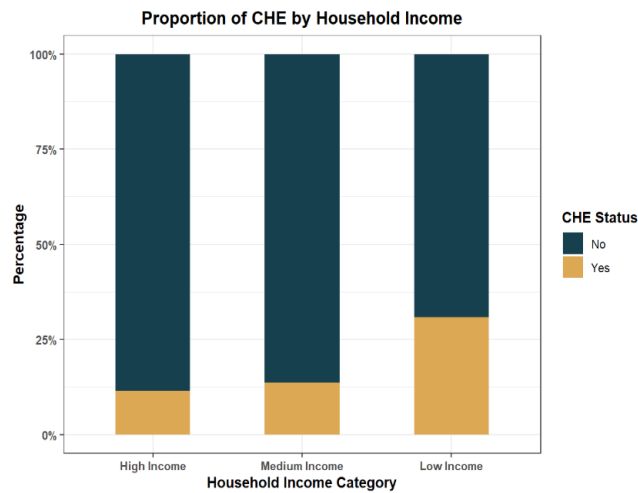


Fig. 7. Proportion of CHE by household income

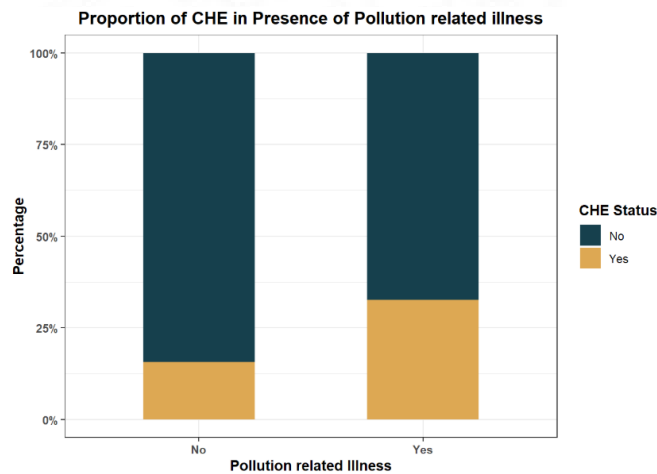


Fig. 8. Proportion of CHE in the presence of pollution related disease

4.5 POLLUTION ADATATION STRATEGY AND CORRESPONDING COST

In this perceived pollution of the household, its effects, adaptation strategy and its related expenditure was studied.

4.5.1 PERCEIVED POLLUTION

Nearly half of the respondents (49%) reported experiencing some form of trouble due to pollution. Among the types of pollution perceived, water pollution was the most reported (42%), followed by air pollution (21%), noise pollution (5.2%) and land pollution (2.1%).

4.5.2 PERCEIVED EFFECTS OF POLLUTION

The findings suggest that both air and water pollution were perceived to have a notable impact on health, daily life, and environmental quality.

Studying the perceived effects of air pollution (Supplementary Table 26) showed that 21 percentage of respondents perceived low air quality, and 19 percentage reported health effects as consequences of air pollution. Among the perceived effects of water pollution (Supplementary Table 27), low water quality was the most perceived which was reported by 41 percentage of respondents. Additionally, 30 percentage of households reported health effects, and 29 percentage noticed that water was often covered with dust. Exploring the perceived impact of pollution on routine activities (Table 19) had shown most frequently reported disruptions included difficulty in arranging drinking water (12%) and the need for frequent sweeping of the house due to dust (11%).

Table 19. Perceived Effect on Routine Activity

Variable¹	N = 329²
Difficulty in Drinking Water Arrangement	38 (12%)
Frequent Sweeping of House	36 (11%)
Fear of Accidents	22 (6.7%)
Lack of Peaceful Atmosphere	15 (4.6%)
Frequent Hospital Visits	14 (4.3%)
Reduced Outdoor Activity	6 (1.8%)

¹ Multiple response; ² n (%)

4.5.3 PERCEIVED EFFECTS OF PRESENCE OF FACTORY/ MINING AREA

In these perceived effects of presence of factory or mining area was explored. Adaptation strategies and its related expenditure was studied. The most cited benefit was employment opportunity (8.2%) followed by sponsor local festival, skill development training, rural development, school infrastructure development, livelihood support, health camp initiative and arrange water resource. The most reported issues were deposit in water making it unfit to drink (23%), dust deposit in the household (22%), and health effects (21%), frequent accident and related deaths, reduced ground water level and loss in agricultural income.

4.5.4 ADAPTATION MEASURES AND RELATED COST

Adaptation measures by households in response to perceived pollution was studied (Table 20). The most common strategies included using water purifiers (22%), cleaning the household frequently (13%). The total reported expenditure of adaptation measures amounted to INR 458,200. Most of them reported that they cope with the pollution (Supplementary Table 28 & 29) and live with it, while only while only few lodged a complaint to concerned authority.

Table 20. Adaptation Measures to Perceived Pollution

Variable¹	N = 329²
Use Water Purifier	72 (22%)
Clean Household	43 (13%)
No Measure	40 (12%)
Limit Window Opening	13 (4.0%)
Seek Healthcare	12 (3.6%)
Reduce Outdoor Activity	8 (2.4%)
Drinking Water from Nearby Area	7 (2.1%)
Wear Mask	2 (0.6%)
Use Boiled Water	1 (0.3%)
Wear Sunglass	1 (0.3%)
Cost of Adaptation Measures (INR)	458,200

¹ Multiple response; ² n (%); Sum

CHAPTER 5. DISCUSSION AND CONCLUSION

5.1. INTRODUCTION

This cross-sectional study, conducted in Ariyalur district during January–February 2025, from 329 households estimated household out-of-pocket healthcare spending, identified its key determinants, and quantified the proportion of families experiencing catastrophic health expenditure. Explored and documented the financial strategies and coping mechanisms households employ and given the district's industrial character - examined local perceptions of environmental pollution and related preventive health expenditure. The findings of this study suggest that healthcare expenditure and financial vulnerability among households in Ariyalur district are shaped by a range of interconnected factors operating at multiple levels. To systematically interpret these influences, the Social Determinants of Health framework (World Health Organization, 2010a) was adopted. This framework recognizes that health and financial outcomes are influenced not only by household characteristics but also by community access, institutional systems, and environmental conditions. Accordingly, the discussion is organized across these levels to better capture the complexity of factors affecting out-of-pocket expenditure and catastrophic health spending and contribute to the broader discourse on healthcare equity and environmental health challenges in India.

5.2. FINDINGS OF THE STUDY

During the study period, almost 88 percentage households reported incurring out-of-pocket expenditure (OOPE) at the point of utilizing healthcare services. The annual median OOPE was INR 14,900, corresponding to a median monthly expenditure of INR 1,242, which exceeds estimates reported in a similar study conducted in Tamil Nadu (Krishnamoorthy et al., 2023). The annual median per capita health expenditure was INR 3,950, higher than

both the national average of INR 2,283 and the Tamil Nadu state estimate of INR 2,034, as reported in the National Health Profile (2023) (CBHI 2024). This elevated expenditure likely reflects the unique industrial context of Ariyalur, where environmental pollution may contribute to greater healthcare needs and costs. The median monthly per capita income of the study population was INR 8,000. More than one-third of households (36%; 95% CI: 31%–42%) spent over 10 percentage of their household budget on healthcare, a proportion exceeding national averages previously reported by Pandey et al. (2018). Additionally, 18 percentage (95% CI: 14%–23%) of households experienced catastrophic health expenditure, defined as healthcare spending exceeding 40 percentage of their capacity to pay. This is lower than the findings from another study conducted in Tamil Nadu by Krishnamoorthy et al. (2023), which reported a prevalence of 25 percentage. The higher estimate in that study could be attributed to its timing - conducted shortly after the COVID-19 pandemic, when there was a sudden surge in healthcare utilization. The burden of healthcare costs was significantly associated with household socioeconomic status, the presence of vulnerable populations, higher disease burden, and patterns of healthcare utilization. The study also found that around 37 percentage of households had distressed sources of financing to meet healthcare expenditure. In addition to this, to comprehensively interpret these findings, the Social Determinants of Health (SDH) framework provides a useful lens. This framework highlights that health, and financial outcomes are the result of layered and interacting factors at multiple levels, including household, community, institutional, and environmental influences. Using this approach, the factors associated with increased out-of-pocket expenditure and catastrophic health expenditure in the study population are discussed below, classified across these levels.

5.2.1. HOUSEHOLD LEVEL

Vulnerable groups in household:

The study found that the presence of vulnerable groups in households was closely linked to higher out-of-pocket expenditure (OOPE) and catastrophic health expenditure (CHE).

Households with elderly members were found to spend more on healthcare, both in terms of regular spending and catastrophic expenses. This finding is consistent with other studies conducted in India, which have shown that elderly care is associated with high healthcare costs due to the greater need for long-term treatment and management of chronic conditions. The economic dependence of the elderly on other household members further exacerbates financial vulnerability (Mohanty et al., 2022). Most elderly individuals are beyond the working age and often lack an independent source of income, relying instead on the earnings of younger family members to meet their healthcare and living expenses. While retired elderly individuals with pensions or savings may mitigate some of the financial strain, the situation is far more precarious for poorer households, where neither the elderly nor other household members have stable income sources. Moreover, when household size is larger and the number of income earners is fewer, the per capita financial burden increases significantly, leaving families more susceptible to catastrophic health spending.

Pregnancy and childbirth-related expenditures were found to significantly increase healthcare spending and contribute to catastrophic health expenditure (CHE) among households. Despite the presence of several government programs and maternal health schemes in Tamil Nadu, such as the Dr. Muthulakshmi Maternity Benefit Scheme and Janani Suraksha Yojana, the burden of out-of-pocket expenditure (OOPE) during pregnancy remains substantial. The exorbitant costs associated with maternal healthcare

mirror findings from other studies in India (Gupta et al., 2024; Sharma et al., 2018). A key reason is the reliance on private healthcare facilities for childbirth, where costs are markedly higher. Even when deliveries occur in public health institutions, many households seek antenatal services from private providers due to the unavailability or perceived inadequacy of certain diagnostic services, specialist consultations, or medicines in the public sector. This fragmented care pathway, combining public and private services, compounds the financial burden. As a result, households are often forced to struggle to finance these expenses, sometimes resorting to borrowing, asset sales, or foregoing other essential expenditures, as reported in previous Indian studies (MoSPI, 2017). These findings highlight the persistent gaps in comprehensive maternal health coverage even in states with relatively strong health systems like Tamil Nadu.

Socioeconomic characteristics of household:

Low per capita income, larger household size, priority household status, and a greater burden of illness within the family emerged as key determinants of higher healthcare spending. In the study area, approximately 63 percentage of households held priority ration cards, indicating lower socioeconomic status. Households with priority cards were significantly more likely to experience catastrophic health expenditure (CHE), aligning with findings from Tamil Nadu, (Reshmi et al., 2021) observed that although government subsidies exist, they often fail to fully cover the costs of long-term or complex care, compelling households to seek private services and absorb high out-of-pocket payments. Larger household size also increased the likelihood of catastrophic health spending, a trend reported in other studies, where each additional household member added to the financial strain, particularly when combined with higher dependency ratios (Azzani et al., 2019).

When stratified by income levels, a clear inequity pattern was evident. Households with lower per capita income spent less on healthcare in absolute monetary terms but were 2.2 times more likely to experience CHE compared to higher-income households. This finding reflects the well-documented phenomenon where even modest health expenses can overwhelm poorer families, pushing them into financial distress (Parmar et al., 2023). National-level analyses similarly demonstrate that India's lowest income quintiles bear a disproportionate burden of catastrophic health spending despite lower absolute health expenditure, highlighting persistent health financing inequities.

In the context of Ariyalur district, where a majority of the population is engaged in the unorganized sector with unstable and irregular income sources (Report on District Level Estimates for the State of Tamil Nadu 2013-14), the vulnerability to health-related financial shocks is further intensified. Households with fluctuating earnings are less able to absorb unexpected healthcare costs, reinforcing the cycle of poverty and financial insecurity when faced with illness.

Disease burden of Households:

The presence of multiple health conditions within households was a significant driver of increased healthcare expenditure. In Tamil Nadu, where the prevalence of lifestyle-related and chronic diseases is steadily rising, the financial burden on families has become particularly acute. In the present study, 45 percentage of households reported managing multiple concurrent health problems, a factor that substantially contributed to heightened financial stress. These findings are consistent with broader evidence indicating that multimorbidity leads to greater healthcare utilization, higher out-of-pocket expenditure, and an increased risk of catastrophic health spending (Shukla et al., 2025). A growing body of research from India suggests that households with members suffering from more than

one chronic illness face nearly double the risk of catastrophic expenditure compared to households without multimorbidity (Bhojani et al., 2012; Kastor and Mohanty, 2018). Multimorbidity not only raises direct costs for consultations, diagnostics, and medications but also imposes indirect costs through income loss and caregiver burden.

5.2.2. COMMUNITY LEVEL

Healthcare-seeking behaviour within the community emerged as a significant contributor to the financial burden faced by households. The study revealed a strong preference for private healthcare providers, with 62 percentage of hospitalizations and 63 percentage of outpatient consultations occurring in private facilities. Notably, 65 percentage of hospitalizations took place in paid general wards rather than utilizing free public services.

The study findings indicate that each inpatient visit substantially increases both out-of-pocket expenditure (OOPE) and the risk of catastrophic health expenditure (CHE) for households. This observation is supported by a recent analysis showing that nearly one-fourth of Indian households experience catastrophic spending related to inpatient services, highlighting the severe financial strain associated with hospital admissions (Rout, 2025).

Despite the availability of free or subsidized government healthcare, the community's preference for private services remained strong across both inpatient and outpatient care. These patterns suggest that perceptions of better quality, greater accessibility, or higher trust in private providers may be key factors influencing healthcare choices. However, reliance on private care comes with significant financial consequences, leading to increased OOPE and a greater likelihood of CHE.

Moreover, the study found that although most healthcare utilization occurred within the same district, suggesting reasonable physical access to services, the preference for costlier private care reflected that perceived service quality, rather than geographic proximity

alone, strongly shaped healthcare-seeking behaviour. Community norms and expectations around healthcare quality appeared to influence decision-making, further contributing to the financial burden observed.

This trend is consistent with national patterns, where use of private sector services has been strongly linked to higher household spending. National data also show that households with any member hospitalized in a private facility are significantly more likely to experience catastrophic health spending (Sriram et al., 2024).

This situation reflects not only weaknesses in public health infrastructure but also the broader influence of commercial determinants of health (Lacy-Nichols et al., 2023). The growing role of the private healthcare market - driven by profit motives, aggressive marketing, and the perception of superior service quality - shapes healthcare-seeking behaviour. Communities are increasingly exposed to private providers as the default option, even for essential health services that ideally should be available publicly. This expansion of the private sector, often unchecked, creates an environment where individuals are nudged toward higher spending on health, regardless of their financial capacity.

5.2.3. INSTITUTIONAL LEVEL

Although a large proportion of individuals reported being covered under government-sponsored insurance schemes, actual utilization of insurance for healthcare expenses remained low, at approximately 5 percentage. This finding aligns with earlier studies from Tamil Nadu, which similarly reported limited uptake of insurance benefits despite widespread enrolment (Reshmi et al., 2021). The low utilization rates point to systemic gaps at the institutional level in delivering effective financial risk protection to households.

Existing research has consistently shown that mere enrolment in public insurance schemes does not necessarily translate into reduced out-of-pocket expenditure (OOPE) for inpatient

care. (Sriram et al., 2024) demonstrated that coverage under government schemes did not significantly lower OOPe among insured households. Furthermore, households with insurance coverage were found to be no less likely to incur catastrophic health expenditure (CHE), as noted by (Mohanty et al., 2022), highlighting that insurance enrolment alone is insufficient for financial protection unless supported by accessible and affordable healthcare services.

Further, the study findings suggest that households were often compelled to seek care from private providers due to the inadequacy of primary care service in public facility, particularly in the management of chronic diseases and provision of comprehensive prenatal care. Even when financial resources were constrained, the limited availability of specialized care and diagnostic services in the public sector forced families to rely on more expensive private healthcare options. Similar patterns have been observed across Tamil Nadu, where studies by (Kastor and Mohanty, 2018; Prinja et al., 2012) emphasized that shortcomings in public sector capacity lead to higher dependency on private providers, thus increasing household healthcare expenditure. These observations highlight that expanding insurance coverage must go hand-in-hand with strengthening primary care to ensure real financial risk protection for vulnerable households.

5.2.4. ENVIRONMENTAL LEVEL

Nearly half of the households surveyed perceived environmental pollution as a significant health concern. This community perception aligns with existing studies indicating that particulate matter concentrations in Ariyalur, driven predominantly by industrial activities such as cement manufacturing and mining, frequently exceed national and international safety standards (Etim et al., 2021; Purushothaman et al., 2020). Prolonged exposure to such environmental degradation poses substantial health risks, particularly through air and water pollution pathways, contributing to the burden of chronic diseases.

The study further observed that pollution-related illnesses - including chronic obstructive pulmonary disease (COPD), asthma, chronic kidney disease (CKD), renal calculi, and allergic disorders - were associated with significantly higher household healthcare expenditures. These findings are consistent with broader evidence showing that environmental exposures substantially elevate the risk of chronic respiratory and renal conditions, thereby increasing direct medical costs and the likelihood of catastrophic health expenditure (Balakrishnan et al., 2018). For instance, the India State-Level Disease Burden Initiative has documented a strong correlation between air pollution exposure and the rising incidence of COPD and CKD, particularly in industrially active regions.

Additionally, the clustering of diseases such as CKD and renal calculi in specific localities within the study area suggests localized environmental degradation, reinforcing concerns about geographic disparities in environmental health risks (Kumar et al., 2022). These findings highlight the urgent need for targeted environmental health interventions and stricter regulation of industrial emissions to mitigate the long-term public health and financial consequences for vulnerable communities.

5.3. STRENGTHS OF STUDY

The study had several notable strengths that enhance the credibility and relevance of its findings.

First, the use of a random sampling method strengthens the generalizability of the results to the broader population.

Second, careful methodological consideration was given to the treatment of healthcare expenditure data. Since out-of-pocket expenditure (OOPE) is a continuous variable and exhibited right-skewed distribution, a log transformation was applied prior to linear regression analysis. This approach preserved the continuous nature of the variable,

improved the normality of residuals, and enhanced the accuracy of the regression estimates without dichotomizing expenditure into arbitrary categories. Close attention paid to ensuring that model assumptions were met, further contributing to the validity of the findings. The use of log-transformation facilitated more accurate modelling of skewed OOOPE data and allowed for interpretation of effects in relative (percentage) rather than absolute terms, which are often more meaningful in health expenditure studies. Similar strategies are commonly recommended in health economics research, where log-transformed models are often used to address skewness and produce more interpretable and robust results (Manning and Mullahy, 2001).

Third, wherever available, medical bills were cross verified with participants' reports to improve the accuracy and reliability of healthcare expenditure data.

Finally, the study tried to explore the linkage between environmental pollution and healthcare expenditure, adding depth to the analysis and expanding its significance beyond traditional health economic assessments. Both direct and indirect healthcare costs were systematically captured, providing a comprehensive understanding of the financial burden faced by households.

5.4. LIMITATIONS OF STUDY

Despite several methodological strengths, the study also had some limitations. Although efforts were made to minimize recall bias by restricting the recall period to one year for inpatient services and one month for outpatient care, there remains a possibility of over- or underestimation in the self-reported healthcare expenditure data. Furthermore, as all expenditure information was based on self-reporting, there is a reporting bias, which may have influenced the accuracy of the cost estimates. It can be noted that these are inherent in expenditure studies.

Moreover, data collection occurred shortly after the monsoon season, a period typically associated with a higher incidence of respiratory illnesses (Singh et al., 2020), which might have influenced outpatient expenditure to some extent. However, this seasonal effect is unlikely to have heavily biased the findings, as the expenditure data reflect an average over a one-year period.

To address the right-skewed distribution of out-of-pocket expenditure (OOPE), a log transformation of the outcome variable was employed, enabling more appropriate application of linear regression techniques. While this approach improved model fit and helped meet key regression assumptions, interpreting results on the log scale presents certain challenges. Although expressing findings as percentage changes offers a more intuitive understanding than interpreting raw log coefficients, it assumes constant relative changes across the range of predictor variables — an assumption that may not always hold true in real-world settings. Additionally, the back-transformation of logged outcomes may not fully capture variability at the extremes of healthcare expenditures, potentially leading to some loss of nuance.

Future research could consider employing complementary modelling strategies, such as generalized linear models (GLMs) with a gamma distribution and a log-link function, which allow for the direct modelling of skewed cost data without the need for transformation. These approaches may better accommodate the inherent distribution of healthcare expenditure data while providing more straightforward interpretations of model outputs.

5.5. RECOMMENDATIONS

Strengthen Primary Healthcare Services: Strengthening primary healthcare can reduce the financial burden on households by minimizing their reliance on more expensive private healthcare services.

Target Vulnerable Populations: It seems the economically vulnerable population is disproportionately affected with increased OOPE and CHE. There should be some programs for targeting the vulnerable populations, especially households having elderly people, under-five children, etc. Additionally, strengthening initiatives like the Integrated Programme for Senior Citizens can enhance access to free or subsidized healthcare for the elderly, addressing the needs of a growing vulnerable population.

Mitigate Environmental Risks: Environmental pollutants add to the morbidity and associated economic burden, as seen with water borne diseases in the study. It would be better to have comprehensive effluent treatment facilities for industries in places like the study area.

5.6. CONCLUSION

This study highlights that healthcare expenditure and financial vulnerability in Ariyalur district are shaped by a complex interplay of household, community, institutional, and environmental factors. High rates of out-of-pocket spending and catastrophic health expenditure were observed, particularly among households with vulnerable groups, chronic disease burdens, and reliance on private healthcare. Despite public insurance coverage, financial protection remains inadequate. Environmental pollution further exacerbates health risks and related expenditure. Strengthening primary care, improving public health services, and mitigating environmental hazards are critical to advancing health equity to achieve Universal Health Coverage.

BIBLIOGRAPHY

- Anjana RM, Unnikrishnan R, Deepa M, et al. (2023) Metabolic non-communicable disease health report of India: the ICMR-INDIAB national cross-sectional study (ICMR-INDIAB-17). *The Lancet Diabetes & Endocrinology* 11(7). Elsevier: 474–489.
- Azzani M, Roslani AC and Su TT (2019) Determinants of Household Catastrophic Health Expenditure: A Systematic Review. *The Malaysian Journal of Medical Sciences : MJMS* 26(1): 15–43.
- Balakrishnan K, Ghosh S, Thangavel G, et al. (2018) Exposures to fine particulate matter (PM_{2.5}) and birthweight in a rural-urban, mother-child cohort in Tamil Nadu, India. *Environmental Research* 161: 524–531.
- Berman AE (PDF) Impoverishment Due to Out-of-pocket Health Expenditures: Measurement and Comparison Across Different Surveys in India. *ResearchGate*. DOI: 10.1177/0973703019872360.
- Bhojani U, Thriveni B, Devadasan R, et al. (2012) Out-of-pocket healthcare payments on chronic conditions impoverish urban poor in Bangalore, India. *BMC Public Health* 12(1): 990.
- Bleakley H (2010) Health, Human Capital, and Development. *Annual review of economics* 2: 283–310.
- Bloom DE, Canning D and Sevilla J (2004) The Effect of Health on Economic Growth: A Production Function Approach. *World Development* 32(1): 1–13.
- CBHI 2024 (2024) National Health Profile 2023. Available at: https://cbhidghs.mohfw.gov.in/WriteReadData/1892s/Final_Central%20Bureau%20of%20Health%20Intelligence%20July%202024.pdf.
- Chowdhury S, Gupta I, Trivedi M, et al. (2018) Inequity & burden of out-of-pocket health spending: District level evidences from India. *Indian Journal of Medical Research* 148(2): 180.
- Collaborators IS-LDBIAP (2020) Health and economic impact of air pollution in the states of India: the Global Burden of Disease Study 2019. *The Lancet. Planetary Health* 5(1): e25.
- Drèze AD and J and Drèze J (2002) *Poverty and Inequality in India: A Reexamination*. Working papers 107, Working paper, August. Centre for Development Economics, Delhi School of Economics. Available at: <https://EconPapers.repec.org/RePEc:cde:cdewps:107> (accessed 29 April 2025).
- Etim M-A, Babaremu K, Lazarus J, et al. (2021) Health Risk and Environmental Assessment of Cement Production in Nigeria. *Atmosphere* 12(9). 9. Multidisciplinary Digital Publishing Institute: 1111.

- Gaddam R and Rao KR (2023) Incidence, Inequality and Determinants of Catastrophic Health Expenditure in India. *Journal of Health Management* 25(1). SAGE Publications India: 30–39.
- Ghosh P, Sadhukhan SK, Dasgupta A, et al. (2023) Scourge of out-of-pocket expenditure on health: A study on its burden and predictors in a rural community of West Bengal. *Journal of Family Medicine and Primary Care* 12(8): 1576–1581.
- Gupta S, Lukhmana S, Dhandapani G, et al. (2024) Out-of-pocket expenditure for antenatal care among women in a tertiary care hospital - A cross-sectional study. *Current Medicine Research and Practice* 14(2): 63.
- Hooda SK (2020) Health System in Transition in India: Journey from State Provisioning to Privatization. *World Review of Political Economy* 11. Pluto Journals: 506–532.
- Iuliana- Claudia M (2019) Health State of Human Capital in the Economic Theory. *Postmodern Openings* 10: 182–192.
- Jamison DT, Summers LH, Alleyne G, et al. (2013) Global health 2035: a world converging within a generation. *The Lancet* 382(9908). Elsevier: 1898–1955.
- Kastor A and Mohanty SK (2018) Disease-specific out-of-pocket and catastrophic health expenditure on hospitalization in India: Do Indian households face distress health financing? *PLoS ONE* 13(5). San Francisco: Public Library Science: e0196106.
- Kickbusch I, Allen L and Franz C (2016) The commercial determinants of health. *The Lancet. Global Health* 4(12): e895–e896.
- Krishnamoorthy Y, Rajaa S, Sinha I, et al. (2023) Equity and extent of financial risk protection indicators during COVID-19 pandemic in rural part of Tamil Nadu, India. *Heliyon* 9(8). Elsevier.
- Kumar E, Subramani T, Li P, et al. (2022) Quantification of health and environmental risks due to radionuclides in limestone mining regions of Ariyalur, South India. *Human and Ecological Risk Assessment: An International Journal* 28(2): 243–264.
- Lacy-Nichols J, Nandi S, Mialon M, et al. (2023) Conceptualising commercial entities in public health: beyond unhealthy commodities and transnational corporations. *The Lancet* 401(10383): 1214–1228.
- Manning WG and Mullahy J (2001) Estimating log models: to transform or not to transform? *Journal of Health Economics* 20(4): 461–494.
- Mohanty SK, Ladusingh L, Kastor A, et al. (2016) Pattern, growth and determinant of household health spending in India, 1993–2012. *Journal of Public Health* 24(3): 215–229.
- Mohanty SK, Sahoo U and Rashmi R (2022) Old-age dependency and catastrophic health expenditure: Evidence from Longitudinal Ageing Study in India. *The International Journal of Health Planning and Management* 37(6): 3148–3171.

- MoHFW National Family Health Survey (NFHS-5) 2019 - 2020. Available at:
https://mohfw.gov.in/sites/default/files/NFHS-5_Phase-II_0.pdf.
- MoSPI (2017) Key Indicator of Social Consumption of India: Health. Available at:
https://www.mospi.gov.in/sites/default/files/publication_reports/KI_Health_75th_Final.pdf.
- Mushkin SJ (1962) Health as an Investment. *Journal of Political Economy* 70(5, Part 2): 129–157.
- NHA 2024 (2024) National Health Account Estimate for India, 2021 - 2022. Available at:
https://cbhidghs.mohfw.gov.in/WriteReadData/1892s/Final_Central%20Bureau%20of%20Health%20Intelligence%20July%202024.pdf.
- NHSRC (2024) National Health Account Estimate for India 2021 - 2022.
- Open Knowledge Repository . Available at:
<https://openknowledge.worldbank.org/entities/publication/a1ea8fbb-2dfb-528e-abc6-6caf4425e9bf> (accessed 29 April 2025).
- Pandey A, Kumar GA, Dandona R, et al. (2018) Variations in catastrophic health expenditure across the states of India: 2004 to 2014. *PLoS ONE* 13(10): e0205510.
- Parmar D, Strupat C, Srivastava S, et al. (2023) Effects of the Indian National Health Insurance Scheme (PM-JAY) on Hospitalizations, Out-of-pocket Expenditures and Catastrophic Expenditures. *Health Systems & Reform* 9(1). Taylor & Francis: 2227430.
- Prinja S, Kaur M and Kumar R (2012) Universal Health Insurance in India: Ensuring Equity, Efficiency, and Quality. *Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine* 37(3): 142–149.
- Public health and environment. Available at:
<https://www.who.int/data/gho/data/themes/public-health-and-environment> (accessed 29 April 2025).
- Purushothaman SK, Selvam J and Muthunarayanan V (2020) A STUDY ON ENVIRONMENTAL AND SOCIO-ECONOMIC ANALYSIS OF ARIYALUR CEMENT CITY, TAMILNADU, INDIA. *PalArch's Journal of Archaeology of Egypt / Egyptology* 17(12). 12: 1147–1162.
- Report on District Level Estimates for the State of Tamil Nadu 2013-14.
- Reshmi B, Unnikrishnan B, Rajwar E, et al. (2021) Impact of public-funded health insurances in India on health care utilisation and financial risk protection: a systematic review. *BMJ Open* 11(12): e050077.
- Rout HS, Catastrophic health expenditure of inpatients in emerging economies: evidence from the Indian subcontinent | Health Research Policy and Systems | Full Text. Available at: <https://health-policy->

systems.biomedcentral.com/articles/10.1186/s12961-024-01202-x (accessed 27 April 2025).

- Sharma S, Verma PB, Viramgami AP, et al. (2018) Analysis of Out-of-Pocket Expenditure in Utilization of Maternity Care Services in Urban Slums of Rajkot City, Gujarat. *Indian Journal of Community Medicine : Official Publication of Indian Association of Preventive & Social Medicine* 43(3): 215–219.
- Shukla SK, John P, Khemani S, et al. (2025) Assessing the financial burden of multimorbidity among patients aged 30 and above in India. *BMC Health Services Research* 25: 86.
- Sivarchaka O and Mamgain H (2024) Transforming Lives Through Ayushman Bharat Pradhan Mantri Jan Arogya Yojana (ABPMJAY): A Review. *NATIONAL BOARD OF EXAMINATIONS JOURNAL OF MEDICAL SCIENCES* 2(7): 730–742.
- Sriram S, Verma VR, Gollapalli PK, et al. (2024) Decomposing the inequalities in the catastrophic health expenditures on the hospitalization in India: empirical evidence from national sample survey data. *Frontiers in Public Health* 12. Frontiers.
- TOI (2021) Burden of pollution on India's healthcare bill. *The Times of India*, 22 November. Available at: <https://timesofindia.indiatimes.com/india/12bn-burden-of-pollution-on-indias-healthcare-bill/articleshow/87846584.cms> (accessed 9 November 2024).
- Wagstaff A (2002) Poverty and health sector inequalities. *Bulletin of the World Health Organization* 80(2): 97–105.
- Wagstaff A, Flores G, Hsu J, et al. (2018) Progress on catastrophic health spending in 133 countries: a retrospective observational study. *The Lancet Global Health* 6(2): e169–e179.
- WHO 2024 (2024) *Global spending on health Emerging from the pandemic*. Available at: <https://www.who.int/publications/i/item/9789240104495>.
- World Health Organization (2010a) A conceptual framework for action on the social determinants of health. Discussion Paper Series on Social Determinants of Health, 2. Geneva: World Health Organization: 76.
- World Health Organization (2010b) The world health report: health systems financing: the path to universal coverage. *Rapport sur la santé dans le monde : le financement des systèmes de santé : le chemin vers une couverture universelle*. Geneva: World Health Organization. Epub ahead of print 2010.
- Xu K, Evans DB, Kawabata K, et al. (2003) Household catastrophic health expenditure: a multicountry analysis. *The Lancet* 362(9378): 111–117.
- Yadav J, Menon GR and John D (2021) Disease-Specific Out-of-Pocket Payments, Catastrophic Health Expenditure and Impoverishment Effects in India: An Analysis of National Health Survey Data. *Applied Health Economics and Health Policy* 19(5): 769–782.

ANNEXURE I

PARTICIPANT INFORMATION SHEET – ENGLISH

Study Title:

A study on pattern of household health expenditure among residents in Ariyalur district, Tamil Nadu

Greetings! I am Dr Vaishnavi D, currently pursuing Master of Public Health (MPH) at Achutha Menon Centre for Health Science Studies (AMCHSS), Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum, Kerala. This study is being carried out as part of the academic requirement which I am currently undertaking.

This study is being done under the supervision of Dr Biju Soman, Professor and HOD at AMCHSS. If this information sheet contains any words or information that you do not understand, please feel free to clarify. You may also ask any questions related to this study.

Purpose Of the Study:

The study is being carried out to estimate the expenses related to healthcare in comparison to household consumption expenditure. In addition, community's perception on local environmental pollution due to nearby cement factory/mining area and expenses involved in adaptation strategies for protection of health will be studied.

Procedure:

The survey will take approximately 30-45 minutes of your time. You will be asked questions about your socio-demographic profile, socio-economic profile, and medical conditions. You will be asked questions on the expenses that you incurred both for the hospitalization preceding 1 year as well as for the outpatient visit in the past 30 days, details about how you financed your treatment and the effect of these expenses on household consumption. You will also be asked questions regarding your total monthly income and general household expenses over the past one year to serve as a comparison. As cement factories/mining areas are present in Ariyalur, you will also be asked about adaptation strategies undertaken and cost involved in such actions to manage pollution. If you find anything difficult to understand, you may stop me in between, and I could take time to

clarify your doubts before moving ahead. I may contact you again if there are any clarifications from the collected information.

Risk and Discomfort:

Participation in this study poses no risk to your health. However, you would be asked questions that you may find personal in nature. I do not foresee any other risk.

Benefit:

There may not be any direct benefit for you from this study. Your contributions, however, will provide valuable insights into educational experiences and help in assessing the financial burden on our households due to pollution impact and health related expenditure for protecting health. This would enable to make specific and potentially beneficial recommendations to the authorities.

Confidentiality:

You will be interviewed in private. All information related to you will be kept confidential and at no stage will your identity be revealed. An identification number will be assigned to each household which will help in maintaining the confidentiality of the data collected. Access to this identification number will be restricted to those analysing the data only.

Voluntary Participation:

Your participation in this study is purely voluntary, which means you can decide whether to participate in the study or not. If at any stage you wish to discontinue, you are free to do so without any adverse consequences.

Funding: I am doing this research at my own expense.

Contact Information:

If you have any questions, or concerns, or require further information about the study, please feel free to contact any of them given below.

Principal Investigator:

Dr Vaishnavi D

MPH Student

AMCHSS, SCTIMST,

Medical College (PO),

Thiruvananthapuram-11

Email ID: vaishnavidev07@sctimst.ac.in

Mobile: +91 7010268570

Guide:

Dr Biju Soman

Professor and HOD

AMCHSS, SCTIMST,

Medical College (PO),

Thiruvananthapuram-11

Email ID: bijusoman@sctimst.ac.in

Office: 0471 2524230

Member Secretary:

Dr Srinivas G

Institutional Ethics Committee

SCTIMST, Trivandrum- 695011

Office: 04712524689

E mail: iec.mem.sec@sctimst.ac.in

Thank you for considering participation in this study.

Sincerely,

Dr. Vaishnavi D

ANNEXURE II
INFORMED CONSENT – ENGLISH

I have been invited to participate in the study titled “A study on pattern of household health expenditure among residents in Ariyalur district, Tamil Nadu”

I have read the information provided about the study, or it has been explained to me, and I have had the opportunity to ask any questions. All my questions have been answered to my satisfaction. I am aware that my participation is voluntary in this study. By consenting to this study, I permit the researcher to contact me for further details if needed for a later part of the study. I also understand that my personal information will be kept confidential, and I have the right to withdraw my consent at any time. I have been informed who should be contacted if the need arises.

Respondent's Signature / Thumb Impression

Respondent's Name:

Date:

Interviewer's Signature:

Interviewer's Name:

Date:

ANNEXURE III

INTERVIEW SCHEDULE – ENGLISH

- | | Yes | No |
|---|-----|----|
| 1) Informed consent obtained?
(If No end the survey) | | |
| 2) Unique ID of household | | |
| 3) Date of interview | | |

SECTION 1

A) HOUSEHOLD CHARACTERISTICS

Sl.no	Question	Response
hh01	Address	
hh02	Location	Rural Urban
hh03	Contact details	
hh04	Social group	OBC SC ST Others
hh05	Total number of members in the household	
Hh06	Is there anyone under 5 years of age?	No Yes (yes, if value is <5 in fm02)
Hh07	Is there anyone above 60 years of age?	No Yes (yes, if value is >60 in fm02)
Hh08	Is there anyone pregnant women?	No Yes (yes, if yes in fm05)
Hh09	Is there anyone with disability?	No Yes
Hh10	Type of household	Nuclear family Joint family Single-parent household Other
Hh11	Type of ration card	Antodaya card BPL card

		APL card No card
Hh12	Major source of water	Piped water in dwelling Piped water outside Protected well House installed RO plant Community RO plant Tanker/truck Pond/spring for drinking Other, specify
hh13	Major source of cooking fuel	Firewood LPG Other natural gas Dung cake Kerosene Charcoal Electric powered Other (specify) No cooking arrangement

B) DETAILS OF MEMBERS IN THE HOUSEHOLD:

(added sheet for each member)

Sl.no	Question	Response
fm01	MEMBER ID	
fm02	Age (completed years/in months)	
fm03	Gender	Male Female Third gender Refuse to reply (if female, go to fm05)
fm04	Living status	Alive Dead (if dead, go to fm17)
fm05	Is the women pregnant? (age between 15-49)	No Yes (if yes, go to pg01) Not applicable
fm06	Whether immunization received?	No Yes

		(if yes, go to vc01) Not applicable
Fm07	Head of HH/ relationship with the head of the HH	HH head Spouse Son/Daughter Father/Mother Other
Fm08	Marital status	Never married Divorce Widow/Widower Currently married Living with partner
Fm09	Education	No education Know how to sign Informal education Primary -Up to 5 th Middle -Up to 8 th Secondary -Up to 10 th Higher secondary -Up to 12 th Graduate/ postgraduate Other
fm10	Occupation	Unemployed Daily wage Mine worker Factory worker Farmer Retired Home maker Student Self-employed Private Government Others
fm11	Is the person earner of the household?	No Yes (if yes, go to fm12)
Fm12	Monthly income (1 year)	(Response * 12)
fm13	Tobacco usage	No Yes
fm14	Alcohol drinking status	Non-alcoholic Alcoholic

fm15	Money spent on tobacco, alcohol purchase	(per month)
fm16	Money spent on grooming, spa, fitness, hygiene products etc.	(per month)
fm17	Have you ever been today by the health worker/doctor that you have any of the following? (multiple response)	Hypertension Type 2 Diabetes Dyslipidemia Anemia COPD/asthma Chronic kidney disease Renal calculus Coronary heart disease Arthritis Stroke Cancer Cataract Thyroid disorder Allergy (rhinitis, skin) PCOS Tuberculosis Filariasis HIV/AIDS Others chronic condition (specify) None (if none, go to fm22)
Fm18	Time since you have diagnosed with above mentioned condition	
Fm19	Whether medical attention received?	No Yes (if no, go to fm20)
Fm20	Reason for not seeking treatment/medical advice	No facility available Too expensive Fear of losing wages Not considered serious Religious belief Other (specify)
Fm21	Money spent on medication and routine check up (in the last 1 month)	
Fm22	Have you enrolled in any health insurance scheme?	No Yes (if yes, go to fm23)
Fm23	Type of health insurance	No insurance PMJAY

		State health insurance Private premium ESI/CGHS/ECHS Other(specify)
fm24	Whether hospitalized in the last 1 year?	No Yes (if yes, go to ip01)
Fm25	Whether had any ailments during the last 1 month?	No Yes (if yes, go to op01)

C) INCOME OF HOUSEHOLD

Sl.no	Question	Response
inc1	Total income earned by members (1year)	
Inc2	Other income, if any (1year)	
Inc3	Total income of household	Inc1+inc2
Inc4	Socioeconomic status Modified BG Prasad scale revised for 2024	Inc3/hh5 Upper Upper middle Middle Lower middle Lower

SECTION 2:

D) HOSPITALIZATION – INPATIENT IN LAST 1 YEAR

Sl.no	Question	Response
Ip01	How many times hospitalized in the last 1 year?	
ip01	Reason for hospitalization	
ip02	Duration of stay	
ip03	Nature of treatment	Allopathy AYUSH Both Other (specify)

ip04	Type of hospital	Government Private Charity/Trust ESIS Other (specify) (if government, go to ip05) (if private, go to ip06)
ip05	Level of care (if govt.)	PHC CHC Secondary hospital Tertiary hospital
ip06	Level of care (if private)	Graduate doctor Specialist Super specialist
ip07	Type of ward	Free Paid General Paid special
ip08	Place of hospitalization	Same district Different district in same state Different state

E) HOSPITALIZATION EXPENSE INCURRED IN LAST 1 YEAR

Sl.no	Question	Response
ipc01	Whether package component	No Yes (if yes, go to ipc02)
ipc02	Total package amount	
Non package component breakdown		
ipc03	Hospital admission charges	
ipc04	Surgeon/ Doctors fee	
ipc05	Bed charges	
ipc06	Surgery, operation theatre and related expense	

ipc07	Medicine from hospital pharmacy	
ipc08	Medicine from pharmacy outside hospital	
ipc09	Investigation (X-ray, ECG, EEG, biochemical assay etc.)	
Ipc10	Medical appliance/aid charge (includes physiotherapy, blood, oxygen etc)	
ipc11	Ambulance / Transport charges i) Home to hospital ii) Hospital to home	
ipc12	Food expense	
ipc13	Other expense (specify)	
ipc14	Did an attendant stay with you in hospital?	No Yes (if yes, go to ipc14)
ipc15	Cost of attendees' stay (food, transport, accommodation)	
ipc16	Time taken to reach hospital	
ipc17	Distance from home to hospital	
Ipc18	Total amount reimbursed, if any	
Ipc19	After hospitalization have you visited a health facility/doctor?	No Yes (if yes, go to ipc19)
Ipc20	Did anyone accompany you to visit	No Yes
Ipc21	Total expense related to visit	
ipc22	Total expense incurred for hospitalization during the last 1 year	

F) OP VISITS DURING THE LAST 1 MONTH

Sl.no	Question	Response
op01	Ailment occurred	
op02	Whether sought medical advice/treatment?	No Yes

		(if no, go to op03)
op03	Reason for not seeking treatment/medical advice	No facility available Too expensive Fear of losing wages Not considered serious Religious belief Other (specify)
Op04	How many times visited OP consultation in the last 1 month?	
op05	Whom consulted	Healthcare worker/ doctor Self/ another household member Friend Medical shop Other (specify)
op06	Total duration of ailment	
op07	Nature of treatment	Allopathy AYUSH Both Other (specify)
op08	Type of hospital	Government Private Charity/Trust ESIS Other (specify) (if government, go to op09) (if private, go to op10)
op09	Level of care (if govt.)	PHC CHC Secondary hospital Tertiary hospital
op10	Level of care (if private)	Graduate doctor Specialist Super specialist
op11	Place of visit	Same district Different district in same state Different state

G) EXPENSE INCURRED FOR OP VISITS DURING THE LAST 1 MONTH

Sl.no	Question	Response
opc01	Doctor's fee	
opc02	Registration fee	
opc03	Medicine from hospital pharmacy	
opc04	Medicine from pharmacy outside hospital	
opc05	Investigation (X-ray, ECG, EEG, biochemical assay etc.)	
opc06	Ambulance / Transport charges i) Home to hospital ii) Hospital to home	
opc07	Medical appliance/aid charge (includes physiotherapy, blood, oxygen etc.)	
opc08	Food expense	
opc09	Other expense (specify)	
opc10	Did an attendant accompany you to the hospital?	No Yes (if yes, go to opc11)
opc11	Cost of attendants (food, transport)	
opc12	Time taken to reach hospital	
opc13	Distance from home to hospital	
opc14	Amount reimbursed by insurance, if any?	
opc15	Total expense for op visit in the last 30 days	

H) PREGNANCY AND CHILDBIRTH RELATED EXPENSE

Sl.no	Question	Response
pg01	No. of pregnancy	
	Prenatal	

pg02	Prenatal, Whether received tetanus toxoid?	No Yes
pg03	Prenatal, Major source of care	HSC/ANM/ASHA/AWW -0 PHC/dispensary/CHC/mobile medical unit -1 govt./ public hospital -2 charitable/trust/NGO run hospital -3 private hospital -4 private doctor/clinic -5 informal health care provider -6 no care was received -7
pg04	Prenatal, Nature of care	No 0 Allopathy 1 AYUSH 2 Both 3
pg05	No of prenatal visit	
pg06	Expenditure incurred for prenatal care	
Delivery		
pg07	Place of delivery/abortion	HSC -0 PHC/dispensary/CHC/mobile medical unit -1 govt./public hospital -2 charitable/trust/NGO run hospital -3 private hospital -4

		at home -5 Not applicable - 6
Pg08	Expenditure on delivery	
Postnatal		
Pg09	Postnatal, Major source of care	HSC/ANM/ASHA/AW W -0 PHC/dispensary/CHC/ mobile medical unit -1 govt./ public hospital -2 charitable/trust/NGO run hospital -3 private hospital -4 private doctor/clinic -5 informal health care provider -6 no care was received – 7 Not applicable - 8
Pg10	If postnatal, Nature of care	No 0 Allopathy 1 AYUSH 2 Both 3
pg11	No of visits	
pg12	Expenditure incurred for postnatal care	
Pg13	Total expenditure on pregnancy	

I) IMMUNIZATION EXPENSE

Sl.no	Question	Response
vc01	Immunization	
vc02	Vaccine obtained from	HSC/AWW - PHC/dispensary/CHC/mobile medical unit -1 govt./ public hospital -2 charitable/trust/NGO-run hospital -3 private hospital -4 private doctor/clinic -5 no vaccination -6
vc03	Expenditure on vaccination	

J) FINANCIAL OPTIONS EMPLOYED:
(if yes in fm19)

Sl.no	Question	Response
fp01	How did you pay for your treatment in the last one year? (all costs including hospitalization and non - hospitalization)? (Multiple answers)	Own savings Family members paid Employer paid Borrowed from friends, relatives, employers Borrowed from bank, moneylender Mortgaged jewellery Sold house, land, or other assets Health insurance Other (Specify

fp02	What were the changes you had to make in the household in the past 1 year, in relation to your health? (Multiple answers)	Extra domestic help Employment of Home nurse Change in Diet Purchase of any support devices Others (Specify)
fp03	Did you come across any rearrangement in household expenditure to meet these health expenses?	No Yes (If yes, go to fp04)
fp04	What were those rearrangements? (Multiple answers)	Reduced food expenditure Reduced investment in education Reduced expenditure on social activities Reduced medical expenses Reduced expenditure on utilities Reduced expenditure on daily goods Reduced expenditure on clothes Reduced expenditure on durable goods Reduction in other expenses (Specify)
fp05	Once a treatment option was advised, have you done any of the following due to inability to arrange finances?	Refused treatment Postponed a suggested option Chosen a less expensive alternative Others (specify)

K) INDIRECT COST INCURRED:
(if yes in fm 24 or fm 25)

Sl.no	Question	Response
ind01	In the last 1 year, has your job been affected because of these conditions?	Not affected Loss of job Change of job Promotion denied Relocated Others (specify) (if no, go to hhe01)
ind02	Have you resumed work after any acute event?	No Yes
ind03	Total number of days lost (without wages)	Hospitalization including medical leave in the last 1 year (Total) Episode 1 Episode 2 Episode 3 Follow up visits
ind04	Wages lost per day	
ind05	Total loss of income for the last 1 year	
ind06	Whether primary care giver is employed?	No Yes (if no, go to hhe01)
ind07	In the last 1 year, was their job affected because of these conditions?	Not affected Loss of job Change of job Promotion denied Relocated

		Others (specify) (if no, go to hhe01)
ind08	Have they resumed work after any acute event?	No Yes
ind09	Total number of days lost (without wages)	Hospitalization including medical leave in the last 1 year (Total) Episode 1 Episode 2 Episode 3 Follow up visits
ind10	Wages lost per day	
ind11	Total loss of income for the last 1 year	

SECTION 3

L) HOUSEHOLD EXPENDITURE:

Sl.no	Question	Response
hhe01	Food expenses: Rice, wheat, cereal, pulses, salt, sugar, oil, spice Milk, egg, meat, vegetables, fruits Beverage Processed food, packed food, others	
hhe02	Electricity, water, telephone	
hhe03	Transport	
hhe04	Education	

hhe05	Rent	
hhe06	Consumables, toiletries	
hhe07	Insurance premium	
hhe08	Donation/gifts	
hhe09	Household appliances	
hhe10	Personal goods like clothes, footwear, jewellery etc.	
hhe11	Reimbursement of loans	
hhe12	Fuel	
hhe13	Vehicle purchase	
hhe14	Repair and maintenance	
hhe15	Other, if any	

SECTION 4

M) PERCEPTION REGARDING LOCAL ENVIRONMENTAL POLLUTION, THEIR ADAPTATION STRATEGIES AND ITS RELATED EXPENDITURE:

- 1) Distance between house and nearest cement factory
- 2) Distance between house and nearest mining area
- 3) Impact of presence of cement industry

3.1) Positive impact

a) If positive, how does the presence of cement factory help you or your family?

b) If positive, how does the presence of cement factory help your community?

3.2) Negative impact

4) Impact of presence of mining area

4.1) Positive impact

a) If positive, how does the presence of mining area help you or your family?

b) If positive, how does the presence of mining area help your community?

4.2) Negative impact

5) Are you troubled by any form of pollution ?

a) No

b) Yes

6) What is/are the common form of pollution you experience ?

a) Air pollution

b) Water pollution

c) Land pollution

d) Noise pollution

7) What do you think are the effects of air pollution that you experience?

a) Reduced quality of air

b) House covered with dust settlement

c) Increased cost of maintenance

d) The area is not livable

e) Friends/ relatives are not visiting

f) Livelihood affected

g) Effects on the health of people

h) Other effect (specify)

8) What do you think are the effects of water pollution?

a) Reduced quality of water

b) Drinking water is affected by dust

c) Drinking water is affected by industrial effluent

d) Effects on the health of people

e) Ground water level is reduced

f) Other effect (specify)

9) How is your day-to-day activity affected by the presence of factory or mining area?

- a) Lack of peaceful atmosphere at home
- b) Difficulty in washing due to polluted water
- c) Increased frequency of hospital visit
- d) Reduced outdoor activity due to dust
- e) Fear of accidents due to congestion
- f) High frequency of sweeping home
- g) Other (specify)

10) Have you experienced any of the following during the last 30 days

- a) Eye irritation
- b) Skin irritation
- c) Allergic rhinitis
- d) Allergic skin disease
- e) Asthmatic episode
- f) Others, if any

11) What is the frequency of visit to hospital for the above mentioned condition?

- a) In the last 1 week
- b) In the last 15 days
- c) In the last 1 month
- d) In the last 1 year
- e) No visit to hospital

12) What steps have you taken to adapt with the pollution?

Sl. no	Measures	Options	Purchase cost	Maintenance cost
1	No measure	No Yes		
2	Reduce outdoor activity	No Yes		
3	Closed transport Example -Car	No Yes (if yes, what is the cost involved)		
4	Limit window opening	No Yes		
5	Wear mask	No Yes		

		(if yes, what is the cost involved)		
6	Wear sunglass	No Yes (if yes, what is the cost involved)		
7	Use air conditioning	No Yes (if yes, what is the cost involved)		
8	Using air purifier	No Yes (if yes, what is the cost involved)		
9	Temporarily leave the area	No Yes		
10	Use boiled water	No Yes		
11	Use water purifier	No Yes (if yes, what is the cost involved)		
12	House cleaning	No Yes (if yes, what is the cost involved)		
13	Other measure (specify)	No Yes (if yes, what is the cost involved)		

13) How do you cope with the effect of air pollution?

- a) Live with it
- b) Migrate to new area
- c) Complaint to concerned authority
- d) Protest
- e) Others (specify)

14) How do you cope with the effect of water pollution?

- a) Live with it
- b) Migrate to new area
- c) Complaint to concerned authority
- d) Protest
- e) Others (specify)

ANNEXURE IV

PARTICIPANT INFORMATION SHEET – TAMIL

பங்கேற்பாளர் தகவல் தாள்

ஆய்வுத் தலைப்பு:

தமிழ்நாட்டின் அரியலூர் மாவட்டத்தில் வசிப்பவர்களிடையே வீட்டு சுகாதார செலவினங்களின் முறை குறித்த ஆய்வு

வணக்கம்! நான் டாக்டர் வைஷ்ணவி தே, தற்போது அச்சுதா மேனன் சென்டர் ஃபார் ஹெல்த் சயின்ஸ் ஸ்டடிஸ் (AMCHSS), ஸ்ரீ சித்ரா திருநாள் இன்ஸ்டிடியூட் ஃபார் மெடிக்கல் சயின்ஸ் அண்ட் டெக்னாலஜி (SCTIMST), திருவனந்தபுரம், கேரளாவில் மாஸ்டர் ஆஃப் பப்ளிக் ஹெல்த் (MPH) படித்து வருகிறேன். நான் தற்போது மேற்கொண்டு வரும் MPH பட்டமேற்படிப்பின் ஒரு பகுதியாக இந்த ஆய்வு மேற்கொள்ளப்பட்டு வருகிறது.

இந்த ஆய்வு AMCHSS இன் பேராசிரியர் மற்றும் HOD டாக்டர் பிஜு சோமன் அவர்களின் மேற்பார்வையில் செய்யப்படுகிறது. இந்த தகவல் தாளில் உங்களுக்கு புரியாத ஏதேனும் சொற்கள் அல்லது தகவல்கள் இருந்தால், தயவுசெய்து இவற்றை என்னிடம் தயங்காமல் கேட்டு தெளிவுபடுத்திக் கொள்ளலாம். இந்த ஆய்வு தொடர்பான எந்த கேள்வியையும் நீங்கள் கேட்கலாம்.

ஆய்வின் நோக்கம்:

குடும்ப நுகர்வு செலவினங்களுடன் ஒப்பிடுகையில் சுகாதாரம் தொடர்பான செலவுகளை மதிப்பிடுவதற்காக இந்த ஆய்வு மேற்கொள்ளப்படுகிறது. மேலும், அருகிலுள்ள சிமெண்ட் தொழிற்சாலை / சுரங்கப் பகுதி காரணமாக உள்ளூர் சுற்றுச்சூழல் மாசுபாடு மற்றும் சுகாதார பாதுகாப்புக்கான தழுவல் உத்திகளில் சம்பந்தப்பட்ட செலவுகள் பற்றிய சமூகத்தின் கருத்து ஆய்வு செய்யப்படும்.

செயல்முறை:

இந்த சர்வே உங்கள் நேரத்தின் தோராயமாக 30-45 நிமிடங்கள் எடுக்கும். உங்கள் சமூக-மக்கள்தொகை விவரம், சமூக-பொருளாதார சுயவிவரம் மற்றும் உடல் ஆரோக்கிய நிலை ஆகியவை பற்றி உங்களிடம் கேள்விகள் கேட்கப்படும். முந்தைய ஆண்டுக்கான மருத்துவமனையில் சேர்க்கப்பட்டதற்கும் கடந்த 30 நாட்களில் வெளிநோயாளி வருகைக்கும் நீங்கள் செய்த செலவுகள், உங்கள் சிகிச்சைக்கு நீங்கள் எப்படி நிதியளித்தீர்கள் மற்றும் வீட்டு நுகர்வில் இந்த செலவுகளின் தாக்கம் ஆகியவை பற்றி உங்களிடம் கேள்விகள் கேட்கப்படும். ஒரு ஒப்பீடாக அமைய, கடந்த ஒரு வருடத்தில் உங்கள் மொத்த மாதாந்திர வருமானம் மற்றும் பொதுவான வீட்டுச் செலவுகள் தொடர்பான கேள்விகளும் உங்களிடம் கேட்கப்படும். அரியலூரில் சிமெண்ட் தொழிற்சாலைகள்/சுரங்கப் பகுதிகள் அதிகமாக இருப்பதால், மாசுபாட்டை நிர்வகிப்பதற்காக மேற்கொள்ளப்படும் தகவமைப்பு உத்திகள் மற்றும்

அத்தகைய நடவடிக்கைகளில் ஈடுபடும் செலவுகள் குறித்தும் உங்களிடம் கேட்கப்படும். நீங்கள் புரிந்து கொள்ள கடினமாக ஏதாவது கண்டால், நீங்கள் என்னை இடையில் நிறுத்தலாம். மேலே செல்வதற்கு முன் உங்கள் சந்தேகங்களை என்னிடம் தெளிவுபடுத்திக் கொள்ளலாம். சேகரிக்கப்பட்ட தகவல்களில் ஏதேனும் விளக்கங்கள் இருந்தால் நான் உங்களை மீண்டும் தொடர்பு கொள்ளலாம்.

ஆபத்து மற்றும் அசௌகரியம்:

இந்த ஆய்வில் பங்கேற்பதால் உங்கள் உடல்நலனுக்கு எந்த ஆபத்தும் ஏற்படாது. இருப்பினும், நீங்கள் தனிப்பட்ட முறையில் காணக்கூடிய கேள்விகள் உங்களிடம் கேட்கப்படும். வேறு எந்த ஆபத்து நேருவதற்கான வாய்ப்பு இல்லை என தெரிவித்துக்கொள்கிறேன்

ஊதியம்:

இந்த ஆய்வினால் உங்களுக்கு நேரடி நன்மை எதுவும் இல்லாமல் போகலாம். எவ்வாறாயினும், உங்கள் பங்களிப்புகள் கல்வி அனுபவங்களில் மதிப்புமிக்க நுண்ணறிவுகளை வழங்குவதோடு, மாசுபாட்டின் தாக்கம் மற்றும் ஆரோக்கியத்தைப் பாதுகாப்பதற்கான சுகாதாரம் தொடர்பான செலவினங்களால் குடும்பங்களின் நிதிச் சுமையை மதிப்பிடுவதற்கு உதவும். இது அதிகாரிகளுக்கு குறிப்பிட்ட மற்றும் சாத்தியமான நன்மை பயக்கும் பரிந்துரைகளை வழங்க உதவும்.

இரகசியத்தன்மை:

நீங்கள் தனிப்பட்ட முறையில் நேர்காணல் செய்யப்படுவீர்கள். உங்களைப் பற்றிய அனைத்து தகவல்களும் ரகசியமாக வைக்கப்படும், எந்த நிலையிலும் உங்கள் அடையாளம் வெளிப்படுத்தப்படாது. ஒவ்வொரு வீட்டிற்கும் ஒரு அடையாள எண் ஒதுக்கப்படும், இது சேகரிக்கப்பட்ட தரவின் ரகசியத்தன்மையைப் பராமரிக்க உதவும். இந்த அடையாள எண்ணுக்கான அணுகல் தரவைப் பகுப்பாய்வு செய்பவர்களுக்கு மட்டுமே கட்டுப்படுத்தப்படும்.

தன்னார்வ பங்கேற்பு:

இந்த ஆய்வில் உங்கள் பங்கேற்பு முற்றிலும் தன்னார்வத்திலானது, அதாவது ஆய்வில் பங்கேற்பதா இல்லையா என்பதை நீங்கள் முடிவு செய்யலாம். எந்த கட்டத்திலும் நீங்கள் நிறுத்த விரும்பினால், எந்தவிதமான பாதகமான விளைவுகளும் இல்லாமல் அவ்வாறு செய்ய உங்களுக்கு சுதந்திரம் உள்ளது.

நிதி: எனது சொந்த செலவில் இந்த ஆராய்ச்சியை செய்கிறேன்.

தொடர்பு தகவல்:

உங்களுக்கு ஏதேனும் கேள்விகள் அல்லது கவலைகள் இருந்தால், அல்லது ஆய்வு பற்றி மேலும் தகவல் தேவைப்பட்டால், என்னைத் தொடர்பு கொள்ளுங்கள், இந்த ஆய்வு பற்றிய

ஏதேனும் கேள்விகளுக்கு, SCTIMST இன் நிறுவன நெறிமுறைக் குழு (IEC) உறுப்பினர் செயலாளரை அணுகலாம்.

முதன்மை ஆய்வாளர்:

டாக்டர் வைஷ்ணவி தே

MPH மாணவர்,

AMCHSS, SCTIMST,

மருத்துவக் கல்லூரி (PO),

திருவானந்தப்-11

மின்னஞ்சல் முகவரி: vaishnavidev07@sctimst.ac.in

கைபேசி: +91 7010268570

வழிகாட்டி:

டாக்டர் பிஜு சோமன்

பேராசிரியர் மற்றும் HOD,

AMCHSS, SCTIMST,

மருத்துவக் கல்லூரி (PO),

திருவானந்தப்-11

மின்னஞ்சல் முகவரி: bijusoman@sctimst.ac.in

அலுவலகம்: 0471 2524230

உறுப்பினர் செயலாளர்:

டாக்டர் ஸ்ரீனிவாஸ் ஜி

நிறுவன நெறிமுறைக் குழு

SCTIMST, திருவனந்தபுரம் 695011

அலுவலகம்: 04712524689

மின்னஞ்சல்: iec.mem.sec@sctimst.ac.in

இந்த ஆய்வில் பங்கேற்பது குறித்து பரிசீலித்ததற்கு நன்றி.

உண்மையுள்ள,

டாக்டர் வைஷ்ணவி தே

ANNEXURE V
INFORMED CONSENT – TAMIL

ஒப்புதல் படிவம்

"தமிழ்நாட்டின் அரியலூர் மாவட்டத்தில் வசிப்பவர்களிடையே வீட்டு சுகாதார செலவினங்களின் முறை குறித்த ஆய்வு" என்ற ஆய்வில் பங்கேற்க நான் அழைக்கப்பட்டுள்ளேன்

ஆய்வைப் பற்றி வழங்கப்பட்ட தகவல்களை நான் படித்துள்ளேன் அல்லது இந்த ஆய்வைப் பற்றி எனக்கு விரிவாக விளக்கப்பட்டுள்ளது. மேலும் ஏதேனும் கேள்விகளைக் கேட்க எனக்கு வாய்ப்பு அளிக்கப்பட்டது. எனது அனைத்து கேள்விகளுக்கும் திருப்தி அளிக்கும் வகையில் பதில் அளிக்கப்பட்டுள்ளது. இந்த ஆய்வில் எனது பங்கேற்பு தன்னார்வமானது என்பதை நான் அறிவேன். பங்கேற்க சம்மதிப்பதன் மூலம், ஆய்வின் பிற்பகுதியில் தேவைப்பட்டால் மேலும் தகவல்களுக்கு என்னை தொடர்பு கொள்ள அனுமதிக்கிறேன். எனது தனிப்பட்ட தகவல்கள் ரகசியமாக வைக்கப்படும் என்பதையும் எந்த நேரத்திலும் எனது ஒப்புதலை விலக்கிக்கொள்ள எனக்கு உரிமை உள்ளது என்பதையும் நான் புரிந்துகொள்கிறேன். தேவைப்பட்டால் யாரைத் தொடர்பு கொள்ள வேண்டும் என்று எனக்குத் தெரிவிக்கப்பட்டுள்ளது.

பதிலளிப்பவரின் கையொப்பம் / கட்டைவிரல் ரேகை

பதிலளிப்பவரின் பெயர்:

தேதி:

நேர்காணல் செய்பவரின் கையொப்பம்:

நேர்காணல் செய்பவரின் பெயர்:

தேதி:

ANNEXURE VI
INTERVIEW SCHEDULE – TAMIL

நேர்காணல் அட்டவணை

- 1) அறிந்தளிக்கப்பட்ட ஒப்புதல் பெறப்பட்டதா? ஆம் இல்லை
a. (இல்லை என்றால், கணக்கெடுப்பை முடிக்கவும்)
- 2) குடும்பத்தின் தனித்துவ ஐடி
- 3) நேர்காணல் நடைபெறும் தேதி

பிரிவு 1

A) வீட்டு பண்புகள்

Sl.no	கேள்வி	பதில்
hh01	முகவரி	
hh02	இடம்	கிராமப்புறம் நகர்ப்புறம்
hh03	தொடர்பு விபரங்கள்	
hh04	சமூகக் குழு	OBC SC ST மற்றவை, குறிப்பிடு
hh05	குடும்பத்தில் உள்ள மொத்த உறுப்பினர்களின் எண்ணிக்கை	
Hh06	5 வயதிற்குட்பட்ட யாராவது இருக்கிறார்களா?	
Hh07	60 வயதுக்கு மேற்பட்டவர்கள் யாராவது இருக்கிறார்களா?	
Hh08	கர்ப்பிணிப் பெண்கள் யாராவது இருக்கிறார்களா?	
Hh09	மாற்றுத்திறனாளிகள் யாராவது இருக்கிறார்களா?	இல்லை ஆம்
Hh10	வீட்டு வகை	தனி குடும்பம்

		கூட்டுக் குடும்பம் ஒற்றைப் பெற்றோர் குடும்பம் மற்றவை
Hh11	ரேஷன் கார்டு வகை	அன்டோதயா அட்டை BPL அட்டை APL அட்டை அட்டை இல்லை
Hh12	நீரின் முக்கிய ஆதாரம்	குடியிருப்பில் குழாய் நீர் வெளியே குழாய் நீர் நன்கு பாதுக்காகப்பட்ட கிணறு வீட்டில் நிறுவப்பட்ட RO பிளான்ட் சமூக RO பிளான்ட் டேங்கர்/டிர்க் குடிப்பதற்கான குளம் / நீருற்று மற்றவை (குறிப்பிடுக)
hh13	சமையல் எரிபொருளின் முக்கிய ஆதாரம்	விறகு LPG மற்ற இயற்கை எரிவாயு சாண புண்ணாக்கு மண்ணெண்ணெய் கரி மின்சாரத்தால் இயங்கும் மற்றவை (குறிப்பிடுக) சமையல் ஏற்பாடு இல்லை

B) குடும்ப உறுப்பினர்களின் விவரங்கள்:

(ஒவ்வொரு உறுப்பினருக்கும் ஒரு தாள் சேர்க்கவும்)

Sl.no	கேள்வி	பதில்
fm01	உறுப்பினர் ஐடி	
fm02	வயது(நிறைவு ஆண்டுகள்/மாதங்களில்)	
fm03	பாலினம்	ஆண் பெண் மூன்றாம் பாலினத்தவர் பதில் சொல்ல மறுப்பு (பெண் என்றால், FM06 க்குச் செல்லவும்)
Fm04	வாழும் நிலை	உயிருடன் இருக்கிறார் இறந்துவிட்டார் (இறந்தால், fm17 க்குச் செல்லவும்)
fm05	பெண்கள் கர்ப்பமாக இருக்கிறார்களா? (வயது 15-49)	இல்லை ஆம் (ஆம் எனில், pg01 க்குச் செல்லவும்) பொருந்தாது
fm06	நோய்த்தடுப்பு அளிக்கப்பட்டதா?	இல்லை ஆம் (ஆம் எனில், vc01 க்குச் செல்லவும்) பொருந்தாது
Fm07	குடும்ப த்தலைவர் / குடும்பத் தலைவருடனான உறவு	குடும்ப த்தலைவர் வாழ்க்கைத் துணை மகன்/மகள் தந்தை/தாய் வேறு

Fm08	திருமண நிலை	திருமணம் செய்து கொள்ளவில்லை விவாகரத்து ஆனவர் விதவை/மனைவியை இழந்தவர் தற்போது திருமணமானவர் வாழ்க்கைத் துணையுடன் வாழ்தல்
Fm09	கல்வி	கல்வி இல்லை கையெழுத்திடுவது எப்படி என்று தெரிந்தவர் முறைசாரா கல்வி முதன்மை - 5 ஆம் வகுப்பு வரை மிடில் - எட்டாம் வகுப்பு வரை இரண்டாம் நிலை - 10 ஆம் வகுப்பு வரை மேல்நிலை - 12 ஆம் வகுப்பு வரை பட்டதாரி / முதுகலை வேறு
fm10	தொழில்	வேலையில்லாதவர் தினக்கூலி சுரங்கத் தொழிலாளி தொழிற்சாலை தொழிலாளி உழவர் ஓய்வு பெற்றவர் ஹோம் மேக்கர் மாணவர்

		சுயதொழில் தனியார் துறை அரசு துறை மற்றவை (குறிப்பிடுக)
fm11	இந்த நபர் வீட்டின் சம்பாதிக்கும் நபரா?	இல்லை ஆம் (ஆம் எனில், fm12 க்குச் செல்லவும்)
Fm12	மாத வருமானம்	
fm13	புகையிலை பயன்பாடு	இல்லை ஆம்
fm14	மது அருந்தும் நிலை	இல்லை ஆம்
fm15	புகையிலை மதுபானம் வாங்குவதற்கான செலவு	(மாதத்திற்கு)
fm16	சீர்ப்படுத்தல், ஸ்பா, உடற்பயிற்சி, சுகாதாரப் பொருட்கள் போன்றவற்றிற்கான செலவு	(மாதத்திற்கு)
fm17	பின்வருவனவற்றில் ஏதேனும் இருப்பதாக எப்போதாவது உடல்நலப் பணியாளர்/மருத்துவர் உங்களிடம் கூறி இருக்கிறார்களா? (பல பதில்கள்)	உயர் இரத்த அழுத்தம் வகை 2 நீரிழிவு நோய் (Type 2 Diabetes) டிஸ்லிபிடெமியா (Dyslipidemia) ரத்தசோகை சிஓபிடி / ஆஸ்துமா நாள்பட்ட சிறுநீரக நோய் சிறுநீரக கல் கரோனரி இதய நோய் கீல்வாதம்

		மாரடைப்பு புற்றுநோய் கண் புரை தேராய்டு கோளாறு அலர்ஜி (ரைனிடிஸ், தோல்) பிசிஓஎஸ் காச நோய் யானைக்கால் நோய் எச்.ஐ.வி / எய்ட்ஸ் மற்றவை நாளப்பட்ட நிலை (குறிப்பிடுக) ஏதுமில்லை (எதுவும் இல்லை என்றால், fm23 க்குச் செல்லவும்)
Fm18	மேலே குறிப்பிட்டுள்ள நோயை நீங்கள் கண்டறிந்ததிலிருந்து கால அளவு?	
Fm19	மருத்துவ கவனிப்பு பெறப்பட்டதா?	இல்லை ஆம் (இல்லை என்றால், fm20 க்குச் செல்லவும்)
fm20	சிகிச்சை / மருத்துவ ஆலோசனையை நாடாததற்கான காரணம்	வசதி ஏதும் இல்லை மிகவும் விலை உயர்ந்தது ஊதியத்தை இழக்க நேரிடும் என்ற பயம் தீவிரமாக கருதப்படவில்லை மத நம்பிக்கை மற்றவை (குறிப்பிடுக)
Fm21	மருந்து மற்றும் வழக்கமான பரிசோதனைக்கு செலவழித்த பணம்	
Fm22	எதிலாவது மருத்துவக் காப்பீட்டுத் திட்டத்தில் சேர்ந்துள்ளீர்களா?	இல்லை

		ஆம் (ஆம் எனில், FM23 க்குச் செல்லவும்)
Fm23	மருத்துவ காப்பீட்டு வகை	காப்பீடு இல்லை PMJAY மாநில மருத்துவக் காப்பீடு தனியார் பிரீமியம் ESI/CGHS/ECHS மற்றவை(குறிப்பிடுக)
fM24	கடந்த 1 வருடத்தில் மருத்துவமனையில் அனுமதிக்கப்பட்டுள்ளீர்களா?	இல்லை ஆம் (ஆம் எனில், IP01 க்குச் செல்லவும்)
fM25	கடந்த 1 மாதத்தில் ஏதேனும் நோய்கள் இருந்ததா?	இல்லை ஆம் (ஆம் எனில், OP01 க்குச் செல்லவும்)

C) குடும்ப வருமானம்

Sl.no	கேள்வி	பதில்
inc1	உறுப்பினர்கள் சம்பாதித்த மொத்த வருமானம் (1 வருடம்)	
inc2	பிற வருமானம், ஏதேனும் இருந்தால் (1 வருடம்)	
Inc3	குடும்பத்தின் மொத்த வருமானம்	inc 1 + inc 2
Inc4	சமூக பொருளாதார நிலை (மாற்றியமைக்கப்பட்ட BG பிரசாத் அளவுகோல் 2024 க்கு திருத்தப்பட்டது)	Inc3 / hh5 மேல் மேல் நடு நடு கீழ் நடு கீழ்

பிரிவு 2:

D) மருத்துவமனை உள்ளிருப்புச் சிகிச்சை – கடந்த 1 வருடத்தில் உள்நோயாளி

Sl.no	கேள்வி	பதில்
Ip01	கடந்த 1 வருடத்தில் எத்தனை முறை மருத்துவமனையில் அனுமதிக்கப்பட்டீர்கள்?	
ip02	மருத்துவமனையில் அனுமதிக்கப்பட்டதற்கான காரணம்	
ip03	தங்கியிருக்கும் காலம்	
ip04	சிகிச்சையின் தன்மை	அலோபதி ஆயுஷ் இரண்டும் மற்றவை (குறிப்பிடுக)
ip05	மருத்துவமனை வகை	அரசு தனியார் தொண்டு / டிரஸ்ட் ESIC மற்றவை (குறிப்பிடுக) (அரசு என்றால், IP05 க்கு செல்லவும்) (தனிப்பட்டதாக இருந்தால், ip06 க்குச் செல்லவும்)
ip06	கவனிப்பு நிலை (அரசு என்றால்)	ஆரம்ப சுகாதார நிலையம் சி.எச்.சி இரண்டாம் நிலை மருத்துவமனை மூன்றாம் நிலை மருத்துவமனை
ip07	பராமரிப்பு நிலை (தனிப்பட்டதாக இருந்தால்)	பட்டதாரி மருத்துவர் சிறப்பு மருத்துவர்

		சூப்பர் ஸ்பெஷலிஸ்ட்
ip08	வார்டின் வகை	இலவசம் பணம் செலுத்தியது சிறப்பு பணம் செலுத்தியது
ip09	மருத்துவமனையில் அனுமதிக்கப்பட்ட இடம்	அதே மாவட்டம் ஒரே மாநிலத்தில் வேறு மாவட்டம் வேறு மாநிலம்

E) கடந்த 1 வருடத்தில் ஏற்பட்ட மருத்துவமனை உள்ளிருப்புச் செலவு

Sl.no	கேள்வி	பதில்
ipc01	பேக்கேஜ் தொகை வழங்கப்பட்டதா?	இல்லை ஆம் (ஆம் எனில், ipc02 க்குச் செல்லவும்)
ipc02	மொத்த பேக்கேஜ் தொகை	
பேக்கேஜ் அல்லாத தொகை பிரேக்டவுன்		
ipc03	மருத்துவமனை சேர்க்கை கட்டணம்	
ipc04	அறுவை சிகிச்சை நிபுணர் / மருத்துவர் கட்டணம்	
ipc05	அறை வாடகை / படுக்கை கட்டணங்கள்	
ipc06	அறுவை சிகிச்சை, ஆபரேஷன் தியேட்டர் மற்றும் தொடர்புடைய செலவுகள்	
ipc07	மருத்துவமனை மருந்தகத்திலிருந்து மருத்துவம்	

ipc08	மருத்துவமனைக்கு வெளியே மருந்தகத்தில் இருந்து மருந்து	
ipc09	பரிசோதனை (எக்ஸ்ரே, ஈ.சி.ஜி, EEG, உயிர்வேதியியல் மதிப்பீடு போன்றவை)	
ipc10	மருத்துவ உபகரணங்கள் / உதவி கட்டணம் (பிசியோதெரபி, இரத்தம், ஆக்ஸிஜன் போன்றவை அடங்கும்)	
ipc11	ஆம்புலன்ஸ் / போக்குவரத்து கட்டணங்கள் iii) ஆஸ்பத்திரியில் இருந்து வீடு iv) வீட்டில் இருந்து ஆஸ்பத்திரி	
ipc12	உணவுச் செலவு	
ipc13	பிற செலவுகள் (குறிப்பிடுக)	
ipc14	மருத்துவமனையில் ஒரு உதவியாளர் உங்களுடன் தங்கியிருந்தாரா?	இல்லை ஆம் (ஆம் எனில், IPC15 க்குச் செல்லவும்)
ipc15	உதவியாளர் தங்குவதற்கான செலவு (உணவு, போக்குவரத்து, தங்குமிடம்)	
ipc16	வீட்டிலிருந்து மருத்துவமனையை அடைய எடுக்கும் நேரம்	
ipc17	வீட்டிலிருந்து மருத்துவமனைக்கான தூரம்	
ipc18	மொத்தத் திரும்பி பெறப்பட்ட தொகை, ஏதேனும் இருந்தால்	
ipc19	மருத்துவமனையில் சேர்க்கப்பட்ட பிறகு, நீங்கள் மருத்துவமனை /மருத்துவரை சந்தித்தீர்களா?	இல்லை ஆம் (ஆம் எனில், ipc20 க்குச் செல்லவும்)

ipc20	உங்களுடன் யாராவது வந்தார்களா	இல்லை ஆம்
ipc21	வருகை தொடர்பான மொத்த செலவு	
ipc22	கடந்த 1 வருடத்தில் மருத்துவமனையில் சேர்க்கப்பட்டதற்காக ஏற்பட்ட மொத்த செலவு	

F) கடந்த 1 மாதத்தில் வெளி நோயாளர் பிரிவு வருகைகள்

Sl.no	கேள்வி	பதில்
Op01	ஏற்பட்ட வியாதி	
op02	மருத்துவ ஆலோசனை / சிகிச்சை கோரப்பட்டதா?	இல்லை ஆம் (இல்லை என்றால், OP03 க்குச் செல்லவும்)
op03	சிகிச்சை / மருத்துவ ஆலோசனையை நாடாததற்கான காரணம்	வசதி ஏதும் இல்லை மிகவும் விலை உயர்ந்தது ஊதியத்தை இழக்க நேரிடும் என்ற பயம் தீவிரமாக கருதப்படவில்லை மத நம்பிக்கை மற்றவை (குறிப்பிடுக)
Op04	கடந்த 1 மாதத்தில் OP ஆலோசனைக்கு எத்தனை முறை சென்றார்?	
op05	யாரிடம் ஆலோசனை கேட்டார்	சுகாதாரப் பணியாளர்/ மருத்துவர் சுய / மற்றொரு வீடு உறுப்பினர் நண்பர் மெடிக்கல் ஷாப்

		மற்றவை (குறிப்பிடுக)
op06	நோயின் மொத்த காலம்	
op07	சிகிச்சையின் தன்மை	அலோபதி ஆயுஷ் இரண்டும் மற்றவை (குறிப்பிடுக)
op08	மருத்துவமனை வகை	அரசு தனியார் தொண்டு / டிரஸ்ட் ESIC மற்றவை (குறிப்பிடுக) (அரசு என்றால், OP09 க்குச் செல்லவும்) (தனியார் என்றால், OP10 க்குச் செல்லவும்)
op09	கவனிப்பு நிலை (அரசு என்றால்)	ஆரம்ப சுகாதார நிலையம் சி. எச். சி இரண்டாம் நிலை மருத்துவமனை மூன்றாம் நிலை மருத்துவமனை
op10	பராமரிப்பு நிலை (தனிப்பட்டதாக இருந்தால்)	பட்டதாரி மருத்துவர் சிறப்பு மருத்துவர் சூப்பர் ஸ்பெஷலிஸ்ட்
op11	சிகிச்சை பெற்ற இடம்	அதே மாவட்டம் ஒரே மாநிலத்தில் வேறு மாவட்டம் வேறு மாநிலம்

G) கடந்த 1 மாதத்தில் OP வருகைகளுக்காக ஏற்பட்ட செலவு

Sl.no	கேள்வி	பதில்
opc01	மருத்துவரின் கட்டணம்	
opc02	பதிவு கட்டணம்	
opc03	மருத்துவமனை மருந்தகத்திலிருந்து மருத்துவம்	
opc04	மருத்துவமனைக்கு வெளியே மருந்தகத்தில் இருந்து மருந்து	
opc05	பரிசோதனை (எக்ஸ்ரே, ஈ.சி.ஜி, EEG, உயிர்வேதியியல் மதிப்பீடு போன்றவை)	
opc06	ஆம்புலன்ஸ் / போக்குவரத்து கட்டணங்கள் iii) ஆஸ்பத்திரியில் இருந்து வீடு iv) வீட்டில் இருந்து ஆஸ்பத்திரி	
opc07	மருத்துவ உபகரணங்கள்/ உதவி கட்டணம் (பிசியோதெரபி, இரத்தம், ஆக்ஸிஜன் போன்றவை அடங்கும்)	
opc08	உணவுச் செலவு	
opc09	பிற செலவுகள் (குறிப்பிடுக)	
opc10	உங்களுடன் ஒரு உதவியாளர் மருத்துவமனைக்கு வந்தாரா?	இல்லை ஆம் (ஆம் எனில், opc11 க்குச் செல்லவும்)
opc11	உதவியாளர்களுக்கான செலவு (உணவு, போக்குவரத்து)	
opc12	வீட்டிலிருந்து மருத்துவமனையை அடைய எடுக்கும் நேரம்	
opc13	வீட்டிலிருந்து மருத்துவமனைக்கான தூரம்	
opc14	காப்பீடு மூலம் திருப்பிச் பெறப்பட்ட தொகை, ஏதேனும் இருந்தால்?	
opc15	கடந்த 30 நாட்களில் OP வருகைக்கான மொத்த செலவு	

H) கர்ப்பம் மற்றும் பிரசவம் தொடர்பான செலவுகள்

Sl.no	கேள்வி	பதில்
pg01	கர்ப்பத்தின் எண்ணிக்கை	
மகப்பேறுக்கு முந்தைய		
pg02	மகப்பேறுக்கு முன், டெட்டனஸ் டாக்ஸாய்டு போடப்பட்டதா?	இல்லை ஆம்
pg03	மகப்பேறுக்கு முன், கவனிப்பின் முக்கிய ஆதாரம்	HSC/ANM/ASHA/AWW -0 ஆரம்ப சுகாதார நிலையம் / மருந்தகம் / CHC / நடமாடும் மருத்துவப் பிரிவு -1 அரசு/ பொது மருத்துவமனை -2 தொண்டு / அறக்கட்டளை / தன்னார்வ தொண்டு நிறுவனம் நடத்தும் மருத்துவமனை -3 தனியார் மருத்துவமனை -4 தனியார் மருத்துவர்/கிளினிக் -5 முறைசாரா சுகாதார வழங்குநர் -6 எந்த கவனிப்பும் பெறவில்லை -7
pg04	மகப்பேறுக்கு முன், பராமரிப்பின் தன்மை	இல்லை 0 அலோபதி 1 ஆயுஷ் 2 இரண்டும் 3
pg05	மகப்பேறுக்கு முந்தைய வருகையின் எண்ணிக்கை	
pg06	மகப்பேறுக்கு முந்தைய பராமரிப்புக்கான செலவு	

பிரசவம்		
pg07	பிரசவம்/கருக்கலைப்பு செய்யும் இடம்	HSC -0 ஆரம்ப சுகாதார நிலையம் / மருந்தகம் / CHC / நடமாடும் மருத்துவப் பிரிவு -1 அரசு/பொது மருத்துவமனை -2 தொண்டு / அறக்கட்டளை / தன்னார்வ தொண்டு நிறுவனம் நடத்தும் மருத்துவமனை -3 தனியார் மருத்துவமனை -4 வீட்டில் -5
Pg08	பிரசவத்திற்கான செலவு	
பிரசவத்திற்கு பின்		
Pg09	பிரசவத்திற்குப் பின்,கவனிப்பின் முக்கிய ஆதாரம்	HSC/ANM/ASHA/AWW -0 ஆரம்ப சுகாதார நிலையம் / மருந்தகம் / CHC / நடமாடும் மருத்துவப் பிரிவு -1 அரசு/ பொது மருத்துவமனை -2 தொண்டு / அறக்கட்டளை / தன்னார்வ தொண்டு நிறுவனம் நடத்தும் மருத்துவமனை -3 தனியார் மருத்துவமனை -4 தனியார் மருத்துவர/கிளினிக் -5 முறைசாரா சுகாதார வழங்குநர் -6 கவனிப்பு கிடைக்கவில்லை -7
pg10	பிரசவத்திற்குப் பின்,பராமரிப்பின் தன்மை	இல்லை 0 அலோபதி 1 ஆயுஷ் 2 இரண்டும் 3
pg11	வருகைகளின் எண்ணிக்கை	

pg12	மகப்பேறு பின் கவனிப்புக்கான செலவு	
pg13	கர்ப்பத்திற்கான மொத்த செலவு	

l) நோய்த்தடுப்பு செலவு

Sl.no	கேள்வி	பதில்
vc01	நோய்த்தடுப்பு	
vc02	பெற்ற இடம்	HSC/AWW - ஆரம்ப சுகாதார நிலையம் / மருந்தகம் / CHC / நடமாடும் மருத்துவப் பிரிவு -1 அரசு/ பொது மருத்துவமனை -2 தொண்டு / அறக்கட்டளை / தன்னார்வ தொண்டு நிறுவனம் நடத்தும் மருத்துவமனை -3 தனியார் மருத்துவமனை -4 தனியார் மருத்துவர்கிளினிக் -5 தடுப்பூசி இல்லை -6
vc03	தடுப்பூசிக்கான செலவு	

J) பயன்படுத்தப்படும் நிதி விருப்பங்கள்:

(FM19 இல் ஆம் என்றால்)

Sl.no	கேள்வி	பதில்
fp01	கடந்த ஒரு வருடத்தில் உங்கள் சிகிச்சைக்கு நீங்கள் எவ்வாறு பணம் செலுத்தினீர்கள்? (மருத்துவமனையில் சேர்க்கப்படுதல் மற்றும் மருத்துவமனையில் சேர்க்கப்படாதது உட்பட அனைத்து செலவுகளும்)?	சொந்த சேமிப்பு குடும்ப உறுப்பினர்கள் பணம் செலுத்தினர் முதலாளி பணம் செலுத்தினார்

	(பல பதில்கள்)	நண்பர்கள், உறவினர்கள், முதலாளிகளிடமிருந்து கடன் வாங்கியது வங்கி, கந்துவட்டிக்காரரிடமிருந்து கடன் வாங்கியது அடகு வைத்த நகைகள் வீடு, நிலம் அல்லது பிற சொத்துக்களை விற்றது மருத்துவ காப்பீடு மற்றவை (குறிப்பிடு)
fp02	உங்கள் உடல்நலம் தொடர்பாக, கடந்த 1 வருடத்தில் வீட்டில் நீங்கள் செய்ய வேண்டியிருந்த மாற்றங்கள் என்ன? (பல பதில்கள்)	கூடுதல் வீட்டு உதவியாளர்களை பணியமர்த்தினார் ஹோம் நர்ஸ் பணியமர்த்தினார் உணவில் மாற்றம் (Change In Diet) ஏதேனும் ஆதரவு சாதனங்களை வாங்குதல் மற்றவை (குறிப்பிடுக)
fp03	இந்த மருத்துவச் செலவுகளைச் சமாளிக்க வீட்டுச் செலவுகளில் ஏதேனும் மறுசீரமைப்பு செய்யப்பட்டதை நீங்கள் கண்டீர்களா?	இல்லை ஆம் (ஆம் எனில், fp04 க்குச் செல்லவும்)
fp04	அந்த மறுசீரமைப்புகள் என்ன? (பல பதில்கள்)	குறைக்கப்பட்ட உணவுச் செலவு கல்வியில் முதலீடு குறைக்கப்பட்டது சமூக நடவடிக்கைகளுக்கான செலவு குறைக்கப்பட்டது குறைக்கப்பட்ட மருத்துவ செலவுகள் பயன்பாடுகளுக்கான செலவு குறைக்கப்பட்டது அன்றாடப் பொருட்களுக்கான செலவு குறைதல் ஆடைகளுக்கான செலவு குறைதல் நெடுவாழ்வுப் பண்டங்களின் மீதான செலவு குறைதல் பிற செலவுகளில் குறைப்பு (குறிப்பிடுக)

fp05	ஒரு சிகிச்சை அறிவுறுத்தப்பட்டவுடன், நிதி ஏற்பாடு செய்ய இயலாமை காரணமாக பின்வருவனவற்றில் எதையாவது செய்தீர்களா?	பரிந்துரைக்கப்பட்ட சிகிச்சையை மறுத்தார் பரிந்துரைக்கப்பட்ட சிகிச்சையை ஒத்திவைத்தது ஒரு மலிவான மாற்றீட்டைத் தேர்ந்தெடுத்தது மற்றவை (குறிப்பிடுக)
------	--	--

K) ஏற்படும் மறைமுக செலவு: (FM 24 அல்லது FM 25 இல் ஆம் என்றால்)

Sl.no	கேள்வி	பதில்
ind01	கடந்த 1 வருடத்தில், இந்த உடலை நிலை பாதிப்பு காரணமாக உங்கள் வேலை பாதிக்கப்பட்டதா?	பாதிக்கப்படவில்லை வேலை இழப்பு வேலை மாற்றம் பதவி உயர்வு மறுப்பு இடமாற்றம் செய்யப்பட்டது மற்றவை (குறிப்பிடுக) (இல்லை என்றால், hhe01 க்குச் செல்லவும்)
ind02	ஏதேனும் கடுமையான நிகழ்வுக்குப் பிறகு நீங்கள் மீண்டும் வேலையைத் தொடங்கினீர்களா?	இல்லை ஆம்
ind03	இழந்த நாட்களின் மொத்த எண்ணிக்கை (ஊதியம் இல்லாமல்)	கடந்த 1 வருடத்தில் மருத்துவ விடுப்பு உட்பட மருத்துவமனையில் சேர்க்கப்பட்டிருத்தல் (மொத்தம்) நிகழ்வு 1 நிகழ்வு 2 நிகழ்வு 3 பின்தொடர்தல் வருகைகள்
ind04	ஒரு நாளைக்கு இழந்த ஊதியம்	
ind05	கடந்த 1 வருடத்திற்கான மொத்த வருமான இழப்பு	
ind06	முதன்மை உதவியாளர் பணியமர்த்தப்படுகிறாரா?	இல்லை

		ஆம் (இல்லை என்றால், hhe01 க்குச் செல்லவும்)
ind07	கடந்த 1 வருடத்தில், இந்த நிலைமைகள் காரணமாக அவர்களின் வேலை பாதிக்கப்பட்டதா?	பாதிக்கப்படவில்லை வேலை இழப்பு வேலை மாற்றம் பதவி உயர்வு மறுப்பு இடமாற்றம் செய்யப்பட்டது மற்றவை (குறிப்பிடுக) (இல்லை என்றால், hhe01 க்குச் செல்லவும்)
ind08	ஏதேனும் கடுமையான நிகழ்வுக்குப் பிறகு அவர்கள் மீண்டும் பணியைத் தொடங்கியிருக்கிறார்களா?	இல்லை ஆம்
ind09	இழந்த நாட்களின் மொத்த எண்ணிக்கை (ஊதியம் இல்லாமல்)	கடந்த 1 வருடத்தில் மருத்துவ விடுப்பு உட்பட மருத்துவமனையில் சேர்க்கப்பட்டிருத்தல் (மொத்தம்) நிகழ்வு 1 நிகழ்வு 2 நிகழ்வு 3 பின்தொடர்தல் வருகைகள்
ind10	ஒரு நாளைக்கு இழந்த ஊதியம்	
ind11	கடந்த 1 வருடத்திற்கான மொத்த வருமான இழப்பு	

பிரிவு 3

L) வீட்டுச் செலவு:

Sl.no	கேள்வி	பதில்
hhe01	உணவு செலவுகள்: அரிசி, கோதுமை, தானியங்கள், பருப்பு வகைகள், உப்பு, சர்க்கரை, எண்ணெய், மசாலா பால், முட்டை, இறைச்சி, காய்கறிகள், பழங்கள்	

	பானம் பதப்படுத்தப்பட்ட உணவு, பேக் செய்யப்பட்ட உணவு, மற்றவை	
hhe02	மின்சாரம், நீர், தொலைபேசி	
hhe03	போக்குவரத்து	
hhe04	கல்வி	
hhe05	வாடகை	
hhe06	நுகர்பொருட்கள், கழிப்பறைகள்	
hhe07	காப்பீட்டு பிரீமியம்	
hhe08	நன்கொடை / பரிசுகள்	
hhe09	வீட்டு உபகரணங்கள்	
hhe10	ஆடைகள், காலணிகள், நகைகள் போன்ற தனிப்பட்ட பொருட்கள்.	
hhe11	கடன்களை திருப்பிச் செலுத்துதல்	
hhe12	எரிபொருள்	
hhe13	வாகன கொள்முதல்	
hhe14	பழுது மற்றும் பராமரிப்பு	
hhe15	மற்றவை, ஏதேனும் இருந்தால்	

பிரிவு 4

M) உள்ளூர் சுற்றுச்சூழல் மாசுபாடு, அவற்றின் தழுவல் நிலைகள் மற்றும் அது
தொடர்பான செலவுகள் பற்றிய கருத்து:

- 1) வீட்டிற்கும் அருகிலுள்ள சிமெண்ட் தொழிற்சாலைக்கும் இடையே உள்ள தூரம்
- 2) வீட்டிற்கும் அருகிலுள்ள சுரங்கப் பகுதிக்கும் இடையே உள்ள தூரம்

3) சிமெண்ட் தொழிற்சாலையினால் ஏற்படும் தாக்கம்

3.1) நேர்மறையான தாக்கம்

அ) நேர்மறையாக இருந்தால், சிமெண்ட் தொழிற்சாலை இருப்பது உங்களுக்கோ அல்லது உங்கள் குடும்பத்திற்கோ எவ்வாறு உதவுகிறது?

ஆ) நேர்மறையாக இருந்தால், சிமெண்ட் தொழிற்சாலை இருப்பது உங்கள் சமூகத்திற்கு எவ்வாறு உதவுகிறது?

3.2) எதிர்மறை தாக்கம்

4) சுரங்கப் பகுதியால் ஏற்படும் தாக்கம்

4.1) நேர்மறையான தாக்கம்

அ) நேர்மறையாக இருந்தால், சுரங்கப் பகுதி இருப்பது உங்களுக்கு அல்லது உங்கள் குடும்பத்திற்கு எவ்வாறு உதவுகிறது?

ஆ) நேர்மறையாக இருந்தால், சுரங்கப் பகுதி இருப்பது உங்கள் சமூகத்திற்கு எவ்வாறு உதவுகிறது?

4.2) எதிர்மறை தாக்கம்

5) எந்த வகையான மாசுபாட்டினாலும் நீங்கள் சிரமப்படுகிறீர்களா?

a) இல்லை

b) ஆம்

6) நீங்கள் சிரமப்படும் மாசுபாட்டின் பொதுவான வகை என்ன?

a) காற்று மாசுபாடு

b) நீர் மாசுபாடு

c) நிலம் மாசுபடுதல்

d) ஒலி மாசுபாடு

7) நீங்கள் அனுபவிக்கும் காற்று மாசுபாட்டின் விளைவுகள் என்ன என்று நீங்கள் நினைக்கிறீர்கள்?

- a) காற்றின் தரம் குறைதல்.
- b) புழுதி படிந்த வீடு
- c) பராமரிப்பு செலவு அதிகரிப்பு
- d) இப்பகுதி வாழத் தகுதியற்றது
- e) நண்பர்கள் / உறவினர்கள் வருகை தருவதில்லை
- f) வாழ்வாதாரம் பாதிக்கப் பட்டுள்ளது
- g) மக்களின் ஆரோக்கிய குறைவு
- h) பிற விளைவு (குறிப்பிடுக)

8) நீர் மாசுபாட்டின் விளைவுகள் என்ன என்று நீங்கள் நினைக்கிறீர்கள்?

- a) நீரின் தரம் குறைதல்
- b) குடிநீர் தூசியால் பாதிக்கப்படுகிறது
- c) தொழிற்சாலைக் கழிவுநீரால் குடிநீர் பாதிக்கப்படுகிறது
- d) மக்களின் ஆரோக்கிய குறைவு
- e) நிலத்தடி நீர்மட்டம் குறைகிறது
- f) பிற விளைவு (குறிப்பிடுக)

9) சிமெண்ட் தொழிற்சாலை அல்லது சுரங்கப் பகுதி இருப்பதால் உங்கள் அன்றாட செயல்பாடு எவ்வாறு பாதிக்கப்படுகிறது?

- a) வீட்டில் அமைதியான சூழ்நிலை இல்லாமை
- b) மாசுபட்ட நீர் காரணமாக துணி துவைப்பது கடினம்.
- c) மருத்துவமனை வருகையின் அதிர்வெண் அதிகரித்தல்
- d) தூசி காரணமாக வெளிப்புற செயல்பாடு குறைதல்
- e) நெரிசல் காரணமாக விபத்துக்கள் ஏற்படும் என்ற அச்சம்
- f) வீட்டைப் அதிக முறை பெருக்குதல்
- g) மற்றவை (குறிப்பிடுக)

10) கடந்த 30 நாட்களில் பின்வருவனவற்றில் எதையாவது நீங்கள் அனுபவித்தீர்களா

- a) கண் எரிச்சல்
- b) தோல் எரிச்சல்
- c) ஒவ்வாமை நாசியழற்சி
- d) ஒவ்வாமை தோல் நோய்
- e) ஆஸ்துமா நிகழ்வு
- f) மற்றவை, ஏதேனும் இருந்தால்

11) மேற்குறிப்பிட்ட நிலைக்கு மருத்துவமனைக்கு எத்தனை முறை வருகை தருகிறார்கள்?

- a) கடந்த 1 வாரத்தில்
- b) கடந்த 15 நாட்களில்
- c) கடந்த 1 மாதத்தில்
- d) கடந்த 1 வருடத்தில்
- e) மருத்துவமனைக்கு செல்லவில்லை

12) மாசுபாட்டில் இருந்து தப்பிக்க நீங்கள் என்ன நடவடிக்கைகளை எடுத்துள்ளீர்கள்?

வரிசை எண்	நடவடிக்கைகள்	விருப்பதேர்வு	கொள்முதல் செலவு	பராமரிப்பு செலவு
1	எதுவும் செய்யவில்லை	இல்லை ஆம்		
2	வெளிப்புற செயல்பாடுகளைக் குறைக்கவும்	இல்லை ஆம்		
3	மூடப்பட்ட போக்குவரத்தைத் தேர்வுசெய்க (கார் போன்றவை)	இல்லை ஆம் (ஆம் எனில், சம்பந்தப்பட்ட செலவு என்ன)		
4	சாளர திறப்பு குறைத்தல்	இல்லை ஆம்		
5	முகக்கவசம் அணிதல்	இல்லை ஆம் (ஆம் எனில், சம்பந்தப்பட்ட செலவு என்ன)		
6	கண்ணாடி அணிதல்	இல்லை ஆம்		

		(ஆம் எனில், சம்பந்தப்ப ட்ட செலவு என்ன)		
7	ஏர் கண்டிஷனிங் பயன்படுத்துதல்	இல்லை ஆம் (ஆம் எனில், சம்பந்தப்ப ட்ட செலவு என்ன)		
8	காற்று சுத்திகரிப்பு பயன்படுத்துதல்	இல்லை ஆம் (ஆம் எனில், சம்பந்தப்ப ட்ட செலவு என்ன)		
9	தற்காலிகமாக ஊரை விட்டு வெளியேறுதல்	இல்லை ஆம்		
10	கொதிக்க வைத்த தண்ணீரைப் பயன்படுத்துதல்	இல்லை ஆம்		
11	நீர் சுத்திகரிப்பு இயந்திரம் பயன்படுத்துதல்	இல்லை ஆம் (ஆம் எனில், சம்பந்தப்ப ட்ட செலவு என்ன)		
12	வீட்டை அடிக்கடி சுத்தம் செய்தல்	இல்லை ஆம் (ஆம் எனில், சம்பந்தப்ப ட்ட செலவு என்ன)		

13	பிற நடவடிக்கைகள் (குறிப்பிடுக)	இல்லை ஆம் (ஆம் எனில், சம்பந்தப்ப ட்ட செலவு என்ன)		

13) காற்று மாசுபாட்டின் விளைவை நீங்கள் எவ்வாறு சமாளிக்கிறீர்கள்?

- a) அதனுடன் வாழ்கிறோம்
- b) புதிய பகுதிக்கு இடம்பெயர்தல்
- c) சம்பந்தப்பட்ட அதிகாரியிடம் புகார்
- d) போராட்டம்
- e) மற்றவை (குறிப்பிடுக)

14) நீர் மாசுபாட்டின் விளைவை நீங்கள் எவ்வாறு சமாளிக்கிறீர்கள்?

- a) அதனுடன் வாழ்கிறோம்
- b) புதிய பகுதிக்கு இடம்பெயர்தல்
- c) சம்பந்தப்பட்ட அதிகாரியிடம் புகார்
- d) போராட்டம்
- e) மற்றவை (குறிப்பிடுக)

ANNEXURE VII
SUPPLEMENTARY TABLES

Table 21. Proportion of Tobacco and Alcohol Users by Gender

Variable	Female, N = 673 ¹	Male, N = 683 ¹
Current Tobacco User		
No	657 (98%)	601 (88%)
Yes	16 (2.4%)	82 (12%)
Current Alcoholic		
No	672 (100%)	546 (80%)
Yes	1 (0.1%)	137 (20%)

¹ n (%)

Table 22. Healthcare Seeking Behaviour Based on Gender

Variable	Female, N = 269 ¹	Male, N = 197 ¹
Sought Healthcare		
No	67 (25%)	49 (25%)
Yes	202 (75%)	148 (75%)
Reason for Not Seeking Healthcare		
Not Considered Serious	45 (16.7%)	31 (15.7%)
Medication Not Advised by Doctor	7 (2.6%)	9 (4.5%)
Felt Expensive	7 (2.6%)	2 (1%)
Health Condition Under Control	2 (0.7%)	1 (0.5%)
Home Remedy	2 (0.7%)	0 (0%)
Dietary Modification	1 (0.3%)	3 (1.5%)
No Belief in Medicine	1 (1.5%)	1 (2.1%)
Fear of Medicine	1 (1.5%)	1 (2.1%)
Stopped Medicine Intake	1 (1.5%)	0 (0%)

¹ n (%)

Table 23. Insurance of Individuals

Variable¹	N = 1,356²
Proportion of Insured Individuals	889 (66%)
CMCHIS (State)	611 (45%)
PMJAY (Centre)	374 (28%)
ESIC / ECHS / CGHS (Employee)	241 (18%)
Private Premium	14 (1.0%)
No Insurance Reported	467 (34%)

¹ Multiple response; ² n (%)

Table 24. Household Modifications for Health Condition

Variable¹	N = 289²
Modified Diet	26 (9.0%)
Purchase of Supportive Device	10 (3.5%)
Infrastructure Modification	2 (0.7%)
Extra Domestic Help	1 (0.3%)

¹ Multiple response; ² Among households reported OOPE

Table 25. Financially Driven Adjustments in Healthcare

Variable¹	N = 289²
Chose Less Expensive Alternate	27 (9.3%)
Refused Treatment	25 (8.7%)
Postponed a Suggested Treatment	4 (1.4%)

¹ Multiple response; ² Among households reported OOPE

Table 26. Perceived Effects of Air Pollution

Variable¹	N = 329²
Low Air Quality	68 (21%)
Health Effects	64 (19%)
Household Covered with Dust	55 (17%)
Livelihood Affected	9 (2.7%)
Increased Cost of Maintenance	3 (0.9%)
Area is Not Liveable	1 (0.3%)

¹ Multiple response; ² n (%)

Table 27. Perceived Effects of Water Pollution

Variable¹	N = 329²
Low Water Quality	136 (41%)
Health Effects	99 (30%)
Water Covered with Dust	95 (29%)
Reduced Ground Water	62 (19%)
Deposits in Water	3 (0.9%)

¹ Multiple response; ² n (%)

Table 28. Coping with Perceived Air Pollution

Variable¹	N = 329²
Live with it	63 (19%)
Complaint to Concerned Authority	4 (1.2%)
Protest	2 (0.6%)

¹ Multiple response; ² n (%)

Table 29. Coping with Perceived Water Pollution

Variable¹	N = 329²
Live with it	134 (41%)
Complaint to Concerned Authority	3 (0.9%)
Protest	0 (0%)

¹ Multiple response; ² n (%)

ANNEXURE VIII

SUPPLEMENTARY FIGURES

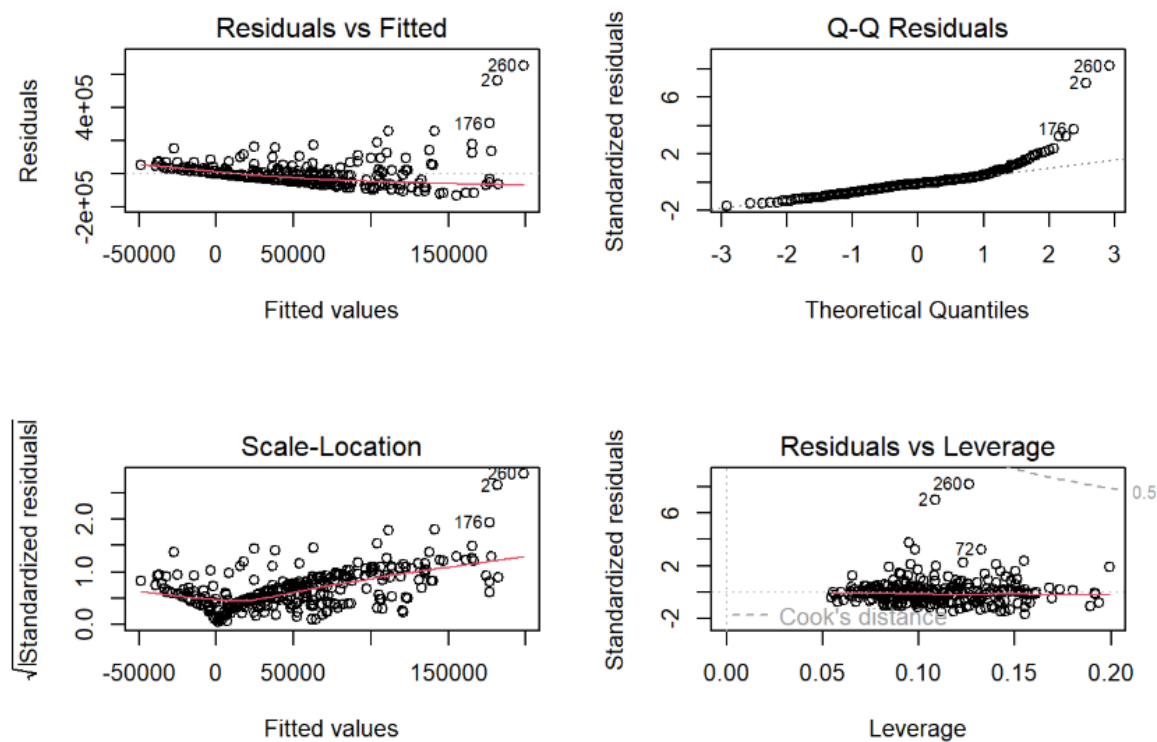


Fig. 9. Residual plots (Original distribution - residuals)

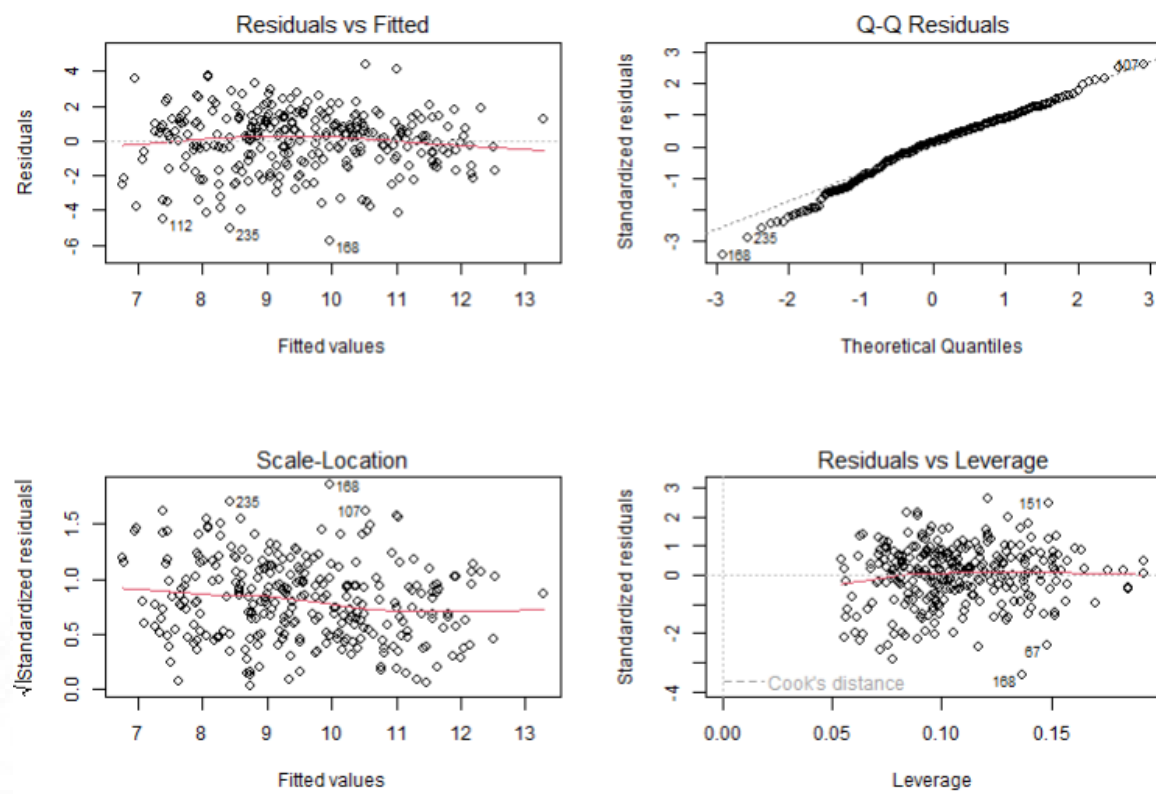


Fig. 10. Residual plots (Log transformed distribution - residuals)

ANNEXURE IX
IEC APPROVAL CERTIFICATE



श्री चित्रा तिरुनाल आयुर्विज्ञान और प्रौद्योगिकी संस्थान, त्रिवेन्द्रम
तिरुवनन्तपुरम - ६९५०११, केरल, इंडिया
SREE CHITRA TIRUNAL INSTITUTE FOR MEDICAL SCIENCES AND TECHNOLOGY, TRIVANDRUM
Thiruvananthapuram - 695 011, Kerala, India
(An Institute of National Importance under Govt. of India)

Grams : Chitramet, Phone : +91-471-2443152, Fax : +91-471-2550728 / 2446433, E-mail : sct@sctimst.ac.in, Website : www.sctimst.ac.in

Institutional Ethics Committee

CDSCO Registration No: ECR/189/Inst/KL/2013/RR-24
DHR Registration No: EC/NEW/INST/2022/2775

SCT/IEC/2346/DECEMBER/2024

15.01.2025

Dr. Vaishnavi D
MPH Student, AMCHSS
SCTIMST, Thiruvananthapuram

Dear Dr. Vaishnavi,

The Institutional Ethics Committee held on 30th December, 2024, reviewed and discussed your application to conduct the study titled "A STUDY ON PATTERN OF HOUSEHOLD HEALTHCARE EXPENDITURE AMONG RESIDENTS IN ARIYALUR DISTRICT, TAMIL NADU" (IEC /2346) .

Principal Investigator	Dr. Vaishnavi D, MPH Student, AMCHSS, SCTIMST
Co-Principal Investigator(s)	Dr. Biju Soman, Professor, AMCHSS, SCTIMST
Duration of the study	6 months

The following members of the Ethics Committee were present at the meeting held on 30th December, 2024

SL. No.	Member Name	Highest Degree	Gender	Scientific /Non Scientific	Affiliation with Institution(s)
1.	Dr. Manoj Murhekar	MD (Preventive & Social Medicine)	Male	Social Scientist	No
2.	Dr. Annapurna.Y	MD	Female	Basic Medical Scientist	No
3.	Adv. Priya Kaimal	LLM, MBL	Female	Legal Expert	No
4.	Dr. Indu PV	MBBS, DPM, MPhil, PhD	Female	Clinician	No
5.	Dr. Rejnish Kumar	MBBS, MD, DNB	Male	Clinician	No
6.	Smt. Rekha Radhakrishnan	M.A (Eng.); B.Ed	Female	Lay person	No
7.	Dr. Biju Soman	MBBS, MD, DPH, MSc, DLSHTM	Male	Basic Medical Scientist	Yes
8.	Dr. Syam K	MBBS, MD, DM	Male	Clinician	Yes
9.	Dr. Srinivas G	PhD	Male	Basic Medical Scientist (Member Secretary)	Yes

The following documents were reviewed:

Original submission

1. IEC Application Form
2. Funding details and Budget
3. Covering letter addressed to the Chairperson, IEC, SCTIMST dated 10.12.2024 forwarded by HOD
4. Interview schedule in English and Tamil
5. Informed Consent Forms in English and Tamil
6. Participant Information Sheets in English and Tamil
7. Checklist Form
8. Proposal
9. Declaration Form
10. CV of PI and Co-PI

Revised submission

1. Covering letter addressed to the Chairperson, IEC, SCTIMST dated 13.01.2025
2. IEC Recommendation letter dated 09.01.2025
3. IEC Recommendation and corresponding response
4. Proposal
5. Participant Information Sheets in English and Tamil
6. Consent Forms in English and Tamil
7. Interview schedule in English and Tamil

IEC Decision

The IEC approved the conduct of the study in the present form.

Remarks:

The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information/informed consent and asks to be provided a copy of the final report.

There was no member of the study team / Guide who participated in voting / decision making process. The ethics committee is organized and operated according to the requirements of Good Clinical Practice and the requirements of the Indian Council of Medical Research (ICMR).

Sincerely,

Dr. G. Srinivas
Member Secretary, IEC

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE (IEC)
SCTIMST, THIRUVANANTHAPURAM



ANNEXURE X

ORIGINALITY REPORT

A study on pattern of household healthcare expenditure among residents in Ariyalur district, Tamil Nadu

ORIGINALITY REPORT

3%

SIMILARITY INDEX

PRIMARY SOURCES

- | | | |
|----------|--|-----------------|
| 1 | Yuvaraj Krishnamoorthy, Sathish Rajaa, Isha Sinha, Murali Krishnan, Gerald Samuel, Krishna Kanth.
"Equity and extent of financial risk protection indicators during COVID-19 pandemic in rural part of Tamil Nadu, India", Heliyon, 2023
<small>Crossref</small> | 271 words — 2% |
| <hr/> | | |
| 2 | dspace.sctimst.ac.in
<small>Internet</small> | 57 words — < 1% |
| <hr/> | | |
| 3 | www.bnpp-kd.org
<small>Internet</small> | 22 words — < 1% |
| <hr/> | | |
| 4 | journals.lww.com
<small>Internet</small> | 21 words — < 1% |
| <hr/> | | |
| 5 | rcastoragev2.blob.core.windows.net
<small>Internet</small> | 21 words — < 1% |
| <hr/> | | |
| 6 | www.healthdata.org
<small>Internet</small> | 20 words — < 1% |

EXCLUDE QUOTES ON
EXCLUDE BIBLIOGRAPHY ON

EXCLUDE SOURCES < 15 WORDS
EXCLUDE MATCHES < 20 WORDS