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Structural Inequalities and Health-Seeking Behaviour among Urban Slum Residents of Karimnagar, Telangana: A Cluster-Sampled Cross-Sectional Study

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ABSTRACT

Background: Urban informal settlements combine economic insecurity, inadequate infrastructure and limited access to affordable primary care, yet evidence from secondary Indian cities is scarce. We examined structural inequalities and first-contact health-seeking behaviour among slum residents near Mankamma Thota, Karimnagar, Telangana.

Methods: A community-based cross-sectional study was conducted from February to June 2024. Using a two-stage 30 × 15 cluster design, 450 households (2,115 residents) were surveyed through interviews with the household head or principal decision-maker, using a pre-tested Telugu schedule and environmental observation. The primary outcome was first contact with an informal provider or local registered medical practitioner (RMP) during acute illness. Associations were assessed by chi-square tests and a population-averaged logistic model (generalised estimating equations, GEE) accounting for clustering. Catastrophic health expenditure (CHE) was out-of-pocket spending above 10% of annual household income.

Results: Acute illness in the preceding 30 days was reported by 173 of 450 households (38.4%; 95% CI 34.1–43.0) and chronic non-communicable conditions by 127 (28.2%). Among 173 acute episodes, first contact was an informal provider/RMP in 91 (52.6%), a private facility in 43 (24.9%), a government facility in 27 (15.6%) and self-medication or pharmacy in 12 (6.9%). CHE affected 188 households (41.8%). Income below ₹10,000 per month (aOR 2.84; 95% CI 1.72–4.68), being uninsured (aOR 2.15; 1.38–3.35), a shared/public water source (aOR 1.92; 1.21–3.04) and distance above 2 km from an Urban Primary Health Centre (aOR 1.78; 1.14–2.78) were associated with informal first contact.

Conclusion: Financial insecurity, infrastructure deficits and geographic barriers coexisted with heavy reliance on informal providers. Accessible, affordable urban primary care, outpatient financial protection and basic-service improvements merit priority. Findings are cross-sectional and associational, not causal.

Keywords: urban health; health-seeking behaviour; informal healthcare providers; urban slums; structural inequality; out-of-pocket expenditure; primary health care; India

1. Introduction

Rapid urbanisation has produced large informal settlements in which crowding, poor water and sanitation and insecure livelihoods concentrate health risks, and the scientific literature on slum health remains underdeveloped relative to urban health in general (Ezeh et al., 2017; UN-Habitat, 2022). Urbanisation does not automatically confer equitable access to healthcare. Residents of informal settlements may live close to facilities yet face barriers of affordability, opening hours, transport, documentation, waiting time and perceived quality. Healthcare use therefore reflects social and material circumstances as well as physical proximity. These dimensions align with Andersen's behavioural model, in which predisposing characteristics, enabling resources and perceived need jointly shape service use (Andersen, 1995). A primary health care approach likewise stresses accessible, integrated services and action on barriers beyond the clinical encounter (World Health Organization [WHO] & United Nations Children's Fund [UNICEF], 2020).

When formal services are difficult to reach or use, households turn to nearby informal providers, pharmacies or self-medication. Informal providers are a heterogeneous group that forms a significant component of health systems in developing countries (Mackintosh et al., 2016; Sudhinaraset et al., 2013), and the quality of public and private ambulatory care in low- and middle-income countries has been systematically reviewed (Berendes et al., 2011). In India, a randomised trial showed that training informal providers can improve quality of care (Das et al., 2016). Among the urban poor of Delhi, unqualified practitioners were the main source of care for episodic illness, formal care was more likely with higher income, higher educational status of the household head and insurance benefits, and out-of-pocket costs were higher in the private sector (Kusuma & Babu, 2019). Awareness and utilisation

of health insurance in the same population were limited, with only 18% of surveyed households insured (Kusuma et al., 2018). Recent work in an urban village of Delhi reinforces the vulnerability of unplanned, overcrowded settlements to out-of-pocket and catastrophic expenditure (Singh & Khokhar, 2023).

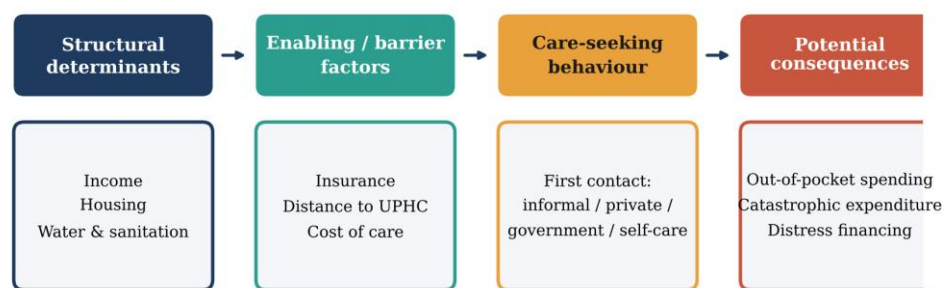
Financial protection is a central concern. Globally, the incidence of catastrophic spending at the 10% threshold was estimated at 11.7% in 2010 (Wagstaff et al., 2018), and its monitoring is part of the Sustainable Development Goals (WHO & World Bank, 2021). In India, the proportion of households with catastrophic health expenditure increased over two decades (Pandey et al., 2018), and national survey data for 2014 and 2018 continue to be analysed for incidence, inequality and determinants (Sriram & Albadrani, 2022). Publicly funded insurance schemes have been evaluated for their effect on out-of-pocket spending and on access to hospital care (Garg et al., 2020; Karan et al., 2017), but they are oriented mainly towards hospitalisation (Lahariya, 2018), which may leave routine outpatient costs with households. The National Urban Health Mission envisages urban primary care delivered through Urban Primary Health Centres (UPHCs) (Ministry of Health and Family Welfare [MoHFW], 2013), within a health system characterised by substantial private provision (Selvaraj et al., 2022), and national surveys such as the National Family Health Survey (NFHS-5) provide state-level context (International Institute for Population Sciences [IIPS] & ICF, 2021).

Recent Indian studies of care-seeking have examined patients at public facilities in an urban district (Fatma & Ramamohan, 2023) and tribal communities in Maharashtra (Asokan et al., 2025), but locally generated evidence from slums in secondary cities remains limited. Secondary cities such as Karimnagar also experience in-migration, informal employment and uneven municipal infrastructure. This study therefore assessed household socioeconomic and environmental conditions, recent morbidity, first-contact choices and health expenditure among slum residents adjacent to Mankamma Thota, Karimnagar.

Prespecified hypothesis: low income, lack of insurance, inadequate water infrastructure and greater distance to a UPHC would be associated with informal healthcare-seeking.

2. Conceptual framework

The study adapted Andersen's healthcare-utilisation model (Andersen, 1995) and the notion of structural inequality (Figure 1). Structural determinants (income, housing, water and sanitation) shape enabling and barrier factors (insurance, distance, cost), which in turn influence the type and timing of care sought and its downstream consequences. The framework is interpretive; the cross-sectional design does not establish temporal order or causation.



Interpretive framework (adapted from Andersen, 1995); cross-sectional data do not establish temporal order.

Figure 1. Conceptual pathway linking structural determinants, enabling/barrier factors, care-seeking behaviour and potential consequences.

3. Materials and methods

3.1 Study design and setting

A community-based analytical cross-sectional study was conducted from February to June 2024 in informal settlement pockets near Mankamma Thota within the municipal limits of Karimnagar, Telangana, India (areas around Kattampur, Kashmrigadda and Bhagyanagar). Local public services include UPHC Kattampur and the Karimnagar District Headquarters Hospital. The study is reported in accordance with the STROBE statement for cross-sectional studies (von Elm et al., 2007).

3.2 Participants and eligibility

Households resident in the selected clusters for at least six months were eligible. The adult head of household or principal decision-maker was interviewed. Households locked on two consecutive visits, temporary visitors or migrants resident for less than six months, and individuals unable or unwilling to consent were excluded.

3.3 Sample size and sampling

Sample size was calculated for a single proportion assuming an expected prevalence of 50%, 95% confidence, 5% absolute precision and a design effect of 1.15 (minimum ≈ 442 households), with an allowance for non-response, giving a target of 450 households. A two-stage 30×15 cluster strategy was used: 30 geographic clusters were delineated and 15 households per cluster were selected by starting at a randomly identified central point and proceeding in a predetermined direction. The final sample comprised 450 households covering 2,115 individuals (Figure 2).

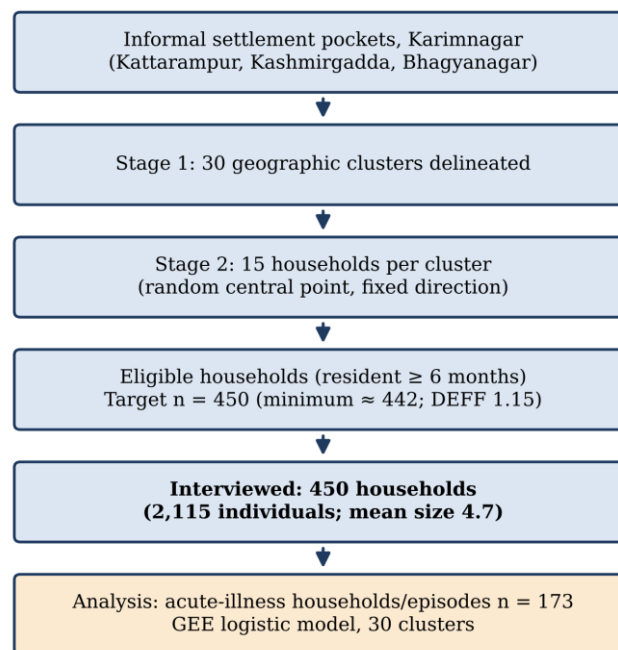


Figure 2. Sampling and analytical flow of the study (STROBE-style flow diagram).

3.4 Data collection

Trained field investigators administered a pre-tested structured questionnaire in Telugu covering sociodemographic and socioeconomic characteristics, housing and environment, acute illness in the preceding 30 days, chronic diagnosed conditions, health-seeking choices, out-of-pocket (OOP) expenditure and perceived barriers to public services. Socioeconomic status was classified with the Modified Kuppuswamy Scale (2023/2024 update). Blood pressure (Omron HEM-7120) and random blood glucose (Accu-Chek Active) were measured among consenting adults for screening; these measurements are not analysed in the present report. Supervisors audited 10% of completed forms daily.

3.5 Outcome and exposure variables

The primary outcome was binary and episode-level among the 173 acute-illness episodes (one index episode per affected household): first consultation with an informal provider or local registered medical practitioner (RMP) (yes = 1) versus any other first contact (private facility, government facility, self-medication or direct pharmacy purchase; no = 0). Exposures were monthly household income ($< ₹10,000$ vs $\geq ₹10,000$), insurance status, drinking-water source, distance to the nearest UPHC (> 2 km vs ≤ 2 km), education of the household head and housing type; sanitation type was examined in bivariate analysis. Catastrophic health expenditure (CHE) was defined as direct out-of-pocket health spending exceeding 10% of total annual household income. Operational definitions are summarised in Table 1.

Table 1. Operational definitions of study variables

Variable	Role	Definition / categories
Informal first contact	Primary outcome	First consultation with informal provider/local RMP (1) vs any other first contact (0)
Monthly household income	Exposure	< ₹10,000 vs ≥ ₹10,000
Health insurance	Exposure	Uninsured vs insured
Drinking-water source	Exposure	Public standpost/shared borewell vs piped household connection
Distance to UPHC	Exposure	> 2 km vs ≤ 2 km
Education of household head	Exposure	Illiterate/non-formal vs literate
Housing type	Exposure	Kutcha/semi-pucca vs pucca
Catastrophic health expenditure	Secondary outcome	Direct OOP health spending > 10% of total annual household income

RMP: registered medical practitioner; UPHC: Urban Primary Health Centre; OOP: out-of-pocket.

3.6 Statistical analysis

Data were entered in Microsoft Excel 2021 and analysed in IBM SPSS Statistics v27. Categorical variables are summarised as frequencies and percentages, with 95% Wilson confidence intervals for key proportions. Pearson's chi-square test assessed bivariate associations. Multivariable analysis used a population-averaged logistic model fitted by generalised estimating equations (GEE) with an exchangeable working correlation to account for clustering within the 30 sampled clusters. Adjusted odds ratios (aOR) with 95% confidence intervals are presented; $p < 0.05$ was considered statistically significant.

3.7 Ethics

Ethical approval was obtained from the Institutional Ethics Committee of Prathima Institute of Medical Sciences, Karimnagar (IEC/PIMS/2024/13). Written informed consent was obtained from adult participants, with guardian consent and verbal assent for participants younger than 18 years. Confidentiality and anonymity were maintained.

4. Results

4.1 Household profile and structural conditions

The survey included 450 households comprising 2,115 individuals (mean household size 4.7). Table 2 and Figures 3 and 4 summarise the profile: 44.0% of households earned below ₹10,000 per month, 50.0% belonged to Kuppuswamy Class V, 62.0% lived in kutcha or semi-pucca housing, 64.0% relied on a public standpost or shared borewell, 46.0% used shared/community latrines or practised open defecation, and 58.0% were uninsured.

Table 2. Household socioeconomic and infrastructure profile (N = 450)

Variable	Category	n	%
Monthly household income	< ₹10,000	198	44.0
	₹10,000–20,000	171	38.0
	₹20,001–30,000	54	12.0
	> ₹30,000	27	6.0
Socioeconomic class (Kuppuswamy)	Class V (lower)	225	50.0

Variable	Category	n	%
	Class IV (upper-lower)	162	36.0
	Class I-III (lower-middle and above)	63	14.0
Education of household head	Illiterate / non-formal	189	42.0
	Primary / middle school	162	36.0
	Secondary / higher secondary / graduate	99	22.0
Housing type	Kutcha / semi-pucca	279	62.0
	Pucca	171	38.0
Drinking-water source	Public standpost / shared borewell	288	64.0
	Piped household connection	162	36.0
Sanitation	Shared/community latrine or open defecation	207	46.0
	Individual household latrine	243	54.0
Health insurance	Uninsured	261	58.0
	Insured	189	42.0

Percentages are of 450 households and sum to 100% within each variable.

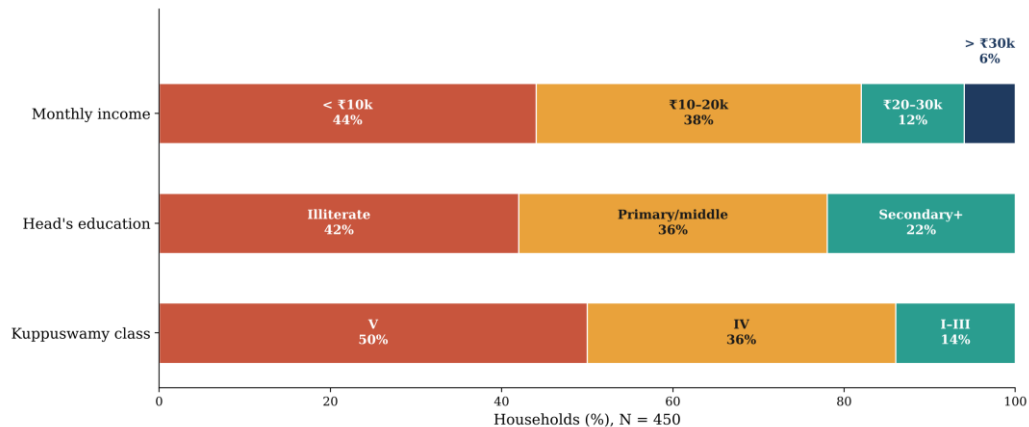


Figure 3. Distribution of household income, education of the household head and socioeconomic class (N = 450).

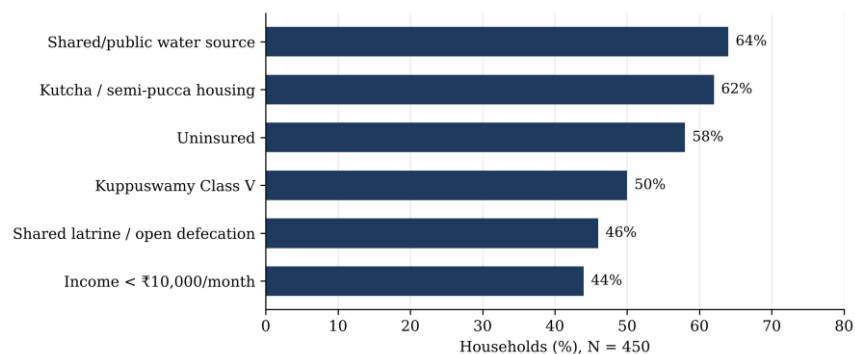


Figure 4. Prevalence of structural deprivation indicators among surveyed households (N = 450).

4.2 Morbidity and first contact for care

Acute illness in the preceding 30 days was reported by 173 of 450 households (38.4%; 95% CI 34.1–43.0), and chronic non-communicable conditions (NCDs) by 127 households (28.2%; 95% CI 24.3–32.6). Acute respiratory infection accounted for 73 of 173 episodes (42.2%) and acute diarrhoeal illness for 50 (28.9%). An informal provider/local RMP was the first contact in 91 episodes (52.6%; 95% CI 45.2–59.9), followed by private clinics/hospitals (24.9%), government UPHC/civil hospitals (15.6%) and self-medication or direct pharmacy purchase (6.9%) (Table 3, Figure 5). Reported reasons mirrored the barriers described in the framework: proximity, short waiting time and credit availability for informal providers; perceived quality and rapid relief for private care; free consultation and medicines for government facilities.

Table 3. First-contact healthcare choice among acute illness episodes (n = 173)

First-contact choice	n	%	95% CI	Main reason reported
Informal provider / local RMP	91	52.6	45.2–59.9	Proximity, short wait, credit availability
Private clinic / hospital	43	24.9	19.0–31.8	Perceived quality, rapid symptom relief
Government UPHC / civil hospital	27	15.6	11.0–21.8	Free consultation and essential medicines
Self-medication / direct pharmacy	12	6.9	4.0–11.7	Lower direct cost, reduced wage loss
Total	173	100.0	—	—

CI: Wilson 95% confidence interval, calculated from the reported counts.

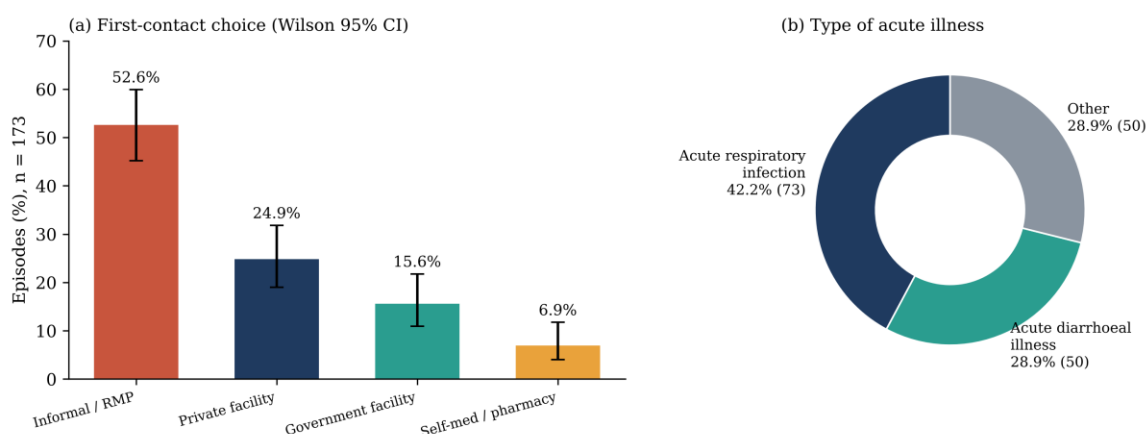


Figure 5. (a) First-contact healthcare choice among 173 acute episodes with 95% CIs; (b) distribution of acute illness type.

4.3 Expenditure and financial coping

Median out-of-pocket expenditure per acute episode was ₹1,250 (IQR ₹600–2,800). For chronic illness, mean monthly spending on medicines and diagnostics was ₹1,850 (SD ₹720). CHE affected 188 households (41.8%; 95% CI 37.3–46.4). To meet acute health costs, 34.2% of households borrowed from informal moneylenders and 18.4% sold or pawned domestic assets (Table 4, Figure 6).

Table 4. Health expenditure and financial coping

Indicator	Estimate	95% CI / spread
Median OOP expenditure per acute episode	₹1,250	IQR ₹600–2,800
Mean monthly expenditure, chronic illness	₹1,850	SD ₹720
Catastrophic health expenditure (> 10% annual income)	188 (41.8%)	37.3–46.4%
Borrowed from informal moneylenders	34.2%	30.0–38.7%

Indicator	Estimate	95% CI / spread
Sold or pawned domestic assets	18.4%	15.1–22.3%

Percentages are of 450 households.

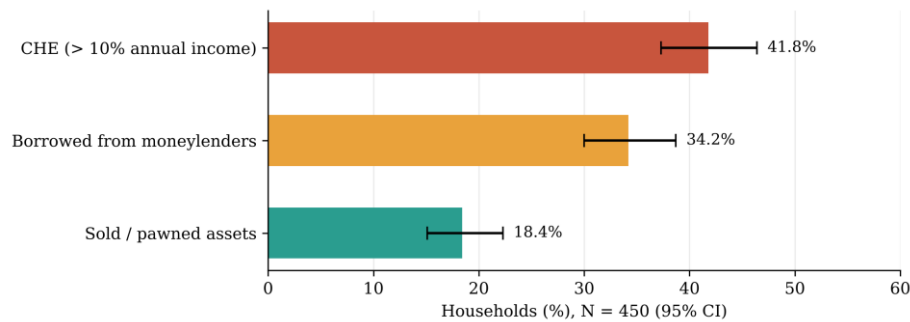


Figure 6. Catastrophic expenditure and distress financing among households (N = 450); error bars show 95% CIs.

4.4 Factors associated with informal first contact

In bivariate analysis, informal first contact was associated with income ($p < 0.001$), insurance status ($p = 0.002$), housing type ($p = 0.014$), distance to UPHC ($p = 0.008$) and sanitation type ($p = 0.021$); unadjusted odds ratios for water source and education of the household head were also significantly elevated (Table 5). In the adjusted model (Table 5, Figure 7), monthly income below ₹10,000 (aOR 2.84; 95% CI 1.72–4.68; $p < 0.001$), being uninsured (aOR 2.15; 1.38–3.35; $p = 0.001$), a shared/public water source (aOR 1.92; 1.21–3.04; $p = 0.005$) and living more than 2 km from a UPHC (aOR 1.78; 1.14–2.78; $p = 0.011$) were independently associated with higher odds of informal first contact. Education of the household head and housing type were not significant after adjustment.

Table 5. Unadjusted and adjusted odds of informal-provider/RMP first contact (n = 173)

Predictor (comparison)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	p-value
Income < ₹10,000 vs $\geq$ ₹10,000 per month	3.12 (2.04–4.78)	2.84 (1.72–4.68)	< 0.001
Uninsured vs insured	2.35 (1.58–3.49)	2.15 (1.38–3.35)	0.001
Shared/public water vs piped household water	2.08 (1.38–3.12)	1.92 (1.21–3.04)	0.005
UPHC distance > 2 km vs $\leq$ 2 km	1.95 (1.30–2.92)	1.78 (1.14–2.78)	0.011
Head education: illiterate/non-formal vs literate	1.74 (1.18–2.56)	1.38 (0.89–2.14)	0.152
Kutcha/semi-pucca vs pucca housing	1.62 (1.09–2.41)	1.24 (0.81–1.90)	0.321

GEE population-averaged logistic model with exchangeable working correlation; p-values refer to adjusted estimates.

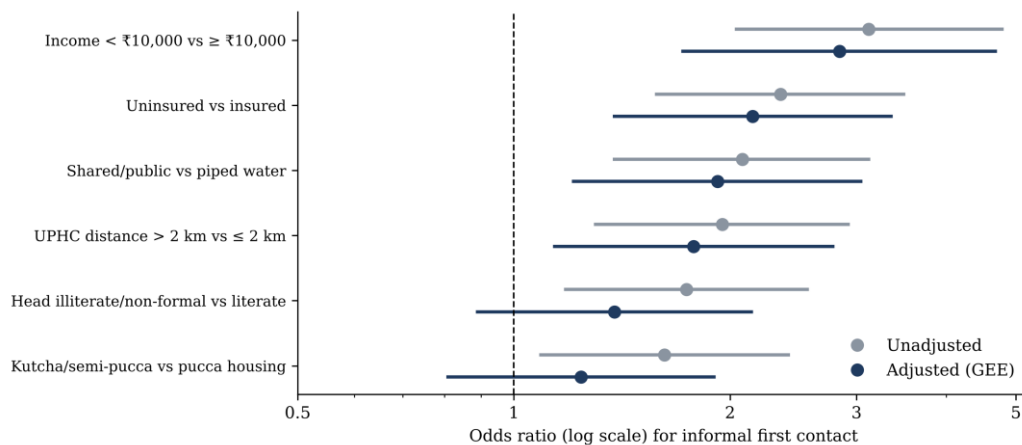


Figure 7. Forest plot of unadjusted and adjusted odds ratios (log scale) for informal first contact.

5. Discussion

This study documents overlapping socioeconomic, environmental and service-access disadvantages in the informal settlements of a secondary Indian city, and shows that informal providers were the most common first contact during acute illness. This is consistent with Delhi data among the urban poor (Kusuma & Babu, 2019) and with the central role of informal providers described in developing-country health systems (Sudhinaraset et al., 2013). The share seeking informal care (52.6%) was higher than the 34.5% reported among ill tribal individuals in Palghar, Maharashtra, where 35.7% took no action (Asokan et al., 2025); the populations, settings and outcome definitions differ, so these figures are not directly comparable. Our deprivation profile is also in keeping with arguments that slum health reflects shared physical and social environments beyond poverty alone (Ezeh et al., 2017; Mberu et al., 2016).

Financial insecurity showed the strongest adjusted association: households earning below ₹10,000 per month had 2.84 times the odds of informal first contact. This accords with the Delhi finding that higher household income was associated with seeking formal care (Kusuma & Babu, 2019). The association should not be read as proof that low income causes informal care-seeking; employment flexibility, illness severity, provider availability and prior experiences were not measured and may also shape choices.

Lack of insurance was also associated with informal first contact (aOR 2.15). Coverage status alone may not indicate effective protection when outpatient consultations, diagnostics and long-term medicines are not covered or accessible; programmes oriented to hospitalisation (Garg et al., 2020; Lahariya, 2018) may leave routine primary-care costs with households. Limited awareness and use of insurance among the urban poor has been documented previously (Kusuma et al., 2018). The high prevalence of catastrophic expenditure (41.8%) and distress financing (moneylender borrowing 34.2%; asset sales 18.4%) corroborates concerns about financial vulnerability in unplanned settlements (Kusuma & Babu, 2019; Singh & Khokhar, 2023). For comparison, catastrophic expenditure was 22.9% in an urban village of Delhi (Singh & Khokhar, 2023), 24.9% nationally in the 2014 utilisation survey (Pandey et al., 2018) and 11.7% globally in 2010 (Wagstaff et al., 2018) (Table 6, Figure 8); differences in definitions, denominators, thresholds and settings limit direct comparison, and our estimate uses annual income rather than consumption. Local evaluation should therefore assess actual benefit use, medicine availability and referral pathways.

Table 6. Selected published estimates relevant to the present findings

Study	Setting	Key finding	Estimate
Kusuma & Babu (2019)	Urban poor, Delhi (2,998 households)	Households reporting ≥ 1 illness event; higher illness costs in private care	74.2% with illness
Singh & Khokhar (2023)	Urban village, Aliganj, Delhi	Catastrophic health expenditure	22.9%
Asokan et al. (2025)	Tribal households, Palghar, Maharashtra	Ill individuals using informal providers (formal 29.8%; no action 35.7%)	34.5%
Pandey et al. (2018)	India, 2014 utilisation survey	Catastrophic expenditure ($\geq 10\%$ of household expenditure)	24.9%
Wagstaff et al. (2018)	133 countries, 2010	Global catastrophic spending, 10% of consumption	11.7%
This study	Slums, Karimnagar	Informal first contact; CHE ($> 10\%$ annual income)	52.6%; 41.8%

Definitions, denominators and survey years differ across studies; the table is descriptive, not a formal comparison.

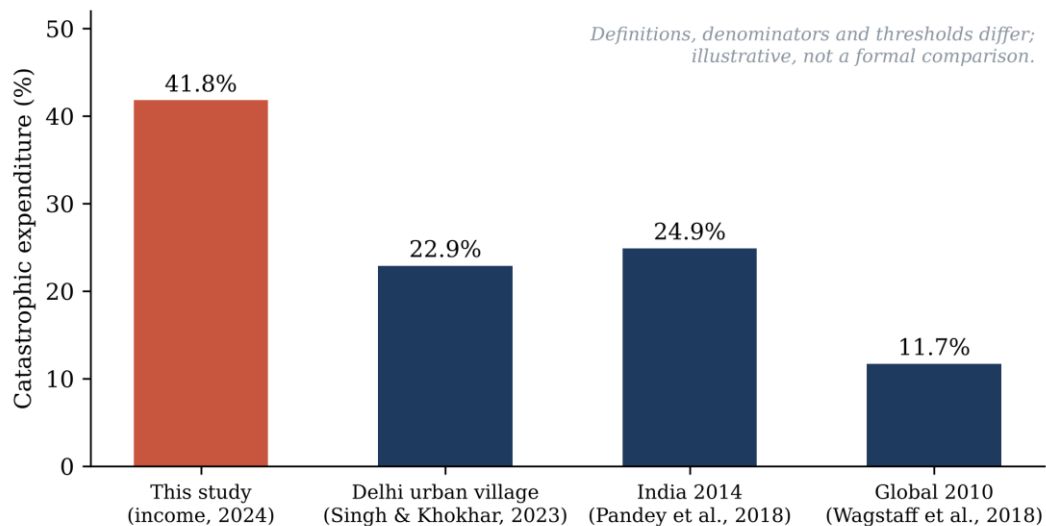


Figure 8. Catastrophic health expenditure in this study alongside published estimates (definitions differ).

Households relying on shared or public water sources had higher odds of informal first contact. Water source likely acts as a marker of wider deprivation, including settlement location, housing quality and municipal service access, so a direct causal pathway should not be inferred. Improved household water and sanitation remain important public-health goals in their own right, particularly given the burden of diarrhoeal illness (28.9% of acute episodes).

Distance above 2 km from a UPHC was associated with informal first contact (aOR 1.78). Distance may capture transport cost and time, but opening hours, waiting times, staff availability, medicine stocks and perceived quality also shape access. Evening clinics, outreach, community-based screening and reliable essential-medicine supply should be designed and evaluated with local communities and health-system managers. Because informal providers are likely to remain a first point of contact, engagement and training of such providers, which improved quality of care in a randomised trial (Das et al., 2016), is a complementary strategy to strengthening public primary care.

5.1 Strengths

The study integrates household socioeconomic data, environmental conditions, morbidity and care-seeking in a defined urban setting; used a pre-tested local-language instrument with supervisory audit of forms; applied a cluster-based sampling plan; and used a multivariable model that accounts for clustering. It provides locally relevant evidence from a secondary Indian city.

5.2 Limitations

The cross-sectional design precludes causal inference. Acute morbidity was self-reported over a 30-day recall period and expenditure was not verified against receipts, so recall and reporting bias are possible. Illness severity, provider quality and perceived need, which strongly influence provider choice, were not included as covariates. The informal-provider outcome combines practitioners with differing training and legal status. The episode-level sample ($n = 173$) limits precision for subgroup comparisons, and bivariate chi-square tests and Wilson confidence intervals do not account for clustering. Household selection by a fixed-direction walk from a random point is not equivalent to fully random selection. No qualitative component explored provider preferences. Findings from slum pockets near one locality may not generalise to other settings.

6. Conclusion

Among slum households near Mankamma Thota, Karimnagar, structural deprivation coexisted with heavy reliance on informal providers for first contact during acute illness. Low income, lack of insurance, dependence on shared/public water and distance above 2 km from a UPHC were associated with informal first contact. These findings support locally tailored action to make affordable, timely and trusted primary care available while addressing basic infrastructure deficits (Figure 9). The results are cross-sectional and should not be interpreted causally.

7. Recommendations for practice and policy

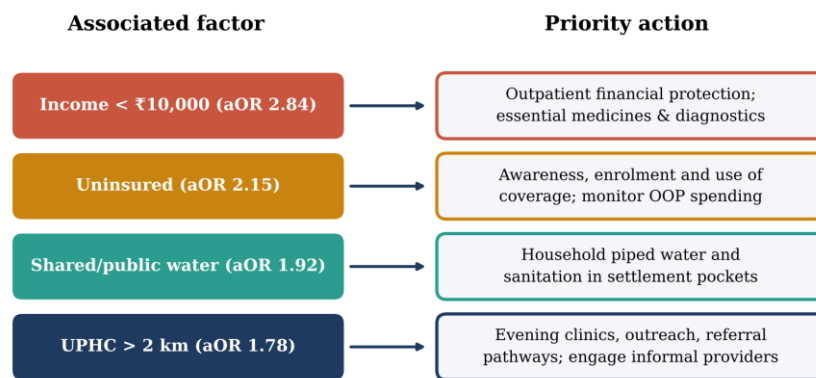


Figure 9. Factors associated with informal first contact and corresponding priority actions.

1. Extend UPHC convenience through evening or extended-hour clinics, predictable service availability and clear referral pathways.
2. Strengthen financial protection for outpatient consultations, essential medicines and diagnostics, and monitor actual household out-of-pocket spending.
3. Expand reliable household piped-water and sanitation services in underserved settlement pockets.
4. Given that 28.2% of households reported a chronic NCD, strengthen community-based hypertension and diabetes screening, follow-up and medicine continuity through UPHC teams and community health workers.
5. Engage residents and informal providers in service design, supported by qualitative research on the reasons for provider choice.
6. In future studies, specify the analytical unit and outcome, adjust variance estimates for clustering, report missing data and include illness severity as a covariate.

Declarations

Ethics approval: Institutional Ethics Committee, Prathima Institute of Medical Sciences, Karimnagar (IEC/PIMS/2024/13).

Consent to participate: Written informed consent from adult participants; guardian consent and verbal assent for those under 18 years.

Data availability: Quantitative datasets are available from the corresponding author on reasonable academic request.

Funding: Self-funded; no external grant support.

Conflict of interest: The authors declare no competing financial or personal interests.

Author contributions: AGA conceptualised the study, developed the protocol and ethics application, supervised data collection, performed the statistical analysis and drafted the manuscript. AA contributed to tool design, epidemiological modelling, literature review, clinical screening and manuscript revision. Both authors approved the final manuscript.

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Abbreviations: ASHA, accredited social health activist; aOR, adjusted odds ratio; CHE, catastrophic health expenditure; CI, confidence interval; GEE, generalised estimating equations; IQR, interquartile range; NCD, non-communicable disease; NFHS, National Family Health Survey; OOP, out-of-pocket; RMP, registered medical practitioner; STROBE, Strengthening the Reporting of Observational Studies in Epidemiology; UPHC, Urban Primary Health Centre.

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