

Original Research



Financial risk protection in receiving healthcare services among residents of Kalutara District

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Abstract

Introduction: Sri Lankan healthcare system includes public and private sectors, with rising private care reliance funded mainly by out-of-pocket expenses (OOPE). Over half of outpatients use private care, exposing households to financial risks and catastrophic health spending.

Objectives: To describe financial strain, indirect costs and barriers to Universal Health Coverage (UHC) in view of financial risk protection in Kalutara District

Methods: A community-based cross-sectional study with an analytical component was conducted in Kalutara District from May to October 2019, inviting 2000 households. Data on household income, expenditure and healthcare costs were collected through an interviewer-administered questionnaire. Scenario-based modelling was done to assess healthcare preferences, accessibility, affordability and financial coping strategies, using retrospective data for comparative household health expenditure analysis. Financial risk protection and associations with catastrophic health expenditure (CHE) were analysed using Mann Whitney U test and chi-squared test. Multiple logistic regression was applied subsequently.

Results: There were 7747 individuals in the 2000 households selected with nearly equal sex distribution. Most participants were over 50 years of age (28.3%) and 26.8% of households had at least one member with a disease, mainly diabetes (12.9%) and hypertension (10.8%). Median monthly income was LKR 68,625 (IQR: LKR 47,125-104,125) with significant spending on food and healthcare. A majority used LP gas for cooking and had electricity. The CHE affected 8.41% of households, with impoverishment rising from 4.8% to 6.7% due to OOPE. Cancer, heart disease, diabetes and arthritis were most strongly linked to CHE.

Conclusions & Recommendations: Notable financial challenges are present among residents of Kalutara District, with 8.41% of households meeting the CHE threshold. Non-communicable diseases like cancer, heart disease and diabetes significantly increase CHE risk, emphasizing the need for stronger financial protection and better healthcare affordability.

Key words: Universal Health Coverage, Catastrophic health expenditure, Financial risk protection

Introduction

Sri Lanka's health system combines free at the point of care government-funded healthcare, with a growing private sector that relies on out-of-pocket payments and is often staffed by public doctors working after hours. This dual system highlights the country's efforts to provide timely healthcare while managing the challenges of a lower-middle-income economy. In the backdrop of high OOOPE, there is a risk of households facing CHE or impoverishment and defaulting treatment permanently (1). Sri Lanka has maintained a moderate incidence of catastrophic expenditure, where 5.3% of the population spent more than 10% of their entire budget on health in 2012 while 0.8% of the population was pushed below the poverty line of \$ 3.10 per capita per day (2). In the Household Income and Expenditure Survey (HIES) of 2019, out of total expenditure, health and personal care was mentioned as 6.5% (3).

Annual health data show that 55% of outpatients choose to receive care from the private sector, while only 45% access services from the state sector (4). Additionally, in 2016, the OOOPE made by households contributed to 53% of the total current health expenditure. These expenses included payments for outpatient and inpatient care from private providers, purchasing prescribed and over-the-counter medicines, other medical supplies from pharmacies, and fees for private laboratory and diagnostic services (5).

The present study, conducted in the Kalutara District of Sri Lanka's Western Province, offers valuable insights into health-related financial profiles, including both direct and indirect costs. It also examined existing financial risk protection measures and explored factors that influence progress toward UHC. Accurate and high-quality data on health financing are essential for addressing key challenges in achieving UHC. By analysing these components, the study highlights important aspects of healthcare affordability and accessibility. Furthermore, the inclusion of diverse settings such as urban, semi-

urban and rural areas in Kalutara District provides a strong basis for understanding variations in healthcare spending and financial protection across different populations. These findings can support the development of targeted interventions, promote equitable allocation of resources and help safeguard households from catastrophic health expenditures. This evidence can guide policymakers in strengthening financial risk protection and advancing UHC efforts in Sri Lanka.

Methods

A community-based cross-sectional study with an analytical component was conducted among members of 2000 households who had been residents in Kalutara District during last six months. All members involved in generating an income were included in the study. Data collection was done from May to October 2019.

The sample size required for the study was calculated to identify the proportion of households having CHE in the Kalutara District (6). It considered 15% as the expected proportion of Sri Lankans having a minor degree of financial risk according to the HIES of 2012/13 (7) (p), 5% significance level (Z) with a margin of error (d) of 5% and a design effect of 2 for an intra-class correlation of 0.1 (8). After adding 10% non-response, the number of required households for the study was 1736.

A two-stage cluster sampling method was used to select the households. Considering 10 households within a *Grama Niladhari* division (smallest administrative division in Sri Lanka) as a cluster, 200 clusters were allocated to all 14 divisional secretariate (DS) divisions of Kalutara District proportionate to the total number of households in each DS division. Within each DS division, the required GN divisions (clusters) were selected randomly and from each, 10 households were selected using systematic sampling.

An interviewer-administered questionnaire consisting of details of household, financial status, healthcare expenses and financial hardships, and health care seeking pattern related financial aspects was used for data collection. Expenses for food, health, housing, transport, and education were considered as essential expenses in the study. Following a thorough literature review and expert opinion, five scenario-based questions were developed to assess financial risk protection aspects of the households: fever for three days needing outpatient department (OPD) treatment, dengue fever needing inward treatment, minor non-urgent surgery planned for the following week (e.g. removing a lump), emergency bypass surgery and cataract surgery. Data collection was done by five trained data collectors who were pre-intern medical graduates.

Data analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 25 software. Financial risk protection was analysed with incidence of CHE (head count), mean positive catastrophic overshoot - mean positive overshoot (MPO), incidence of impoverishment and Poverty Gap Index. The CHE cutoff was regarded as 10% as it was the most commonly used value in such analyses (9-10).

Associations of CHE were tested with Mann

Whitney U test and chi-squared test at 5% significance level. Multivariate logistic regression techniques were applied to detect the independent risk and protective factors of financial risk protection. The factors showing an association at $p < 0.2$ with CHE in the univariate analysis as well as other factors with $p > 0.2$ in the univariate analysis but considering their plausibility and literature, were included purposefully into the multivariate analysis (11).

Results

Response rate was 100%. A total of 2000 households with 7747 study participants were included in the study. Approximately equal percentages of males (49.3%) and females (50.7%) were observed. Most of the participants were more than 50 years old ($n=2196$; 28.3%) and less than 18 years of age ($n=1895$; 24.5%). While 17.6% ($n=1365$) were professionals, 40.3% ($n=3120$) were employed and 14.5% ($n=1127$) were students. There were 26.8% households having a member with a disease, such as diabetes (12.9%) and hypertension (10.8%) being the most common diseases. Continuous medical care was needed by 22.3%. Majority of the households used LP gas for cooking (88.7%), had electricity (98%) and owned a television (94.1%), while only 23.8% had a personal vehicle.

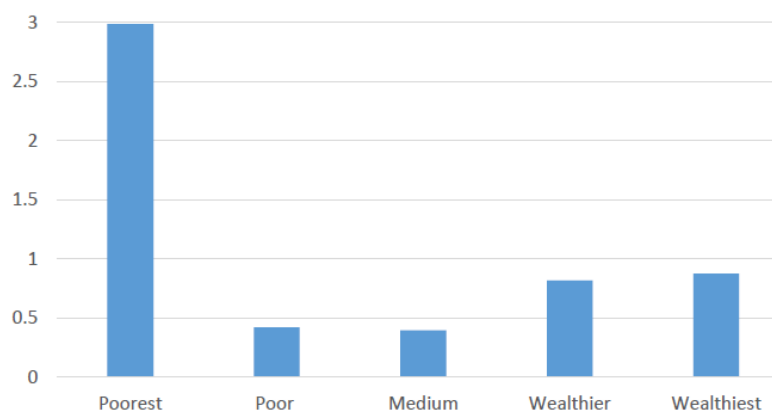
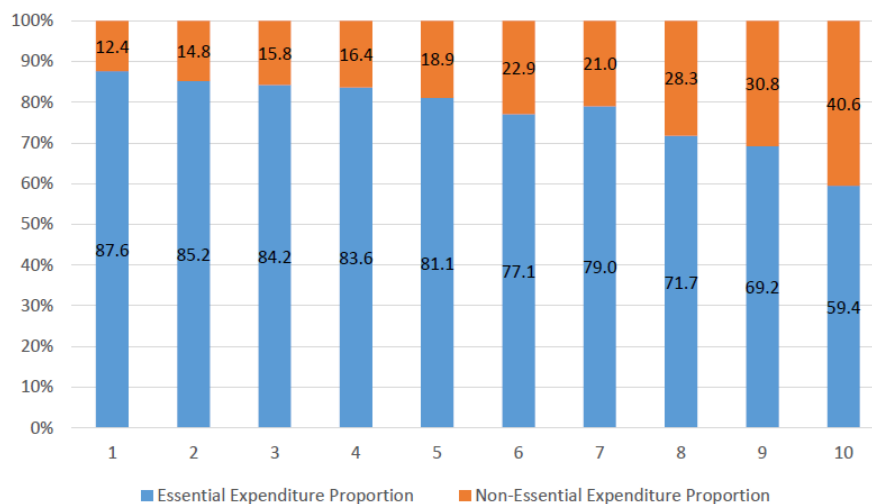


Figure 1: Value difference of the maximum and minimum wealth index score of each quintile

Principal Component Analysis (PCA) was carried out to weight each factor and to calculate a wealth index score for each household according to the household assets. They were categorized into five quintiles from poorest to wealthiest. The highest value difference of

the maximum and minimum wealth index scores was observed in the “poorest” category (Figure 1). Income of the study participants from various sources is depicted in supplementary file 1.



*1-10 reflects the respective deciles

Figure 2: Essential and non-essential expenditure proportion among households across the deciles

The median monthly expenditure of the sample was LKR 61,795 (IQR: 42,160-93,865), with the highest reported for food (LKR 20,000) followed by education (LKR 6000). Over 28% accessed curative care, with lower rates for preventive (0.59%) and rehabilitative (0.08%) services. Over 90% of participants felt that government services adequately met their curative, preventive and rehabilitative healthcare needs. Satisfaction with curative care was notably higher among those who used private sector services (Figure 2).

The median expenditure for consultations was LKR 2000 (IQR: LKR 1800-2500). Among the treatment costs, getting angiograms done was reported to have the highest expenditure (median: LKR 37,500; IQR: 20,000-40,000). Total healthcare cost median was LKR 6830 (IQR: 4965-10,260), while direct healthcare cost median was LKR 3990 (IQR: 1710-11,400). Indirect healthcare cost median was LKR 3600 (IQR: 1600-8000). The breakdown of direct and indirect health expenditure among the households during a period of one month is

summarized in supplementary file 1.

In scenario-based analysis, 73.4% (n=1475) preferred private care for a three-day fever, mainly for convenience, while over 75% chose government facilities for dengue, surgeries and cataract procedures due to cost, reliability and trust. For emergency bypass surgery, three times more participants selected government hospitals (supplementary file 2).

For a three-day fever, 7.5% of the households could not afford any amount of expenses and 68.9% could afford it if it would be less than LKR 2000. Out of those who would select the private sector for the same condition, 42.6% (n=615) could afford it if the cost was less than LKR 2000 and 59.6% (n=880) could afford it only if the cost was less than LKR 10,000. In case of a dengue fever, 28.9% (n=13) of the households who would attend the private sector could afford the cost if it was between LKR 20,000-30,000. One fifth of the participants (n=102; 20.9%) could afford to spend between LKR 40,000-50,000

for a minor surgery out of the people who would go for the private sector. Among those choosing the government sector, 11.6% (n=182) said they couldn't afford lenses, while 23.5% (n=368) could afford them only if the cost was below LKR 5000. Majority

of the people who would go to the private sector for an emergency bypass surgery could afford LKR 50,000-60,000 (n=263; 61.8%). Scenario-wise preferences were summarized in Table 1.

Table 1: Scenario-wise preferences, affordability, and facility availability: government versus private sector in the Kalutara District

Scenario	Preferred sector (%)	Key reason	Key affordability findings	Key facility availability
Three-day fever	Private 73.4%	Convenience & accessibility	42.6% of private users only if < LKR 2,000	Counselling 66.9% Labs 69.4% Pharmacy 83.9% (pvt.)
Dengue fever	Govt. 97.8%	Trust in reliability & affordability	Private use minimal (2.2%)	ICU 89.4% Labs 71.2% (govt.)
Minor surgery	Govt. 75.8%	Affordability of surgery	20.9% private users afford LKR 40,000 - 50,000	Surgical theatre 83% (govt.); 73.3% (pvt.)
Emergency bypass surgery	Govt. 78.8%	Lower cost & wider ICU/theatre access	61.8% private users afford LKR 50,000 - 60,000	ICU 91.2% Surgical theatres 92.9% (govt.)
Cataract surgery	Govt. 79.5%	High private cost; affordability of lenses	23.5% afford lenses only if < LKR 5000; 11.6% not affordable	Govt. access broad; higher satisfaction private

About half of households relied on insurance for costly procedures like emergency bypass (47.9%) and cataract surgery (50.6%). For minor fever episodes, 32.9% restricted daily expenses. CHE affected 8.41% of households, with MPO 14–16%, and impoverishment rising from 4.8% to 6.7% due to

OOPE. The poverty gap index was 1.2% and 1.65% before and after the total health payments (Table 2). When only the direct health expenses were considered, the post-health payment value was 1.43%.

Table 2: Poverty gap index and average deviation of the sample below the poverty line

Comparison	Poverty gap index
When per capita total expenditure was compared with the poverty line	1.65% (76.64/ 4650)
When per capita (total expenditure- total health expenditure) was compared with the poverty line	1.2% (56.3/ 4650)
When per capita (total expenditure- direct health expenditure) was compared with the poverty line	1.43% (66.62/4650)

The bivariate analysis of the CHE at 10% cut-off is shown in Table 3. In addition to the total income, the number of householders with nine disease conditions was having significant associations with the

occurrence of CHE at 10% cut-off level. The number of family members of a household was not significantly associated with occurrence of the CHE at 10% cutoff level.

Table 3: Bi-variate analysis of the CHE at 10% cut-off when total expenditure was concerned

Factor	Test statistic*	p-value
Total monthly income	519211.5	<0.001
Number of family members	455936.0	0.753
Number of householders with heart disease	550064.5	0.001
Number of householders with hypertension	556517.0	0.001
Number of householders with diabetes	601072.0	0.001
Number of householders with asthma	439877.5	0.043
Number of householders with epilepsy	456747.0	0.04
Number of householders with cancer	458466.5	<0.001
Number of householders with kidney disease	457734.5	0.019
Number of householders with arthritis	493747.0	<0.001
Number of householders with gastritis	463746.0	0.026

*Statistically significant at 5% significance level when applied Mann Whitney U test; Reference categories: ≤ LKR 50,000 income and ≤4 family members per household; Outcome variable: with CHE (category 1) and without CHE (category 0)

Significant predictors of CHE include heart disease (OR: 3.13; $p<0.001$), diabetes (OR: 2.19; $p<0.001$), cancer (OR: 7.12; $p=0.004$), arthritis (OR: 1.74; $p<0.001$), hypertension (OR: 1.29; $p=0.003$), and kidney disease (OR: 2.37; $p=0.048$). Households with cancer showed the highest financial burden (OR: 7.12), while asthma and epilepsy were not

significantly associated with CHE (Table 4). Household income was not considered as a potential predictor in multivariable analysis, since the dependent variable (i.e. CHE) was already defined based on the ratio of OOE to household income/expenditure.

Table 4: Multivariable binary logistic regression of catastrophic health expenditure at the 10% total expenditure cut-off

Factor	Beta co-efficient	Adjusted odds ratio (95% CI)	p-value
Number of householders with heart disease	1.14	3.13 (2.36, 4.17)	<0.001*
Number of householders with hypertension	0.26	1.29 (1.9, 1.53)	0.003*
Number of householders with diabetes	0.78	2.19 (1.86, 2.56)	<0.001*
Number of householders with asthma	-0.09	0.91 (0.7, 1.18)	0.461
Number of householders with epilepsy	0.69	2.0 (0.78, 5.07)	0.145
Number of householders with cancer	1.96	7.12 (1.89, 26.87)	0.004*
Number of householders with kidney disease	0.86	2.37 (1.01, 5.59)	0.048*
Number of householders with arthritis	0.55	1.74 (1.31, 2.3)	<0.001*
Number of householders with gastritis	0.29	1.33 (0.94, 1.89)	0.107

*Statistically significant at 5% significance level; Reference categories: ≤ LKR 50,000 income and ≤4 family members per household; Outcome variable: with CHE (category 1) and without CHE (category 0)

Model fitting information: Nagelkerke R square=0.213; overall percentage correct with classification table=72.4%; Hosmer and Lemeshow test significance=0.069

Discussion

This study is among the first in Sri Lanka to explore financial risk protection within the framework of UHC using comprehensive household-level data from an entire district. By combining descriptive and analytical approaches, it provides a nuanced picture of perceived healthcare needs, healthcare-seeking patterns and OOPE in the Kalutara District. The findings contribute valuable insights into the current state of financial protection in Sri Lanka, particularly in the context of a dual health system where a free public sector coexists with a rapidly growing private sector.

The study revealed that over one-fourth of households had members with known diseases, while more than one-fifth reported continuous medical needs. This is consistent with the national profile where the burden of non-communicable diseases (NCD) has been steadily rising (12). Globally, the World Health Organization estimates that NCDs account for 71% of all deaths, with the majority occurring in low- and middle-income countries (LMICs) (13). In Sri Lanka, over 80% of total mortality is attributed to NCDs, suggesting that the increasing prevalence of chronic illness directly translates into higher financial vulnerability for households.

The median monthly income among study households was LKR 68,625, higher than the national medians reported by the HIES in 2016 and 2019. Similarly, household expenses were also higher. While temporal differences partly explain this, the findings suggest that the Kalutara District represents a relatively advantaged socioeconomic profile compared to the national average. Similar urban-rural disparities in financial protection have been documented in countries like India (14) and Vietnam (15), where wealthier or urban households report higher incomes and expenditures, yet are not necessarily shielded from catastrophic costs. For policymakers, this highlights the importance of disaggregated monitoring of CHE and

impoverishment at sub-national levels rather than relying solely on national aggregates.

Scenario-based modelling showed clear preference patterns. Private facilities were chosen for minor fevers due to convenience, echoing trends in India and Pakistan (16-17). For dengue and major surgeries, households preferred government facilities for reliability and affordability, consistent with findings from Thailand and Pakistan, underscoring the public sector's essential role in equitable high-cost care (18-19).

These results highlight a fundamental policy implication: the public sector remains indispensable for financial protection in high-cost care, while the private sector fulfils convenience-driven demand. Balancing these roles through regulatory frameworks, strategic purchasing, and partnerships could strengthen UHC efforts.

This study found CHE incidence of 8.41% at the 10% cut-off, which was higher than HIES estimates because both direct and indirect costs were included (20). Globally, around 11.7% of households face CHE (21), while Indian estimates approach 17% (16) and Vietnamese data also show marked impoverishment (15). In Kalutara District, 6.7% of households fell below the poverty line after health spending and the poverty gap index reached 1.2%. Cancer, heart and kidney disease strongly predicted CHE, while family size had little effect, highlighting disease burden as the main driver (22-23).

The mean positive overshoot values (14-16%) observed in this study provide a more nuanced understanding of the depth of financial burden. This is lower than Ethiopia (17.3% among households with depression) but higher than Nepal, where overshoot values reached nearly 50% for certain conditions. The implication is that while fewer households may cross the CHE threshold, those that do experience a severe and disproportionate burden, often requiring debt or asset sales to cope. Policy

responses must therefore not only reduce incidence but also cushion households from extreme overshoot.

These findings have important implications for Sri Lanka's progress toward UHC. Strengthening financial protection is critical, as general taxation and free public care alone are inadequate; risk pooling, social health insurance, or targeted NCD subsidies could reduce OOPE. Addressing indirect costs such as transport and income loss through workplace schemes or vouchers would ease hidden burdens. Expanding preventive and early interventions could lower disability and CHE linked to NCDs. Integrating private providers via regulation and strategic purchasing, while prioritizing equity for poorer households, remains essential.

Nevertheless, the study relied on self-reported data, raising risks of recall bias. The focus on a one-month expenditure recall could be influenced by seasonal or circumstantial variations. Nonetheless, the comprehensive inclusion of both direct and indirect costs and the use of scenario-based modelling enhance the robustness of findings. Future studies could strengthen external validity by expanding to multiple districts and incorporating longitudinal designs.

Conclusions & Recommendations

Over a quarter of households in Kalutara District had members with a known chronic disease and more than 5% households with disabilities. The poorest households experienced the highest wealth disparity, while the middle-income group had the lowest, based on the wealth index. Indirect health expenditure contributed significantly to the total health expenditure and must be included when calculating CHE. The OOP health expenses increased the incidence of impoverishment from 4.8% to 6.7% and raised the poverty gap index from 1.2% to 1.65%. Chronic conditions like heart disease, diabetes and cancer were linked to higher CHE, highlighting the need for more research and better financial risk protection for families.

The recommendations include strengthening comparative monitoring through benchmarking sub-national data with regional LMIC experiences to guide equitable reforms and improve financial protection indicators. Further, implementing context-specific policies is recommended through Samurdhi health support, piloting NCD-focused insurance models and reinforcing primary healthcare-based screening to reduce OOPE, safeguard vulnerable households and accelerate Sri Lanka's progress toward UHC.

Public Health Implications

- This study offers critical insights into the financial risk protection state of UHC in the Kalutara District, emphasizing the importance of addressing financial risks, enhancing service utilization, and improving awareness about preventive care. By leveraging existing public health infrastructure and addressing identified gaps, policymakers can take significant strides toward achieving UHC in Sri Lanka.

Author Declarations

Competing interests: The authors declare that they have no competing interests

Ethics approval and consent to participate: Ethics approval was obtained by the Ethics Review Committee of National Institute of health Services- Kalutara (NIHS/ETC/19/82R). Administrative clearance was

obtained from the Director General of Health Services, Provisional and Regional Health authorities and the relevant Divisional Secretaries. Informed written consent was obtained from each participant prior to data collection.

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Author contributions: HND: participated in the designing of the study, data collection, and performed the statistical analysis, drafting the manuscript; PdS: Supervisor; and DSKD: data collection and data entry and MDUB- data collection and data entry. All authors read and approved the final manuscript.

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Supplementary file 1: Breakdown of health expenditures [LKR] of the study households during the past month

Supplementary file 2: Facilities available 24×7 in the preferred sector (government or private) as perceived by the participants in each of the five scenarios