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# OUT-OF-POCKET EXPENDITURE ON MEDICINES AMONG PATIENTS WITH CHRONIC DISEASES

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**Abstract**

Medicines are the largest component of out-of-pocket health spending in many countries, and people living with chronic diseases buy them month after month. This narrative review summarises published work on how out-of-pocket expenditure on medicines is measured, how large the burden is for chronic conditions such as diabetes, hypertension and heart disease, which factors raise it, and what follows for adherence, health and household finances. It also reviews policy responses including insurance, generic substitution and price regulation. Findings are consistent in direction but vary in method and setting, and few studies follow patients over time. The article is a review of published evidence and reports no new survey data.

## 1. INTRODUCTION

A prescription is only useful if the patient can pay for it. In health systems where care is largely tax-funded or fully insured, this is easy to forget. In many others, particularly in low- and middle-income countries, medicines are bought at the pharmacy counter with money from the household budget, and a month's supply of drugs for diabetes, hypertension or asthma can compete with food, rent and school fees [1, 2]. Medicines account for a larger share of out-of-pocket health spending than most people expect, and for the chronically ill the bill recurs indefinitely, since the treatment does not end.

The rise of noncommunicable diseases has made this a mainstream concern rather than a

niche one. Chronic conditions now cause most deaths worldwide and most of the growth in health care demand, and they affect households through the cost of care as well as through lost earnings [3, 4]. Studies from India, China, Vietnam, Kenya and other settings have documented how long-term treatment can push families into debt, force the sale of assets, or lead them to skip doses [5, 6]. Even in wealthier countries with extensive coverage, cost-sharing for prescriptions can lead patients to underuse essential drugs [7, 8].

This review brings together published evidence on out-of-pocket expenditure on medicines among people with chronic diseases. It covers how the burden is defined and measured, the size and distribution of the burden in the main conditions, the factors that raise or lower it, its consequences for adherence, health and household finances, and the policies that have been tried. The article is a synthesis of published research and does not report a new survey or primary data. Where figures are quoted they are taken from the cited sources and are best read as illustrations of scale and not as universal values [9, 10].

Terminology used in the rest of this review follows common practice. Out-of-pocket (OOP) payments are those made directly by the patient at the point of care. Noncommunicable diseases (NCDs) cover cardiovascular disease, diabetes, chronic respiratory disease and cancer, which together dominate chronic treatment needs. Universal health coverage (UHC) is the goal that all people can obtain needed services without financial hardship, and the World Health Organization (WHO) has made protection against OOP burden one of its two core measures of progress towards it [11, 12]. The use of these terms is not uniform across the literature, so figures from different studies should be compared with caution [13, 14].

Before turning to the evidence, a point about wording. Out-of-pocket expenditure means payments made by patients or their households at the time of service use, not reimbursed by any insurer or public programme. It excludes the premiums paid to insurers and the indirect costs of travel or lost work, though these may matter as much. In the literature on medicines the term sometimes extends to co-payments, deductibles and the full price of non-covered drugs. Papers seldom state which of these is meant, and a careful reader should look for the definition before comparing numbers across studies [13, 14].

## 2. CONCEPTS AND MEASUREMENT

The main framework for thinking about the financial burden of health care is financial protection, meaning that people should be able to use needed services without suffering serious economic hardship. The World Health Organization linked this to universal health coverage in its 2010 report and again in the global monitoring report of 2017, which uses catastrophic spending and impoverishment as the two headline indicators [11, 12]. Medicines matter to both, because they are the item most often paid for directly and because they accumulate over months and years in a way that a single hospital bill does not [15, 16].

Catastrophic health expenditure is generally defined as out-of-pocket payments exceeding a stated share of household income, expenditure or capacity to pay. Xu and colleagues used a threshold of forty per cent of non-subsistence expenditure in a multicountry analysis [9], while others use ten per cent of total consumption or income, and the choice of threshold alters the estimated proportion of affected households considerably [17, 18]. The impoverishment approach counts households pushed below a poverty line by their health payments [17]. Wagstaff reviewed the indicators and their weaknesses, noting that neither captures people who forgo care because they cannot pay, a point of obvious relevance to medicines [13].

A second family of measures judges the affordability of medicines directly. The standard approach asks how many days' wages the lowest-paid unskilled government worker would need to buy a course of treatment or a month of a chronic therapy. Cameron and colleagues applied this to medicines in thirty-six developing and middle-income countries and found that

availability in public facilities was low and that originator brands were often unaffordable [2]. Niëns and colleagues extended the approach to estimate impoverishing effects of purchasing medicines in several developing countries, showing that treatment for common conditions could push large numbers of people below the poverty line when bought at private-sector prices [1].

The Disease Control Priorities series and other work from the World Bank have also stressed that the burden should be set against household resources. A payment of the same size can be trivial for one family and ruinous for another, so studies that report only mean spending hide a skewed distribution in which a minority of households carry very high costs [3, 19]. Quintile analysis, concentration indices and the share of households crossing the catastrophic threshold are all used to show this distribution. Such measures have shown that in several countries the poorest households spend a lower absolute amount on medicines than the richest, yet a much higher fraction of their income [10, 19].

Data sources shape what can be said. Household expenditure surveys give national figures but usually lump health spending together, or record it over a short recall period that misses lumpy or seasonal costs. Disease-specific surveys and clinic-based studies give richer detail but cover selected patients. Hsu and colleagues discussed the methodological difficulties of tracking financial protection globally, including inconsistent recall periods, different definitions of household consumption and the treatment of very poor households with little to spend [14]. Calculation choices matter, too: Cylus and colleagues showed that different methods yield quite different pictures of catastrophic spending in Europe [18].

A subtler measurement problem is that low spending can signal either good protection or lack of access. A poor household that cannot afford its antihypertensives will record zero expenditure on them, and appear protected in a survey of spending. Studies that pair expenditure data with information on unmet need or treatment gaps are therefore more informative than those based on spending alone [10, 13]. The same applies to comparisons across countries: a country with lower per capita medicine spending may have achieved lower prices, or it may simply have patients who go without [2, 10].

## 3. BURDEN IN CHRONIC DISEASE

Households with a chronically ill member spend more on health and are more likely to experience catastrophic payments than other households. A review of low- and middle-income country studies found that noncommunicable diseases consistently imposed a heavy financial burden, with medicines being a leading component of out-of-pocket costs, especially for outpatient treatment [3]. Jan and colleagues, in a Lancet series on the household economic burden of these diseases, described how long-term treatment, repeated visits and lost income combine, and noted that the poor bear a larger share of income than the better off [5].

India has produced some of the most detailed evidence. Engelgau and colleagues analysed national survey data and found that households with members suffering from noncommunicable diseases had markedly higher health expenditure than comparable households, with outpatient medicines forming a large part of the difference [6]. Karan and colleagues studied the household-level burden of heart disease and reported that costs consumed a large share of annual household spending, forcing many families to borrow or sell assets [20]. Mahal, Karan and Engelgau placed these findings in the context of the national economy, estimating the macro-level effects of chronic disease [19]. In India, drugs account for a majority of outpatient out-of-pocket spending in most surveys [6, 21].

Estimates of the macro-level cost help to explain why governments have started to take notice. The World Economic Forum estimated the cumulative economic output lost to noncommunicable diseases over two decades, taking in direct treatment costs and lost productivity [4]. The calculation is built on assumptions that others have questioned, but it has been widely cited. Household-level studies tell a more concrete story, and because the costs of chronic disease are repeated and long-term, they erode savings in

a way that a single acute illness does not [4, 5, 19]. The disease may be controlled while the household's finances deteriorate.

Diabetes and hypertension illustrate how the burden plays out over time. Both require lifelong drug treatment, usually with several agents as the disease progresses, and both require monitoring tests that add to the cost. Studies from low- and middle-income countries find that the cost of newer glucose-lowering drugs and of insulin, when bought privately, can take a substantial fraction of income for poorer households, while generic metformin and sulfonylureas are far more affordable [3, 5]. For hypertension, generic antihypertensives are cheap per tablet, but patients often need two or three, and the aggregated monthly cost may still be burdensome in low-income households [1, 3].

Multimorbidity multiplies the problem. Barnett and colleagues showed that multimorbidity is common and increases with age and deprivation [22], and a systematic review linked the presence of several chronic conditions with higher out-of-pocket spending on medicines, with each additional condition adding to the burden [23]. These households not only pay for more drugs but are also exposed to more complex regimens, which adds to the risk of poor adherence and error. For the health system, this suggests that the most financially vulnerable patients are those with the greatest need for coordinated care [22, 23].

Respiratory disease and mental illness are less well studied, though they pose similar problems. Inhalers for asthma and chronic obstructive pulmonary disease are costly in many markets, and several analyses place them among the medicines least affordable relative to wages [1, 2]. Psychotropic drugs are often cheap but long-term, and stigma may keep patients from seeking insurance reimbursement. Cancer treatment is the extreme case, in which a single course may exceed annual household income. These conditions fall within the wider concern for NCDs, yet the published evidence on medicine-specific costs for them is much thinner than for diabetes and cardiovascular disease [3, 5].

The evidence on the burden of chronic disease medicines is summarised in table 1, which groups published findings by the kind of evidence they offer, from measurement frameworks to national studies and policy evaluations. The distribution of entries across groups is shown in fig. 1. The table does not attempt to rank countries or diseases, since methods differ too widely for that. What it shows is a consistent message across settings: medicines are a leading cost, the burden falls hardest on poorer households, and the available policy tools have only partial effect [1, 3, 5, 9].

**Table 1: Main groups of published evidence on out-of-pocket spending on medicines in chronic disease**

| Topic | Reported finding | Ref. |
|---|---|---|
| Catastrophic expenditure | Household payments above a set share of capacity to pay were measured across many countries. | [9, 10] |
| Impoverishment | Out-of-pocket payments push households below the poverty line, shown first for Vietnam. | [13, 17] |
| Medicine affordability | Treatment costs several days' wages in many developing countries, mainly for originator brands. | [1, 2] |
| Noncommunicable disease burden | Medicines are a leading component of household costs for chronic disease in low- and middle-income countries. | [3, 5] |
| Indian household studies | Chronic disease raises household spending, with outpatient drugs prominent. | [6, 20] |
| Multimorbidity | More conditions go with higher out-of-pocket spending on medicines. | [22, 23] |
| Cost-related nonadherence | Chronically ill adults reduce or skip drugs because of cost, with poorer outcomes. | [7, 24] |
| Cost-sharing effects | Higher co-payments lower use and adherence; full cover after infarction improved outcomes. | [8, 25, 26] |
| Generic substitution | Switching from brands to generics could save substantial sums but uptake is low. | [27, 28] |

| Topic | Reported finding | Ref. |
|---|---|---|
| Public insurance | Hospital-only schemes offered limited protection from outpatient drug spending. | [29, 30] |

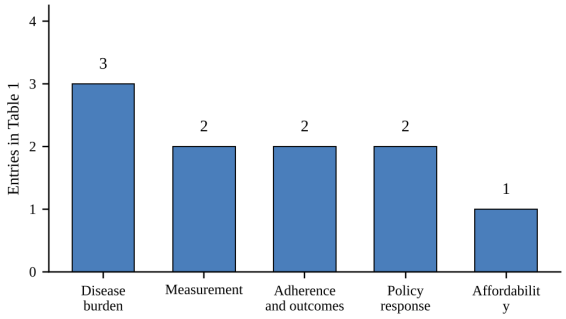



**Fig. 1: Number of entries in table 1 by evidence group**

Wealthier countries are not exempt. Khera and colleagues reviewed the financial toxicity of atherosclerotic cardiovascular disease in the United States and described how high deductibles and drug prices led many patients to ration or delay treatment, with those least able to pay most affected [31]. In such systems the burden is less about catastrophic impoverishment and more about cost-related nonadherence, a pattern that has been documented for years in older adults and in people with chronic illness [7, 24]. The details differ, but the logic is the same as in poorer settings: when a repeat purchase is expensive, some patients stop buying it [7, 31].

## 4. DETERMINANTS OF EXPENDITURE

Medicine prices are the first determinant. Differences between originator brands and generic equivalents are large in most markets, and several studies show that prices in the private sector are far above international reference levels and above those in the public sector [2, 28]. Babar and colleagues, studying Malaysia, found that medicine prices, availability and affordability varied greatly between sectors, with large mark-ups along the supply chain [28]. Cameron and colleagues estimated that switching from originator brands to lowest-priced generics could produce major savings in developing countries, although generic uptake remained low [27]. Where prices are high, even small prescription volumes translate into substantial household cost.

Availability is closely tied to price. Where public facilities lack stock, patients are sent to private pharmacies and pay market prices, which is more expensive than free or subsidised provision [2, 16]. Bigdeli and colleagues proposed viewing access to medicines through health system components, including financing, procurement, supply and prescribing practices, and noted that shortages in public facilities are an important driver of out-of-pocket purchases [16]. A study may therefore find high expenditure in a region where policy promises free essential drugs, since the policy exists on paper but the drugs are not on the shelf [15, 16].

Insurance design determines how much of the cost is passed to the patient. Cost-sharing in the form of co-payments, coinsurance and deductibles is common in higher-income systems, and its effect depends on how much the patient pays and on whether essential drugs are exempted [8, 26]. In many low- and middle-income countries, public insurance covers hospital care but not outpatient medicines, which leaves the commonest chronic disease costs uncovered. Selvaraj and Karan explained why public insurance schemes in India offered limited protection, in part because they cover inpatient treatment while chronic disease spending is mostly outpatient [30]. Shahrawat and Rao found that insured households remained vulnerable to substantial out-of-pocket payments [21].

Regulatory and trade settings influence prices more than clinicians usually realise. Patent protection and data exclusivity delay the entry of generics, and tax and tariff regimes add to prices at the border and in the pharmacy [15, 28]. Mark-ups by wholesalers and retailers, often set as a percentage of the price, can double or triple the cost to the patient, and value-added taxes on medicines are applied in some countries and not in others [16, 28]. The Lancet Commission pointed to such price components as a legitimate target for policy, one that does not require changing clinical practice at all [15].

Patient and household characteristics shape both need and ability to pay. Older age, multimorbidity, lower income, rural residence and lack of insurance are repeatedly associated with higher burden relative to

resources [3, 32]. Mukherjee and colleagues, studying households in Kerala, found that social class strongly influenced both the level of spending and its economic impact, with poorer households bearing a proportionally heavier load [32]. Health literacy, trust in generics and the habits of prescribers also matter. Patients who believe that brand names are better, or who are never told that a cheaper equivalent exists, pay more for the same active ingredient [27, 28].

Prescribing practice is a determinant that is easily overlooked. Prescribing by brand name, the use of fixed-dose combinations that are more costly than their separate components, the frequent addition of vitamins and tonics, and the use of costly drugs where cheaper ones would do all increase the bill [1, 27]. In some settings dispensing doctors and pharmacies are paid through margins on the drugs they sell, which gives an incentive to prescribe more and to prescribe expensive brands. These supply-side forces are hard to measure with household surveys, and they explain why price regulation alone sometimes disappoints [16, 28].

## 5. CONSEQUENCES FOR HEALTH AND HOUSEHOLDS

The most direct consequence is cost-related nonadherence. Piette and colleagues surveyed chronically ill adults in the United States and reported that a large minority had cut back on prescribed drugs because of cost, through skipping doses, taking less or not filling prescriptions, with the highest rates among those with low income and with multiple conditions [7]. Heisler and colleagues linked restricting medication because of cost with worse self-reported health over time in older adults [24]. Nonadherence of all causes is a major problem in chronic therapy, and cost adds to the forgetfulness, side effects and complex regimens that already limit adherence [33, 34].

Evidence that cost sharing affects use comes from policy changes as well as surveys. Goldman and colleagues reviewed the effects of drug cost sharing and found that higher co-payments reduced use of medicines, with the reduction larger for chronic disease drugs and with some evidence of offsetting increases in other medical use [8]. A meta-analysis of co-payments for publicly insured populations found that higher cost sharing was associated with lower adherence [26]. Madden and colleagues reported that people with cost-related nonadherence also cut spending on basic needs, which shows how medicine costs spill over into other parts of household life [35].

Not all cost-related behaviours are the same, and the terms used in the literature can confuse. Skipping doses, splitting tablets, stretching the interval between refills, taking a cheaper alternative and failing to fill a prescription at all differ in clinical risk. Some practices, such as switching to a generic, are beneficial. Others, such as halving the dose of an antihypertensive, may be dangerous only slowly. Studies that distinguish among them give a better idea of the clinical risk than those that report a single nonadherence figure [7, 33]. The World Health Organization's report on adherence to long-term therapies set this in the wider context of patient, provider and system factors, with cost as one of many [34].

Is the reverse also true, that removing cost improves outcomes? The Post-Myocardial Infarction Free Rx Event and Economic Evaluation trial randomised patients to full coverage of preventive drugs after myocardial infarction and found that full coverage improved adherence and reduced rates of major vascular events and costs for patients, without raising total spending [25]. The result is often cited as proof of principle, though it was in an insured population in one country. Equivalent trials in low-income settings are rare, so the extent to which similar reductions would be seen where baseline adherence is lower is not known [25, 34].

Financial consequences reach beyond the pharmacy. Households facing catastrophic medicine spending adopt coping strategies that include borrowing, selling assets or livestock, drawing down savings, reducing food and education spending, and having children leave school to work [3, 5, 32]. Wagstaff and van Doorslaer, in an early study of Vietnam, demonstrated how health payments push households into poverty, and the pattern has been confirmed in many

countries since [17]. Wagstaff and colleagues' analysis of data from 133 countries showed that the incidence of catastrophic spending had not fallen in step with improved coverage, particularly in low-income countries [10].

Behind these household effects lies a loss to health systems. People who stop treatment are more likely to present later with complications, such as stroke, renal failure or amputation, requiring costlier hospital care. This offset makes the case that financial protection for essential medicines can pay for itself over time, at least in part, although estimates of the net effect vary and are uncertain in the absence of long-term trial data [25, 36]. Atun and colleagues argued that health systems built for acute episodes respond poorly to chronic conditions, and that this mismatch, including the way medicines are financed, adds to avoidable disease progression [36].

## 6. POLICY RESPONSES

Policy tools fall into groups: lowering prices, improving availability in public facilities, extending insurance to cover outpatient medicines, and encouraging rational use. The Lancet Commission on essential medicines for universal health coverage reviewed these options and argued that access to essential medicines should be treated as a core component of universal coverage, with explicit attention to pricing, procurement and financing [15]. It emphasised that medicines can be made more affordable only when multiple strategies are combined, which fits the pattern seen in the earlier sections of this review [2, 15].

Experience from HIV treatment programmes provides a hint of what is possible. When antiretroviral drugs moved from private sale to free public provision, with pooled procurement and generic competition, prices fell steeply and access expanded greatly in many low- and middle-income countries [15]. The lesson drawn by the Lancet Commission was that the mix of competition, bulk purchasing and public financing could be applied to other long-term therapies, although the political and organisational conditions differ for chronic diseases that affect many more people [15, 36]. Whether the same approach could be applied to diabetes and hypertension medicines remains open and depends on health system capacity.

Generic policies have the most evidence behind them. Generic substitution, whether mandatory or encouraged, lowers cost to patients and payers, and Cameron and colleagues estimated large potential savings in developing countries from switching away from originator brands [27]. Success depends on trust in generic quality, on prescribers' willingness to prescribe by international non-proprietary name and on regulation of mark-ups [27, 28]. Where these supports are absent, generics remain on the shelf but are not chosen. Public programmes that sell quality generics at controlled prices in dedicated outlets are one way to overcome this, though published evaluations of such outlets are patchy [15, 16].

Insurance reform is another lever. Several analyses of publicly financed insurance schemes in India concluded that schemes covering hospitalisation only gave limited financial risk protection, since much of the burden arose from outpatient care and medicines [29, 30]. Prinja and colleagues' systematic review found that these schemes improved utilisation in some cases but showed little consistent effect on out-of-pocket spending [29]. Extending coverage to outpatient chronic care and medicines, as some states and countries have attempted, appears a logical remedy, but the budgetary cost and the risk of overuse need to be set against the benefit [5, 29].

Reducing or removing cost-sharing for essential chronic disease drugs is a simpler proposal. Evidence from trials and natural experiments suggests that value-based approaches, in which cost sharing is lowered for high-value drugs such as those preventing cardiovascular events, can improve adherence [25, 26]. Jan and colleagues recommended that policy should prioritise financial protection for chronic disease, including pooling resources, targeting subsidies to poor households and covering outpatient medicines [5]. Their argument was based on observational data and policy experience, not trials, and the right design depends on the

structure of each health system [5, 36].

Finally, supply-side measures such as procurement reform, pooled purchasing, regular stock monitoring and transparent pricing can reduce the need for patients to go to private pharmacies. Bigdeli and colleagues suggest that the effect of any single measure depends on the rest of the system, so reforms to financing without reforms to supply may disappoint [16]. The World Health Organization's monitoring work emphasises the importance of measuring progress with consistent indicators, including both catastrophic spending and unmet need [12, 14]. Without these, claims of success or failure rest on partial data.

## 7. LIMITATIONS AND FUTURE DIRECTIONS

The literature has weaknesses that readers should bear in mind. Most studies are cross-sectional, so they describe spending at one time and cannot show how it evolves as a disease progresses. Recall periods are short, definitions of out-of-pocket spending vary, and small sample sizes limit the precision of estimates for specific diseases [13, 14]. Many reports come from a few countries, notably India and the United States, and generalisation to others is uncertain. In addition, the focus on expenditure can obscure the households that spend nothing because they cannot afford treatment [10, 13].

Causal interpretation is a further difficulty. Associations between high spending and poor adherence, or between insurance and lower burden, may be confounded by income, severity of disease and health-seeking behaviour. People who are sicker spend more and also do worse, which can make spending look harmful when it is simply a marker of need [7, 24]. Natural experiments and randomised designs, such as the full-coverage trial after myocardial infarction, are the strongest answers to this problem but are rare and tend to come from insured populations [25, 26]. Readers should therefore treat much of the observational evidence as describing patterns, not proving cause.

Future research should do several things. Longitudinal studies that follow patients from diagnosis would clarify how costs change and which coping strategies households adopt [5, 23]. Trials or well-designed natural experiments of policies that remove cost barriers for chronic disease medicines, particularly in low- and middle-income countries, are needed [25, 36]. Measures that combine expenditure with unmet need would give a fairer picture of financial protection [13, 14]. Finally, cost studies should report separately for medicines, consultations, diagnostics and transport so that policymakers can target the largest items [3, 16].

For practitioners, the evidence has direct implications. Asking patients about cost is a legitimate and necessary part of prescribing for chronic disease. Choosing generic drugs, rationalising regimens, avoiding unnecessary additions and writing prescriptions that match what the patient can pay for all reduce the risk of dropout [7, 33]. Pharmacists have a particular role in advising on lower-cost equivalents and on how to continue therapy when money is short. These steps do not solve the structural problem, but they help the individual patient while wider reform is awaited [27, 28].

## 8. CONCLUSION

Published evidence shows that medicines are among the largest sources of out-of-pocket health spending for people with chronic diseases, and that the burden is heaviest for poorer, older and multimorbid households [3, 5, 23]. Prices, availability, insurance design and prescribing habits all contribute [2, 16, 30]. The consequences include rationed or abandoned treatment, borrowing and asset sales, and probably poorer health [7, 17, 24].

Policies that combine lower prices, better public supply, outpatient coverage and reduced cost-sharing for essential drugs have the best theoretical support, though the evidence for individual measures is uneven and often drawn from higher-income settings [15, 25, 27]. The field needs longitudinal studies, trial-quality evaluations of financing reforms and measurement that captures people who go without treatment [13, 14]. Until then, clinicians can help by asking about cost and choosing affordable regimens [33].

## 9. ABBREVIATIONS

HIV-Human immunodeficiency virus, NCD-Noncommunicable disease, OOP-Out-of-pocket, WHO-World Health Organization, UHC-Universal health coverage


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Nil


## 11. AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

## 12. CONFLICT OF INTERESTS

Declared none

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