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Beyond access: The role of out-of-pocket costs in shaping healthcare choices for children under five in Uganda

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Abstract

Background: This study examines how out-of-pocket health expenditure influences care-seeking and provider choice for recent illness among children under five in Uganda.

Methods: We analysed data from 3,615 children under five years of age using the Uganda National Household Survey (UNHS - 2023/24). Expected out-of-pocket expenditure (OOPE) was estimated using local median healthcare costs. We modelled healthcare seeking using survey-weighted probit regression and provider choice (public, private, pharmacy/self-care) using multinomial logit models. Analyses accounted for potential endogeneity and were stratified by rural–urban residence and socioeconomic status

Results: Among children with recent illness, 84.6% sought care. Most OOPE occurred in private facilities (69%), followed by public facilities (20.7%) and pharmacy/self-care (10.3%). Higher expected OOPE reduced the probability of seeking care by 2 to 4 percentage points, with stronger effects among poorer and rural households. Among those seeking care, higher expected OOPE was associated with increased use of private providers and reduced use of public and informal care. These effects remained robust after adjustment for endogeneity.

Conclusions: Anticipated healthcare costs influence both whether care is sought and which provider is chosen. Higher expected costs discourage care-seeking among disadvantaged households and shift provider choice toward private facilities. Policies to improve child health must address both financial barriers and the accessibility and quality of public healthcare services.

Background

Out-of-pocket expenditure (OOPE) remains a major source of healthcare financing in many low- and middle-income countries (LMICs), where it accounts for over 40% of total health spending and continues to expose households to catastrophic expenditure and impoverishment [1]. Globally, an estimated 15% of households incur catastrophic health spending and approximately 10% are pushed into poverty due to health-related cost, although these proportions vary across countries [2–10].

OOPE has traditionally been examined in relation to whether individuals seek care and whether health expenditure becomes catastrophic or push households into poverty [4–6, 10]. This had led to a strong focus on utilisation-based indicators and financial protection metrics of the Universal Health Coverage (UHC) frameworks. While this approach has generated important evidence into financial hardship and unmet need, it largely treats healthcare behaviour as a binary decision, whether care is sought or not, and assumes care is appropriate and effective.

In practice, however, many LMIC health systems are highly pluralistic, with households choosing between public facilities, private providers, pharmacies, and informal sources that differ in cost, quality, and availability [11, 12]. In these contexts, financial constraints may shape behaviour not only at the

decision to seek care, but also in the choice of provider. For example, informal fees, medicine stock-outs and uncertainty in public services can alter the effective price of care and shift households toward alternative providers [13–15].

Emerging evidence suggests that households respond to anticipated or realised OOPE through two related pathways: by foregoing care or by substituting across provider types [11, 12]. As a result, overall utilisations rates may appear stable even when cost-driven shifts in provider choice occur. This is important because provider choice is closely linked to treatment quality, timeliness, and financial risk. A focus solely on utilisation may therefore, conceal welfare-reducing substitution toward more expensive, or lower-quality care. As a result conventional UHC metrics, which typically record any provider contact as utilisation, may overestimate effective service coverage by failing to capture these substitution dynamics [16–19].

This provider selection pathway offers a potential explanation for the persistent disconnect between high reported utilisation and poor health outcomes observed in many LMICs, including Uganda [16, 17]. If OOPE systematically influences where patients seek care, then financial barriers affect health not only through non-use but also through cost-driven provider choice, even when utilisation is recorded [16–20].

Despite its importance, the causal role of affordability in shaping provider selection remains underexplored. Provider choice is often treated as driven by preferences or physical access-determined rather than financial constrains [11, 21, 22]. Using nationally representative household survey data from Uganda, this study reframes financial protection as encompassing both care avoidance and cost-driven provider selection within a pluralistic health system. Specifically, we aim to: 1) quantify healthcare-seeking avoidance associated with expected OOPE; and 2) estimate the extent to which OOPE influences provider selection at the first point of care.

Methods

Study design and data source

This study used data from the Uganda National Household Survey (UNHS) 2023/24, a nationally representative, cross-sectional survey conducted by the Uganda Bureau of Statistics (UBOS). The UNHS collects detailed information on household demographics, consumption and expenditure, illness, healthcare-seeking behaviour, provider type, and out-of-pocket health spending. The survey employed a two-stage stratified cluster sampling design. In the first stage, Enumeration Areas (EAs) were selected using probability proportional to size (PPS), stratified by rural–urban residence across 15 subregions. In the second stage, 10 households were systematically selected from updated household listings within each EA. Data were collected through face-to-face interviews using Computer Assisted Personal Interviews (CAPI) between March 2023 and February 2024 to capture seasonal variation. A total of 15,813 households were successfully interviewed out of 17,160 selected households, corresponding to a response rate of 91.9%.

Study population

The analytic sample comprised 3,093 households with 3,615 children under five years of age who had experienced an illness or injury in the 30 days preceding the survey and had complete information on healthcare-seeking and the associated out-of-pocket expenditure among those who sought care. Unlike earlier rounds, the UNHS 2023/24 did not collect detailed symptom-level information.

Analytical framework and measures

Out-of-pocket expenditure (OOPE) was conceptualised as a price signal influencing both healthcare-seeking and provider selection within Uganda's pluralistic health system [23, 24]. Conditional on illness/injury, households choose among public facilities, private providers, pharmacies or drug shops, and informal sources that differ in cost, availability, and perceived quality [16, 25]. Variation in expected costs across providers may induce substitution toward lower-cost options, including pharmacies and informal care particularly among financially constrained household. Such responses may preserve overall utilisation while masking cost-driven differences in provider choice [26, 27].

Uganda's health system exhibits substantial variation in effective prices. Although public services are officially free at the point of use, patients often incur costs due to informal fees, medicine stock-outs, and transport expenses s [28, 29]. In contrast, private providers operate under heterogeneous pricing structures, with costs typically higher than in public facilities. These differences reflect both cost recovery and variation in service quality, drug availability and waiting times, making expected costs central to provider choice. Care-seeking options are grouped based on ownership, level of formalisation, and service delivery mode. Public facilities included government hospitals, health centres (HC II-IV) outreach services, and government-employed community health workers. Private providers included private hospitals, clinics, licensed practitioners, and outreach services. Pharmacy or self-care included pharmacies, drug shops, retail medicines outlets, informal providers, traditional practitioners. 'No care' referred to illness episodes without external treatment. This classification aligns with prior studies in Uganda and similar settings [25, 30–32]

Out-of-Pocket Expenditure (OOPE)

OOPE was defined as total direct spending per illness episode, including consultation and registration fees, medicines, diagnostic tests, and other facility charges, transport costs and reported informal payments [33, 34]. Monthly OOPE was categorised as US$0, US$0.01–3.68, US$3.69–7.36, and > US$7.36, based on Uganda's per-capita health expenditure benchmarks. The categories correspond to low, moderate and high financial burden levels. In the descriptive analyses, OOPE was examined both in absolute terms and as a share of total household consumption expenditure to capture affordability [35–37].

To approximate expected cost exposure, we constructed enumeration area (EA)-level median OOPE by provider type. This measure captures local price norms and supply-side cost conditions that households are likely to anticipate when making care decisions. To avoid mechanical correlation with individual spending, EA medians were calculated using a leave-one-out approach, excluding the index observation. This approach helps isolate exogenous price variation from illness-specific expenditure [33, 34, 38].

Covariates

All models adjusted for individual, household, and geographic characteristics identified a priori. These included age and sex of the child, illness duration (as a proxy for severity), age and sex of the household head, education level and household socioeconomic status measured using consumption-based welfare quintiles [39–41]. For analysis, quintiles were grouped into lowest 40%, the middle 40%, and the top 20%. Geographic controls included urban-rural residence, region and distance to the nearest health facility as a proxy for physical access and non-medical costs [42, 43].

Econometric analysis

Healthcare-seeking was modelled using a survey-weighted probit regression estimating the probability that a child under five years of age with an illness episode sought care. The primary independent variable was the log of median enumeration-area (EA) OOPE, representing expected cost exposure. Models were estimated for the full sample and stratified by socioeconomic status and residence.

Provider selection was modelled using a multinomial logit (MNL) model, appropriate for discrete choice among multiple mutually exclusive provider types. Conditional on seeking care, individuals were assumed to select the provider that maximises expected utility as a function of OOPE and observed characteristics The probability of selecting provider j was specified as:

$$P(Y_i = j) = \frac{\exp(\alpha_j + \beta_j\, OOPE_i + \gamma_j X_i)}{\sum_k \exp(\alpha_k + \beta_k\, OOPE_i + \gamma_k X_i)},$$

where Y_i denotes provider choice, $OOPE_i$ captures cost exposure, and X_i is a vector of covariates.

Average marginal effects (AMEs) were reported to facilitate interpretation of how changes in OOPE shift the probability of selecting each provider type.

Endogeneity of OOPE

OOPE may be endogenous because realised expenditure is jointly determined with provider choice and may reflect unobserved illness severity or provider behaviour. To address this, we implemented a control-function approach.

In the first stage, logged OOPE was regressed on exogenous covariates and an instrumental variable: EA-level OOPE (leave-one-out), capturing local price conditions. Residuals from this model were included in the multinomial provider-choice model.

Endogeneity was formally tested by assessing the joint Wald test that accounted for the survey design. The null hypothesis of exogeneity was rejected ($F(2,307) = 37.6$, $p < 0.001$), indicating statistically significant endogeneity of OOPE. Inclusion of the residual term corrects for correlation between OOPE and unobserved determinants of provider selection.

Heterogeneity analyses

All analyses were stratified by household socioeconomic status and urban–rural residence to assess distributional differences. These dimensions captured variation in financial constraints, access to providers, and market structure, which may influence responsiveness to OOPE. Stratified models allow the magnitude and direction of OOPE effects to vary across groups.

Survey design and statistical inference

All analyses accounted for the complex sampling design. Sampling weights were applied to ensure representativeness and adjust for unequal selection probabilities. Standard errors were clustered at the enumeration area level to account for intra-cluster correlation. Results from non-linear models are presented as average marginal effects, expressed in percentage points, to facilitate comparability across outcomes.

Results

Sample characteristics by care-seeking pathway

Children who did not receive care were older on average and were predominantly in the 24–59 months (Table 1). They also had the shortest illness-duration profile, (92.3% reported ill for 1–7 days. All children in this group lived within 5 km of the nearest provider. Non-use was more common among children from lower socioeconomic status (SES) households (54.8%), households with lower education attainment of the household head and larger households.

Children using pharmacies or self-care occupied an intermediate position between non-user and formal care users. Most had illness duration of 1–7 days (90.3%), although a larger share had illness lasting 14–30 days (7%) compared with non-users. This group was concentrated in the low- and middle-SES categories (43.3% and 40.8%, respectively), with limited representation from the high-SES group (15.9%). Their expenditure profile was generally lower than that of formal care users: 66.4% were in the low OOPE category, although 6.4% exceeded the 10% catastrophic expenditure threshold.

Children treated in private facilities were younger than non-users, with a greater share in the 0–23-month age range and were more likely to come from higher-SES households. Nearly one-quarter (24.6%) were from the high SES group, the largest share across provider categories. Illness duration was longer than among pharmacy/self-care users but shorter than among public facility users, with 11.0% reporting illness lasting 14–30 days. Private facility users also faced the highest financial burden: 43.1% were in the high OOPE category and 25.1% exceeded the 10% catastrophic expenditure threshold.

Children treated in public facilities had the longest illness-duration profile, with 12.6% reporting illness lasting 14–30 days. They were also more likely to come from female-headed households (30.7%), rural households (73.7%), and low- or middle-SES households. Public facility users were also the most likely to live more than 5 km from nearest provider (17.4%). Although their expenditures were lower than those of private facility users, 15.2% still exceeded the 10% catastrophic expenditure threshold.

Overall, the descriptive results show a clear gradient in care-seeking. Older children with shorter illness duration and lower household socioeconomic position were more concentrated among non-users and pharmacy/self-care users, whereas children with longer illness duration were more likely to use formal care. Within formal care, private facilities were used disproportionately by children from better-off households, while public facilities were served more rural and socioeconomically constrained households. See Table 1.

Table 1. Sample characteristics and out-of-pocket expenditure by provider type among under-five children with illness episodes

Table 1
Sample characteristics and out-of-pocket expenditure by provider type among under-five children with illness episodes

Characteristic	No care N = 558 n (%)	Pharmacy/self-care N = 660 n (%)	Private facility N = 1,562 n (%)	Public facility N = 835 n (%)	Total N = 3,615 n (%)
Age of household head					
18–44 years	378 (67.7)	481 (72.9)	1172 (75.0)	642 (76.9)	2673 (73.9)
45–59 years	125 (22.4)	136 (20.6)	252 (16.1)	133 (15.9)	646 (17.9)
60 + years	55 (9.9)	43 (6.5)	138 (8.8)	60 (7.2)	296 (8.2)
Sex of household head					
Male	433 (77.6)	500 (75.8)	1206 (77.2)	579 (69.3)	2718 (75.2)
Female	125 (22.4)	160 (24.2)	356 (22.8)	256 (30.7)	897 (24.8)
Household size					
2–4 members	139 (24.9)	227 (34.4)	546 (35.0)	276 (33.1)	1188 (32.9)
5–6 members	199 (35.7)	222 (33.6)	502 (32.1)	267 (32.0)	1190 (32.9)
7 + members	220 (39.4)	211 (32.0)	514 (32.9)	292 (35.0)	1237 (34.2)
Education of household head					
None/Primary	16 (43.2)	33 (60.0)	88 (60.7)	65 (69.9)	202 (61.2)
Secondary	17 (45.9)	21 (38.2)	44 (30.3)	15 (16.1)	97 (29.4)
Vocational/Tertiary	4 (10.8)	1 (1.8)	13 (9.0)	13 (14.0)	31 (9.4)
Child sex					

Note to Table 1: *Continuous variables are reported as mean (SD). Overall values were household head age 38.3 (13.0) years, household size 6.0 (2.6), child age 29.3 (16.5) months, illness duration 6.0 (4.6) days, total health expenditure US$7.4 (12.8), and OOPE share 6.6 (12.2).*

Characteristic	No care N = 558 n (%)	Pharmacy/self-care N = 660 n (%)	Private facility N = 1,562 n (%)	Public facility N = 835 n (%)	Total N = 3,615 n (%)
Male	282 (50.5)	332 (50.3)	807 (51.7)	440 (52.7)	1861 (51.5)
Female	276 (49.5)	328 (49.7)	755 (48.3)	395 (47.3)	1754 (48.5)
Child age, months					
0–11 months	81 (14.5)	114 (17.3)	275 (17.6)	158 (18.9)	628 (17.4)
12–23 months	114 (20.4)	138 (20.9)	387 (24.8)	227 (27.2)	866 (24.0)
24–59 months	363 (65.1)	408 (61.8)	900 (57.6)	450 (53.9)	2121 (58.7)
Socioeconomic status (SES)					
Low SES — bottom 40%	306 (54.8)	286 (43.3)	533 (34.1)	366 (43.8)	1491 (41.2)
Middle SES — middle 40%	179 (32.1)	269 (40.8)	644 (41.2)	347 (41.6)	1439 (39.8)
High SES — top 20%	73 (13.1)	105 (15.9)	385 (24.6)	122 (14.6)	685 (18.9)
Place of residence					
Urban	170 (30.5)	212 (32.1)	513 (32.8)	220 (26.3)	1115 (30.8)
Rural	388 (69.5)	448 (67.9)	1049 (67.2)	615 (73.7)	2500 (69.2)
Distance to healthcare provider					
<=5kms	558 (100.0)	641 (97.1)	1480 (94.8)	690 (82.6)	3369 (93.2)
>5kms	0 (0.0)	19 (2.9)	82 (5.2)	145 (17.4)	246 (6.8)
Days of illness					

Note to Table 1: *Continuous variables are reported as mean (SD). Overall values were household head age 38.3 (13.0) years, household size 6.0 (2.6), child age 29.3 (16.5) months, illness duration 6.0 (4.6) days, total health expenditure US$7.4 (12.8), and OOPE share 6.6 (12.2).*

Characteristic	No care N = 558 n (%)	Pharmacy/self-care N = 660 n (%)	Private facility N = 1,562 n (%)	Public facility N = 835 n (%)	Total N = 3,615 n (%)
1–7 days	515 (92.3)	596 (90.3)	1320 (84.5)	693 (83.0)	3124 (86.4)
8–13 days	19 (3.4)	18 (2.7)	70 (4.5)	37 (4.4)	144 (4.0)
14–30 days	24 (4.3)	46 (7.0)	172 (11.0)	105 (12.6)	347 (9.6)
Out-of-pocket health expenditure					
US$0	0 (.)	41 (6.2)	9 (0.6)	217 (26.0)	267 (8.7)
US$0.01–3.68: Low OOPE burden	0 (.)	438 (66.4)	514 (32.9)	308 (36.9)	1260 (41.2)
US$3.69–7.36: Moderate OOPE burden	0 (.)	104 (15.8)	365 (23.4)	138 (16.5)	607 (19.9)
>US$7.36: High OOPE burden	0 (.)	77 (11.7)	674 (43.1)	172 (20.6)	923 (30.2)
Share of OOPE to total household expenditure					
No CHE	0 (.)	618 (93.6)	1170 (74.9)	708 (84.8)	2496 (81.6)
CHE at 10%	0 (.)	42 (6.4)	392 (25.1)	127 (15.2)	561 (18.4)

Note to Table 1: *Continuous variables are reported as mean (SD). Overall values were household head age 38.3 (13.0) years, household size 6.0 (2.6), child age 29.3 (16.5) months, illness duration 6.0 (4.6) days, total health expenditure US$7.4 (12.8), and OOPE share 6.6 (12.2).*

Distributional of total OOPE spending by provider

Private facilities accounted for the largest share of OOPE health spending overall and in all subgroups (Fig. 1). Overall, 69.0% of total expenditure occurred in private facilities, compared with 20.7% at public facilities and 10.3% in pharmacy/self-care. This pattern was observed in both urban and rural areas, although the private-sector share was higher in urban areas (73.3%) than in rural areas (66.2%). Rural households allocated a somewhat larger share of spending to public facilities (22.9%) than urban households (17.3%), while the share on pharmacy/self-care was similar across residence groups. By socioeconomic status, private facilities remained the main source of spending in all groups, and their share increased with SES: 63.5% among low-SES households, 66.3% among middle-SES households, and

76.6% among high-SES households. In contrast, the share spent in public facilities was highest among low-SES households (25.3%) and lowest among high-SES households (15.5%). Spending on pharmacy/self-care was comparatively small across all SES groups, ranging from 7.9% among high-SES households to 11.7% among middle-SES households. See **Fig. 1**.

OOPE and probability of seeking care

Across all probit models, higher OOPE payments were associated with a lower probability of seeking care. In the full sample, a one-unit increase in log median EA OOPE was associated with a 2 percentage-point reduction in the likelihood of care-seeking (AME: −0.02; 95% CI: −0.03, − 0.01). The association was stronger among low-SES households, from whom higher expected costs were associated with a 4 percentage-point reduction in care-seeking (AME: −0.04; 95% CI: −0.07, − 0.02). Among middle-SES households, the corresponding reduction was 2 percentage points (AME: −0.02; 95% CI: −0.03, − 0.01), while non statistically significant associations was observed among high-SES households.

By residence, higher expected costs were associated with lower care-seeking in both urban and rural areas, with a larger reduction in rural areas (AME: −0.03; 95% CI: −0.04, − 0.02) than in urban areas (AME: −0.02; 95% CI: −0.04, − 0.00). See **Table 2**.

Table 2. Average marginal effects (AME) on probability of seeking care across models.

Socioeconomic status was itself strongly associated with care-seeking. Relative to the lowest SES group, children from the middle-SES households were 10 percentage points more likely to seek care in the full sample (AME: 0.10; 95% CI: 0.06, 0.14), while those from high-SES households were 16 percentage points more likely to do so (AME: 0.16; 95% CI: 0.10, 0.21). Longer illness duration was also associated with a higher probability of care-seeking, although the magnitude was smaller. Other demographic characteristics showed limited or inconsistent associations. See **Table 3**.

Table 3. Average marginal effects of out-of-pocket payments on provider choice, by population subgroup

OOPE and Provider Choice

Higher expected out-of-pocket payments were consistently associated with shifts in provider choice away from public facilities and pharmacy/self-care toward private formal providers across all population groups (Table 3). In the full sample, higher expected OOPE was associated with a 19 percentage-point lower probability of using pharmacy/self-care or public facility (AME: −0.19; 95% CI: −0.22, − 0.17), and a 38 percentage-point higher probability of using a private formal facility (AME: 0.38; 95% CI: 0.34, 0.43).

These patterns were similar across socioeconomic and urban–rural subgroups. Among low-SES households, higher expected OOPE was associated with 21 percentage-point lower probability of using pharmacy/self-care, a 19 percentage-point lower probability of using a public facility, and a 40 percentage-point higher probability using private formal care. Comparable results were observed among middle and high SES households, as well as in urban and rural areas.

Adjusted Wald tests for the joint significance of the control-function residuals were statistically significant in all models, supporting the presence of endogeneity and the use of control-function specification. Overall, these findings indicate that higher expected OOPE is associated not only with lower overall care-seeking, but also with reallocation across provider types among those who seek care.

Discussion

This cross-sectional analysis of nationally representative survey data included 3,615 children under five years of age with recent illness episodes and examined how expected out-of-pocket expenditure (OOPE) is associated with care seeking and provider choice. To our knowledge, this is the first study in Uganda to assess expected OOPE as a determinant of both whether care is sought and where care is first obtained for childhood illness. Four mains findings emerge. First higher expected OOPE was associated with lower probability of seeking care, with stronger effects among poorer households. Second, household socioeconomic status was independently associated with care seeking, with children from better-off households more likely to receive treatment. Third, among children who sought care, higher expected OOPE was associated with substitution away from public facilities and pharmacy/self-care towards private formal providers. Fourth, these patterns persisted after adjusting for endogeneity, suggesting that anticipated OOPE costs shape both entry into care and provider selection, with important implications for equity and financial protection.

Our findings suggest that expected OOPE is not only a marker of financial burden but also an important behavioural determinant of child healthcare seeking in Uganda. At the extensive margin, higher expected OOPE was associated with a statistically and substantively meaningful reduction in care-seeking, with the largest decline observed among poorer households. This pattern is consistent with evidence from sub-Saharan Africa indicating that direct payments and indirect access costs, including transport, waiting time, and foregone labour income, remain important deterrents to healthcare utilisation and contributors to financial hardship [44]. In Uganda, where health financing remains heavily reliant on OOPE [45, 46], sensitivity to anticipated cost may contribute to delayed or foregone care even for conditions requiring timely treatment. The fact that expected OOPE predicted healthcare seeking before any payment was made suggests that households respond not only to realised expenditure, but also to anticipated financial risk.

The results also highlight socioeconomic position is a major axis of inequality in child healthcare use. Even after adjustment for expected OOPE and other covariates, children from better-off households were more likely to receive care than those from poorer households. This finding aligns with prior evidence from Uganda showing persistent socioeconomic gradients in care-seeking for common childhood illnesses [47, 48]. Together, these findings suggest that reliance on household financing may widen inequities in access by making poorer households more responsive to anticipated costs, thereby weakening progress toward universal health coverage [44].

Among children who sought care, higher expected OOPE was associated with a substantial shift in provider choice away from public facilities and pharmacy/self-care toward private formal providers. This pattern differs from the common assumption that higher costs necessarily push households toward informal or lower-cost care. One possible explanation is that, in pluralistic health systems, expected OOPE may capture more than price alone. In setting where public services are affected by medicine stock-outs, staff shortages, congestion, and hidden non-fee costs, private providers may be perceived as more reliable, timely, or available, despite higher direct charges. Given Uganda's large private healthcare sector and documented constraints in public services readiness, this interpretation is plausible [49, 50]. More broadly, the findings suggest that households may respond to local health-system conditions by choosing providers on the basis of perceived value, availability, and predictability, rather than price alone.

The control-function results strengthen this interpretation by showing that OOPE is endogenous to provider choice, consistent with non-random sorting on unobserved factors. However, the persistence of large and statistically robust associations after adjustment suggests that anticipated financial exposure has an independent role in structuring care pathways. This extends existing evidence, much of which relies on realised spending conditional on care-seeking and is therefore vulnerable to reverse causality. By focusing on expected OOPE measured *ex ante*, our analysis provides a clearer view of financial barriers as a determinant, rather than merely a consequence, of healthcare use.

These findings have important policy implications. They suggest that suggest that achieving universal health coverage for child health in Uganda will require more than maintaining formal user-fee exemptions in public facilities. Financial protection must address the broader cost envelope faced by households, including transport, time costs, and informal charges, while also improving the readiness and reliability of public services. Without such changes, nominal 'free public care' may remain effectively inaccessible to many households, particularly the poor [46, 50].

Strengths, limitations, and future research

A key strength of this study is the use of expected OOPE rather than realised expenditure, which allows financial barriers to be examined at the point where care-seeking decisions are made. The nationally representative survey data improve external validity, and the use of survey-weighted models enhances population-level inference. In addition, the control-function approach provides formal evidence that OOPE is endogenous in provider-selection models and helps address bias arising from unobserved severity and non-random sorting.

Several limitations should be noted. First, expected OOPE may reflect both prices and local service conditions, making it difficult to isolate purely financial mechanisms from supply-side constraints. Second, provider categories used in the analysis may mask substantial within-category heterogeneity in quality, regulation, and service scope. Third, the cross-sectional design limits causal inference and does not capture how care-seeking and provider choice evolve over the course of an illness episode. Fourth,

the UNHS 2023/24 lacked detailed symptom-level data, which constrained adjustment for clinical presentation beyond illness duration.

Future work should build on these findings by linking provider substitution to quality-adjusted and welfare-relevant outcomes, including treatment appropriateness, recovery, and financial consequences. Longitudinal data are needed to better understand how provider choices change as illness progresses, particularly under uncertainty and liquidity constraints. Further work could also examine heterogeneity by child age, illness type, poverty status, and rural-urban context.

Conclusion

Out-of-pocket expenditure was associated with child healthcare use in Uganda through two linked pathways: among financially constrained households and substantial reallocation of provider choice among those who sought care. These association were socially patterned, strongest among poorer households, and robust to endogeneity adjustment. Achieving equitable universal health coverage will therefore require policies that reduce financial barriers while also improving the availability, reliability, and perceived value of affordable public care.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Cure Children Hospital Research and Ethics Committee (CCHU-REC/21/019), the Uganda National Council for Science and Technology (HS919ES), and REK West Norway (project number 47004). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from all participants; for minors or incapacitated participants, consent was obtained from their parents or legal guardians. All participant information was anonymized before analysis and reporting.

Consent to publish

Not applicable.

Data availability statement

The data underlying this article will be shared on reasonable request to the corresponding author.

Competing interests

The authors have declared that no competing interests exist.

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Authors contributors

FO conceived the study, developed the analytical framework, acquired the data, conducted data preparation, performed the statistical analyses, and drafted the initial manuscript. PO-O, TT, IMSE, and AML contributed to the interpretation of the findings and critically reviewed the manuscript for important intellectual content. All authors read and approved the final manuscript and take responsibility for the decision to submit for publication.

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Figures

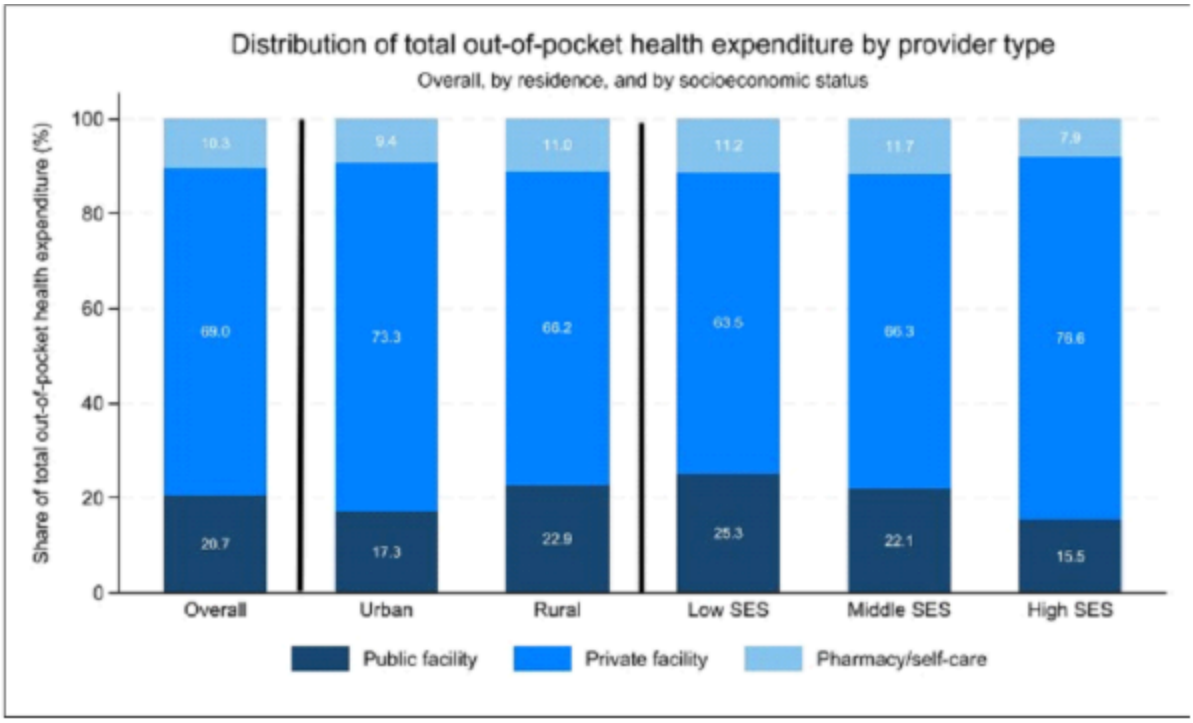


Fig 1: Distribution of total out-of-pocket health expenditure by provider type, overall and by residence and socioeconomic status

Figure 1

See image above for figure legend

Supplementary Files

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- S1Table2.pdf
- S1Table3.pdf