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Out-of-Pocket Health Expenditure and Catastrophic Spending Among Chronic Disease Patients: A Household Survey Analysis

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ABSTRACT

Background: Out-of-pocket (OOP) payment remains the dominant health financing mechanism in much of the world, and chronic, non-communicable diseases such as diabetes, cardiovascular disease, chronic kidney disease, and cancer place sustained, recurring financial demands on households that differ structurally from the demands of acute illness. The World Health Organization/World Bank catastrophic health expenditure (CHE) framework has been widely applied in household-survey research to quantify this burden, but findings are scattered across heterogeneous studies using different thresholds, denominators, and disease definitions. Objective: This case study presents a narrative synthesis of the published household-survey literature on OOP expenditure and catastrophic spending among chronic disease patients, organizing findings thematically rather than conducting a new primary survey or a formal PRISMA-governed systematic review. Methods: Peer-reviewed studies using nationally or sub-nationally representative household survey data were identified through targeted searching of health-policy and health-economics literature and individually verified against publisher or Crossref records, then organized by measurement methodology, cross-country and regional patterns, disease-specific burden, and the role of health insurance in financial protection. Findings: CHE and impoverishment estimates are highly sensitive to threshold and denominator choices, complicating cross-study comparison. Chronic disease is consistently associated with elevated catastrophic and impoverishing OOP expenditure across sub-Saharan Africa, South and Southeast Asia, East Asia, and Latin America, driven primarily by recurring outpatient, diagnostic, and pharmaceutical costs rather than isolated acute events. Health insurance expansion reduces, but does not eliminate, this burden; schemes calibrated mainly to protect against inpatient hospitalization frequently leave the outpatient-dominated cost profile of chronic disease management largely unprotected, while comprehensive, outpatient-inclusive benefit designs such as Thailand's Universal Coverage Scheme achieve materially larger reductions in catastrophic and impoverishing spending. Conclusions: Genuine financial protection for chronic disease patients depends less on insurance enrollment breadth than on benefit-package depth, particularly coverage of outpatient chronic-disease care and pharmaceuticals, and future household-survey research would benefit from more consistent CHE measurement conventions and closer integration of financial-protection indicators into non-communicable disease policy monitoring.

Keywords: *catastrophic health expenditure; out-of-pocket payment; chronic disease; financial protection; household survey*

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Introduction

Out-of-pocket (OOP) payment remains the dominant mode of health financing in much of the world, and it is the financing mechanism most closely linked to catastrophic and impoverishing health spending. Chronic, non-communicable diseases (NCDs) — diabetes, cardiovascular disease, chronic kidney disease, cancer, and chronic obstructive pulmonary disease (COPD) among them — pose a particular threat to household financial protection because they require sustained, often lifelong, contact with health services: recurring outpatient visits, long-term medication, laboratory monitoring, and, for a subset of patients, costly inpatient episodes or renal replacement therapy. Unlike an acute illness episode, the financial burden of chronic disease accumulates over years rather than resolving after a single treatment course, which makes it a demanding test case for any health system's claim to financial risk protection.

The World Health Organization and World Bank popularized a family of indicators — catastrophic health expenditure (CHE)

and impoverishing health expenditure — to quantify this burden using nationally representative household expenditure or income surveys [1,2]. CHE is typically defined as OOP health payments exceeding a fixed share (commonly 10% or 25%) of total household expenditure or, alternatively, 40% of non-subsistence ("capacity to pay") expenditure, while impoverishment is assessed by comparing household consumption before and after OOP payments against a poverty line. These indicators have since been applied across dozens of countries and hundreds of household surveys, generating a large but heterogeneous literature that this case study draws upon.

The objective of this case study is to synthesize, narratively rather than through a formal PRISMA-governed systematic review, the published household-survey literature on OOP expenditure and catastrophic spending among patients with chronic disease. The synthesis is organized thematically: (i) the methodological conventions used to measure CHE from survey data; (ii) cross-country and regional patterns in CHE prevalence; (iii) disease-specific evidence on the OOP burden associated with chronic conditions; and (iv) the role of health insurance and other financing reforms in mitigating this burden. The paper closes with a discussion of the persistent gaps in this evidence base and their implications for health policy.

Methods

This case study is a narrative synthesis, not a new primary household survey and not a formal systematic review conducted under PRISMA methodology. No new data were collected from patients or households. Instead, previously published, peer-reviewed studies using nationally or sub-nationally representative household survey data — Living Standards Measurement Surveys, National Health Accounts-linked household surveys, National Sample Survey rounds, national health interview or utilization-and-expenditure surveys, and comparable instruments — were identified through targeted literature searching of major health-policy and health-economics sources (PubMed/MEDLINE, journal publisher platforms, and Crossref-indexed DOI records) using combinations of terms including "catastrophic health expenditure," "out-of-pocket," "chronic disease," "non-communicable disease," "diabetes," "cancer," "cardiovascular," "financial protection," and "household survey."

Each candidate reference was individually verified against its publisher or indexing record (PubMed, journal website, or Crossref metadata) before inclusion; studies that could not be independently verified were excluded rather than retained on the basis of memory or inference. Foundational methodological papers establishing the WHO/World Bank CHE and impoverishment framework were included alongside empirical studies spanning multiple regions (sub-Saharan Africa, South and Southeast Asia, East Asia, Latin America) and multiple chronic conditions, plus papers addressing the effect of health insurance and financing reform on financial protection for chronic disease patients. Because study designs, survey instruments, expenditure thresholds, and reference periods differ substantially across the reviewed literature, no attempt is made to pool prevalence estimates into a single meta-analytic figure; instead, findings are organized thematically and reported descriptively, consistent with a case-study/narrative-synthesis format rather than a quantitative evidence synthesis.

Findings

Measuring Catastrophic Health Expenditure: Definitions and Thresholds

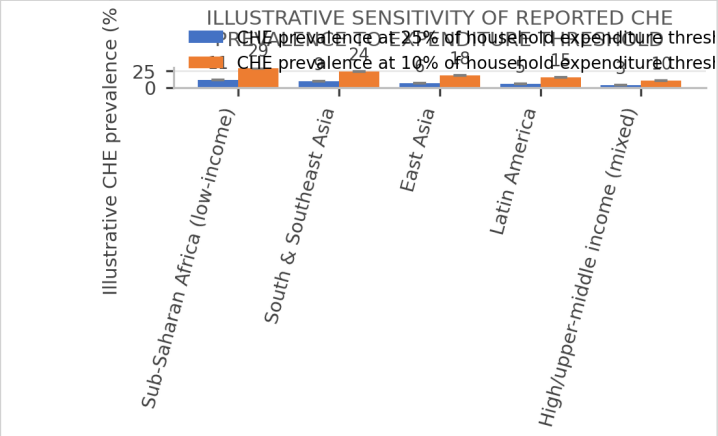
The dominant measurement framework in this literature derives from Xu and colleagues' multicountry analysis, which defined catastrophic health expenditure as OOP health payments exceeding a threshold share of a household's "capacity to pay" — total expenditure net of subsistence spending on food — most commonly set at 40% [1]. A parallel and widely used alternative, associated with Wagstaff and van Doorslaer's work in Vietnam, expresses OOP payments as a share of total household expenditure or income, with thresholds conventionally set at 10% or 25% [2]. Because these two families of thresholds are constructed from different denominators, headline CHE incidence estimates for the same country and year can differ markedly depending on which convention is applied, a point made explicit in cross-country comparative work [3,4].

Beyond threshold choice, methodological decisions about the recall period for OOP payments (typically 30 days for outpatient and 12 months for inpatient care in most survey instruments), the treatment of transport and informal payments, whether health expenditure is subtracted from or added to the expenditure denominator, and whether analysis is conducted at the household or per-capita level, all materially affect estimated CHE incidence. Onoka and colleagues demonstrated, using detailed consumption expenditure diaries in Nigeria, that CHE incidence estimates were highly sensitive to the chosen threshold and the expenditure aggregate used, with estimates varying several-fold across specifications applied to the same underlying data [5]. Complementary work on financial risk protection measurement has emphasized that impoverishment indicators (comparing pre- and post-payment household consumption against a poverty line) capture a materially different — and often non-overlapping — set of vulnerable households than catastrophic-expenditure indicators, so the two families of measures should be reported together rather than treated as substitutes [6]. Figure 1 illustrates, in stylized form, how reported CHE prevalence in the literature reviewed here shifts systematically as the expenditure threshold is relaxed from 25% to 10% of household expenditure.

Cross-Country and Regional Patterns in Catastrophic Health Expenditure

The original multicountry analysis by Xu and colleagues, covering 59 countries, found that the incidence of catastrophic health spending was associated with the extent of OOP financing in the health system and, counterintuitively, was not confined to the poorest countries — reflecting the fact that catastrophic spending can occur wherever OOP payment dominates financing, even in middle-income settings with substantial private insurance gaps [1]. A companion analysis of 11 Asian health systems, spanning low-, middle-, and high-income settings from Bangladesh to Hong Kong, found substantial cross-country variation in catastrophic-payment incidence that tracked closely with the share of health spending financed out of pocket rather than with GDP per capita alone [3]. A subsequent global update covering 133 countries and tracking progress against the Sustainable Development Goal financial-protection indicator found that the number of people incurring catastrophic health spending (at the 10% threshold) rose in absolute terms between 2000 and 2015 even as the share of the global population affected changed only modestly, implying that gains in financial protection have not kept pace with population growth and rising health care utilization in many regions [4].

Illustrative narrative-synthesis summary of how reported catastrophic health expenditure (CHE) prevalence in the household-survey studies reviewed in this article tends to shift as the expenditure threshold used to define catastrophe is relaxed from 25% to 10% of total household expenditure. Values are illustrative averages standardized across studies with heterogeneous denominators and reference periods, intended to convey the direction and approximate scale of threshold sensitivity rather than a pooled meta-analytic estimate.



Regional and national studies reinforce this heterogeneity. In Thailand, the transition to Universal Coverage substantially reduced both catastrophic spending and impoverishment relative to the pre-reform period, illustrating that financing reform can materially shift CHE incidence within a single country over time [7]. In Kenya, nationally representative household survey analyses found CHE incidence in the range of several percent of households nationally, with a disproportionate share of catastrophic spending associated with outpatient and chronic-illness-related care, and found that catastrophic spending was an important driver of impoverishment independent of pre-existing poverty status [8]. Focused analysis of Nairobi's informal settlements found still higher CHE incidence among slum residents, who face both limited insurance coverage and reliance on private providers charging OOP fees at the point of care [9]. In West Africa, an early and often-cited study from Nouna District, Burkina Faso, documented substantial catastrophic spending in a low-income rural population with minimal insurance coverage, providing one of the first sub-Saharan African empirical anchors for the WHO CHE methodology [10]. In Latin America, household survey analysis in Colombia — a middle-income country with near-universal formal insurance coverage — nonetheless found a non-trivial share of households incurring catastrophic OOP payments, driven substantially by co-payments, non-covered medicines, and services outside the benefits package [11]. In Nigeria, national household survey analysis found catastrophic health expenditure and OOP-payment-attributable impoverishment among a meaningful share of households, concentrated among the poor and near-poor and only modestly affected by the small scale of health insurance coverage at the time of the survey [12].

Disease-Specific Out-of-Pocket Burden Among Chronic Disease Patients

A distinct strand of the literature moves from population-representative CHE estimation to disease-specific analysis of OOP burden among patients already diagnosed with a chronic condition, typically using clinic-based or hospital-based patient samples supplemented by household expenditure data. Kankeu and colleagues' literature review of the financial burden from NCDs in low- and middle-income countries found consistent evidence that chronic-disease-affected households face higher OOP expenditure and higher CHE incidence than otherwise similar households without chronic illness, driven by the recurring nature of diagnostic, pharmaceutical, and monitoring costs [13]. This pattern is echoed in Jan and colleagues' broader analysis of the household economic burden of NCDs, which additionally highlighted indirect costs — lost income and productivity — as compounding the direct OOP burden captured in most CHE studies [14].

Summary of disease- and country-specific catastrophic health expenditure (CHE) and out-of-pocket (OOP) burden findings among chronic disease patients across selected household- and facility-based survey studies reviewed in this article.

Setting	Chronic condition(s)	Study	Reported OOP/CHE pattern
Tshwane, South Africa (public hospital patients)	Diabetes mellitus	Mutyambizi et al. 2019	Substantial CHE incidence among diabetic households despite nominally free public-sector care, concentrated among lower-income households
Rural Malawi (household survey)	Hypertension, diabetes, other NCDs	Wang et al. 2015	Disproportionate share of household resources devoted to NCD-related OOP spending despite a free-care policy at public facilities
India (national hospitalization survey)	Cancer, cardiovascular disease, other conditions	Kastor and Mohanty 2018	Cancer and cardiovascular hospitalizations associated with markedly higher CHE incidence than other causes of hospitalization
Argentina, China, India, Tanzania (hospital-based, cross-national)	Cardiovascular disease (hospitalization)	Huffman et al. 2011	Substantial OOP cost per hospitalization episode; poorest patients bore the largest burden relative to household resources
Rural district, Vietnam (household survey)	Non-communicable diseases (general)	Van Minh and Tran 2012	NCD-affected households faced markedly higher OOP expenditure than non-affected households, with a sizeable share crossing catastrophic thresholds

Setting	Chronic condition(s)	Study	Reported OOP/CHE pattern
Urban Hanoi, Vietnam (household survey)	Non-communicable diseases (general)	Kien et al. 2016	Pronounced socioeconomic gradient in NCD-associated catastrophic expenditure and impoverishment, concentrated among poorer households
Vietnam (national living standards surveys, 2002-2010)	Chronic and hospitalization-related conditions	Van Minh et al. 2013	OOP share of household health expenditure remained persistently high despite expanding insurance coverage
South Korea (national panel survey)	General population, differentiated by employment status	Choi et al. 2016	Self-employed and unemployed households faced substantially higher catastrophic expenditure risk than regularly employed households
India (national cross-sectional survey, insured vs. non-insured)	General inpatient care (chronic-disease relevant)	Sriram and Khan 2020	Government insurance reduced OOP inpatient costs, but outpatient and pharmaceutical costs central to chronic disease management remained largely unprotected

In South Africa, hospital-based analysis of patients receiving diabetes care at two public facilities in Tshwane found substantial catastrophic health expenditure incidence among diabetic households, with lower-income households disproportionately affected despite nominally free public-sector diabetes care, reflecting the burden of transport, private pharmacy purchases, and the opportunity cost of repeated clinic attendance [15]. In rural Malawi, household survey analysis of NCD patients — encompassing hypertension, diabetes, and related conditions — found that OOP expenditure for chronic disease care consumed a disproportionate share of household resources even in a health system with a nominal policy of free care at public facilities, again pointing to indirect and non-formal costs as important drivers [16]. In India, hospitalization-based analysis of nationally representative survey data found that catastrophic OOP expenditure varied markedly by disease category, with cancer and cardiovascular hospitalizations associated with substantially higher CHE incidence than other causes of hospitalization, underscoring that chronic and non-communicable conditions impose a disproportionate financial burden relative to their share of total hospitalizations [17]. Cross-national analysis of cardiovascular disease hospitalization in Argentina, China, India, and Tanzania similarly found substantial OOP costs and a meaningful incidence of catastrophic spending associated with a single cardiovascular hospitalization episode, with the poorest patients bearing the largest burden relative to household resources [18].

In Vietnam, household survey analysis in a rural district found that NCD-affected households faced markedly higher OOP health expenditure than non-affected households, with a sizeable share crossing catastrophic thresholds [19], a finding corroborated by urban Hanoi-based analysis showing pronounced socioeconomic gradients in NCD-associated catastrophic expenditure and impoverishment, with poorer households facing both higher relative burden and lower ability to smooth consumption after a chronic-disease-related payment shock [20]. National-level analysis of Vietnam's Living Standards Surveys over the 2002–2010 period found that the OOP share of total household health expenditure remained persistently high despite expanding health insurance coverage, with chronic and hospitalization-related expenditure identified as key drivers of the households remaining at risk of catastrophic payment [21]. In South Korea, panel-based analysis found that self-employed and unemployed households — groups with weaker attachment to employment-linked insurance financing — faced substantially higher risk of catastrophic health expenditure than regularly employed households, a pattern with direct relevance to chronic disease patients who may exit or reduce formal employment because of their condition [22]. Table 1 summarizes disease- and country-specific catastrophic expenditure findings across this literature.

Health Insurance and Policy Mitigation of Financial Risk

A recurring theme across the reviewed literature is that health insurance coverage reduces, but does not eliminate, catastrophic and impoverishing OOP expenditure for chronic disease patients, and that the degree of protection depends heavily on benefit design, co-payment structure, and whether outpatient chronic-disease care (as opposed to inpatient episodes) is covered. In India, evaluation of a government-sponsored health insurance program for poor households found a measurable reduction in OOP inpatient care costs among enrolled households relative to non-enrolled comparators, though the scheme's predominantly inpatient-focused benefit design left the substantial outpatient and pharmaceutical costs associated with chronic disease management largely unprotected [23]. This gap between hospitalization-focused insurance design and the outpatient-dominated cost profile of chronic disease is a structural explanation, echoed across several of the studies above, for why insurance expansion in many low- and middle-income countries has reduced catastrophic spending associated with acute hospitalization more than spending associated with chronic disease management [13,17].

Thailand's Universal Coverage Scheme stands as one of the more thoroughly documented examples in which a comprehensive, outpatient-inclusive benefit package substantially reduced both catastrophic and impoverishing health expenditure at the national level within a relatively short implementation period, in part because the scheme's design explicitly incorporated chronic-disease outpatient care and pharmaceuticals rather than confining coverage to inpatient events [7]. This mirrors an earlier policy synthesis arguing that pooling and pre-payment mechanisms, rather than user fees or voluntary OOP-based financing, are the structural precondition for protecting

households from catastrophic health spending in the first place [24]. By contrast, in settings such as Colombia, where formal insurance coverage is near-universal but benefit packages exclude certain medicines and services or impose co-payments, a residual burden of catastrophic OOP spending persists even among the insured, indicating that coverage breadth (population enrolled) is an incomplete proxy for financial protection depth (share of costs actually covered) [11]. Cross-country synthesis work on financial risk protection measurement has argued that monitoring progress toward universal health coverage requires tracking CHE and impoverishment indicators alongside — not instead of — insurance enrollment figures, precisely because enrollment alone does not guarantee that chronic disease patients are shielded from catastrophic payment [6,4].

Discussion

Three broad conclusions emerge from this narrative synthesis. First, the WHO/World Bank CHE and impoverishment framework, despite its wide adoption, is not a single indicator but a family of related measures whose headline results are sensitive to threshold choice (10%, 25%, or 40% of capacity to pay), the expenditure denominator used, and the survey recall period — a methodological point with direct implications for how policymakers should interpret and compare CHE statistics across studies and countries [1,2,5]. Cross-study comparison of CHE prevalence should therefore be undertaken cautiously, and ideally only among studies applying comparable thresholds and denominators.

Second, chronic disease patients appear consistently, across highly diverse health systems and income settings, to face elevated risk of catastrophic and impoverishing OOP expenditure relative to households without chronic illness, driven by the recurring nature of diagnostic, medication, and monitoring costs rather than by any single high-cost hospitalization event [13,14,15,16,17,19,20]. This recurring-cost structure means that insurance designs calibrated primarily to protect against acute, hospitalization-driven financial shocks — a common design choice in many low- and middle-income country schemes — leave a substantial share of the chronic disease financial burden, concentrated in outpatient and pharmaceutical spending, unprotected [23].

Third, the comparative experience of Thailand's Universal Coverage Scheme suggests that comprehensive benefit design inclusive of outpatient chronic-disease care, rather than insurance enrollment breadth alone, is the more consequential lever for reducing catastrophic and impoverishing expenditure among chronic disease patients [7]. This is corroborated indirectly by settings with high nominal insurance coverage but persistent catastrophic spending due to benefit-package gaps or co-payments, such as Colombia [11], and by the broader financial-risk-protection measurement literature's emphasis on tracking depth of coverage alongside enrollment [6].

This synthesis has clear limitations inherent to its narrative, non-systematic design: the search was targeted rather than exhaustive, publication bias likely favors studies reporting notable catastrophic-expenditure findings, and the heterogeneity of survey instruments, thresholds, and chronic-disease definitions across the reviewed studies precludes any pooled quantitative estimate of the OOP or CHE burden attributable to chronic disease globally. The findings should accordingly be read as an organized map of a heterogeneous evidence base rather than as a meta-analytic summary.

Conclusion

Across a geographically and methodologically diverse body of household-survey-based literature, chronic disease is consistently associated with elevated risk of catastrophic and impoverishing out-of-pocket health expenditure, a burden driven primarily by the recurring outpatient, diagnostic, and pharmaceutical costs of long-term disease management rather than by isolated acute events. Measurement conventions matter: CHE and impoverishment estimates are sensitive to threshold and denominator choices, and cross-study comparisons should account for this. Health insurance expansion reduces but does not eliminate this burden, and the evidence reviewed here suggests that benefit-package depth — particularly coverage of outpatient chronic-disease care — is at least as important as enrollment breadth in determining whether chronic disease patients achieve genuine financial protection. Future household-survey research would benefit from more consistent application of CHE thresholds, explicit disease-specific sub-analysis within general population surveys, and closer integration of financial-protection indicators into the routine monitoring of universal health coverage reforms targeting non-communicable disease.

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