HOUSEHOLD HEALTH EXPENDITURE IN RURAL MALAPPURAM, KERALA: AN EMPIRICAL ANALYSIS OF SOCIO-ECONOMIC CHARACTERISTICS, EXPENDITURE PATTERNS AND DETERMINANT FACTORS

Lukmanul Hakeem M[1], Dr. Moon Moon Hussain[2]
[1]PhD Research Scholar, Schools of Social Sciences and Humanities, BS Abdur Rahman Crescent Institute of Science and Technology Chennai &
Assistant Professor Department of Economics SAFI Institute of Advanced Study (Autonomous), Vazhayoor. Email ID: lukmanmoothali@gmail.com
[2]Associate Professor, Schools of Social Sciences and Humanities, BS Abdur Rahman Crescent Institute of Science and Technology Chennai.
Email ID: moon@crescent.education
Corresponding Author: Dr. Moon MooHussain Email Id: moon@crescent.education

ABSTRACT
Background: Household expenditure is a major indicator of economic status of a family, and out-of-pocket expenditure will badly affect the household budgets, this study focuses micro-level evidence from rural Malappuram, Kerala. Objectives: To undestand the socio-economic profile of rural households, characterise their health expenditure pattern and health-spending burden, and identify determinants of health expenditure. Methods: the study used the method a cross-sectional survey of 348 rural households was conducted in a structured questionnaire. The Study used 305 complete cases were analysed using descriptive statistics, Spearman correlation, Kruskal–Wallis and Mann–Whitney tests, and ordinary least squares regression with robust standard errors (ordered logit as a robustness check). Results: Mean monthly household income, expenditure and health expenditure were ₹20,787, ₹11,811 and ₹2,787, respectively. Health spending absorbed 23.6% of total expenditure and was strongly regressive (median 40.0% of income in the lowest income class versus 5.0% in the ₹40,000–60,000 class; ρ= -0.72). Medicines (56.1%) and doctor consultations (46.6%) were the commonest health items; 67.2% of households had no health insurance and 33.1% reported catastrophic health expenditure. Household income (B = 0.253, p < 0.001) and health expenditure (B = 0.411, p = 0.002) were significant determinants of expenditure; when savings were added, income and savings (B = 0.192, p < 0.001) remained significant (RZ = 0.468 and 0.503). Education, age, gender and family type had no independent effect, whereas households with unemployed heads spent least. Conclusion: Income capacity is the main driver of household expenditure, and recurring medicine and consultation costs fall heavily on low-income households with little insurance protection. Livelihood support and wider coverage of outpatient care and essential medicines are needed.

Keywords: Household Expenditure; Health Expenditure; Out-Of-Pocket Payments; Socio-Economic Determinants; Rural Households; Malappuram; Kerala.
How to cite this article: Lukmanul Hakeem M. HOUSEHOLD HEALTH EXPENDITURE IN RURAL MALAPPURAM, KERALA: AN EMPIRICAL ANALYSIS OF SOCIO-ECONOMIC CHARACTERISTICS, EXPENDITURE PATTERNS AND DETERMINANT FACTORS. Int J Drug Deliv Technol. 2026;16(90s):158-164. DOI: 10.25258/ijddt.16.90s.16.

1. INTRODUCTION

Household expenditure is commonly used as a welfare indicator because consumption is smoother, and usually better measured, than income source in rural economies dominated by unorganized sector.[1,2] The Consumption mainly depends on expected lifetime resources as well as current income,[3,4] while household composition, education and occupation shape both its level and its allocation across needs.[5,6] In India, growth in consumption has been accompanied by persistent inequality across regions and different social groups.[7,8]

Health care is a major claim on rural household budgets. Out-of-pocket (OOP) payments finance most health spending in India, push households into poverty and debt,[9,10] and are only weakly offset by publicly financed insurance.[11] Catastrophic health expenditure (CHE) has been documented in Kerala for acute coronary syndrome[12] and COVID-19 hospitalisation,[13] and national surveys show wide variation in utilisation and spending.[14] Less is known about the routine, recurring costs of medicines and consultations that make up most household health spending, and about how this burden varies with income.[15,16]

Kerala combines high human development[17] with

heavy reliance on remittances; Malappuram has long been a major source of Gulf emigration.[18] Remittance income can shift household spending towards education and housing,[19] and poorer households face distinctive constraints in how they allocate consumption and health spending.[20] Education and occupation may further health behaviour,[21] while caste and informal employment remain sources of economic insecurity.[22,23] Yet micro-level evidence on these relationships for rural Malappuram is limited.

This study therefore uses primary household data to: (i) describe the socio-economic characteristics of rural households in Malappuram; (ii) analyse the pattern and composition of household expenditure, with emphasis on health spending; and (iii) identify the determinants of monthly household expenditure, namely income, savings, health expenditure, education, occupation, family type, age and gender of the household head.

2. MATERIALS AND METHODS

2.1 Study design and data collection

A descriptive and analytical cross-sectional survey was carried out in rural areas of Malappuram district, Kerala, in 2026. A structured questionnaire, administered through Google Forms, collected information on household demographics, education, occupation, income, savings, loans, health expenditure, health insurance and perceived expenditure pressure. A multi-stage design was followed: rural panchayats were identified first, and households were then selected by simple random sampling. In total, 348 households responded.

2.2 Variables and measurement

The dependent variable was total monthly household expenditure. Explanatory variables were monthly household income, monthly health expenditure, average monthly savings, education of the household head (four levels), primary occupation of the head (seven groups), family type (nuclear/joint), and age and gender of the head. Income, expenditure, health expenditure and savings were recorded in predefined class intervals; each class was represented by its midpoint, and the open-ended top class was assigned its lower limit plus half the width of the preceding class (for example,
₹60,000 and above = ₹70,000).[24] Because the questionnaire did not record household size, family type was used as a proxy for household structure. Where more than one occupation was reported, the first-listed was taken as primary, and Thiyya households were classified under Other Backward Classes (OBC), to which the community belongs in Kerala.

2.3 Statistical analysis

Objectives (i) and (ii) were addressed with frequencies, means, standard deviations and medians; the Kruskal–Walli's test examined how the health burden (health expenditure as a share of income) varied across income classes. For objective (iii), associations with expenditure were tested using Spearman rank correlation (appropriate for grouped data), Kruskal–Wallis and Mann–Whitney tests, and a chi-square test with Cramér's
V for income and expenditure classes; effect sizes were interpreted against conventional benchmarks.[26] Determinants were then estimated by ordinary least squares (OLS) regression. Model 1 included income, health expenditure,education, age, gender, family type and occupation (reference: daily wage labour). Model 2 added average monthly savings, which was treated as a proxy for financial capacity rather than as a cause of spending, because savings and expenditure are jointly determined from income. Heteroscedasticity was present (Breusch–Pagan $p < 0.001$), so HC3 robust standard errors were used;[27] multicollinearity was low (maximum variance inflation factor 2.08).[28] Robustness was checked with log-transformed expenditure, an ordered logit model of the six expenditure classes, alternative values for the top income class (₹60,000 and ₹85,000), and a larger sample complete only on the model variables (n = 326). Analyseswere performed in Python 3 (pandas, SciPy), with the regression estimators coded directly; significance was set at 5%.

3. RESULTS AND DISCUSSION

3.1 Socio-economic profile of households

Table 1. Socio-economic profile of sample households (N = 305)

Characteristic	n	%	Characteristic	n	%
Gender of head			**Education of head**		
Male	187	61.3	Below 10th / literate	106	34.8
Female	118	38.7	Higher secondary	118	38.7
Age group (years)			Undergraduate	55	18.0
20-30	77	25.2	Postgraduate and above	26	8.5
30-40	76	24.9	**Primary occupation**		
40-50	74	24.3	Own business	103	33.8
50-60	60	19.7	Daily wage labour	68	22.3

60 and above	18	5.9	Private sector	61	20.0
Marital status			Agriculture	25	8.2
Married	266	87.2	Government / pension	20	6.6
Unmarried	34	11.1	Unemployed / not working	20	6.6
Divorced/Separated	5	1.6	Other (driver, teacher, abroad)	8	2.6
Religion			**Monthly income (₹)**		
Muslim	277	90.8	Below 5,000	38	12.5
Hindu	25	8.2	5,000-10,000	48	15.7
Christian	3	1.0	10,000-15,000	76	24.9
Social category			15,000-25,000	55	18.0
OBC (incl. Thiyya)	269	88.2	25,000-40,000	46	15.1
General	23	7.5	40,000-60,000	30	9.8
SC	9	3.0	60,000 and above	12	3.9
ST	4	1.3	**Government assistance**		
Family type			Yes	71	23.3
Nuclear	191	62.6	No	234	76.7
Joint	114	37.4			

Source: Primary survey data (2026). Percentages are of the analytic sample and may not sum to exactly 100.0 because of rounding. Mean monthly household income (class midpoints) = ₹20,787 (SD ₹16,957; median ₹12,500).

Table 1 shows that most households were headed by men (61.3%), but 38.7% were female-headed, a substantial share that may reflect male out-migration and widowhood. Three-quarters of heads (74.4%) were aged 20–50 years and only 5.9% were 60 or older. The sample was predominantly Muslim (90.8%) and OBC (88.2%), and 62.6% lived in nuclear families, consistent with the nuclearisation of rural Kerala households. Educational attainment was moderate: 34.8% of heads had not completed 10th standard and 26.5% held a degree.

Livelihoods were largely informal: own business or self-employment (33.8%) and daily wage labour (22.3%) together accounted for more than half of households, whereas only 6.6% were in government service or pension. Such work is typically associated with unstable earnings and limited social protection.[23] Accordingly, 53.1% of households earned below ₹15,000 per month, and only 23.3% received any government assistance, indicating limited reach of welfare schemes among households of low and variable income.

3.2 Pattern and composition of household expenditure

Table 2. Expenditure, savings and health-financing indicators (N = 305)

Indicator	Value
A. Monthly amounts (₹, class midpoints)	**Mean (SD); median**
Household income	20,787 (16,957); 12,500
Total household expenditure	11,811 (7,675); 12,500
Health expenditure	2,787 (3,273); 2,500
Average monthly savings	8,244 (10,737); 4,000
B. Health burden	**Value**
Health expenditure as % of total expenditure (aggregate; household median)	23.6; 22.9
Health expenditure as % of income (aggregate; household median)	13.4; 13.3
Households spending ₹5,000 or more per month on health, n (%)	26 (8.5)
C. Savings, credit, insurance and catastrophic spending	**n (%)**
Saves money regularly (yes)	138 (45.2)
Has outstanding bank loan (yes)	52 (17.0)
Any member has regular health check-up (yes)	43 (14.1)
No health insurance	205 (67.2)
Not aware of insurance status	46 (15.1)
Covered by private or government insurance	54 (17.7)
Catastrophic health expenditure in past 12 months (yes)	101 (33.1)
Expenditure increased over last three years (yes)	202 (66.2)

Source: Primary survey data (2026). Catastrophic health expenditure was self-reported (health spending above 10% of household income in a single episode). The response "maybe" (savings, loans, check-ups and catastrophic spending) is not shown; aggregate % = sum of health expenditure ÷ sum of expenditure (or

income).

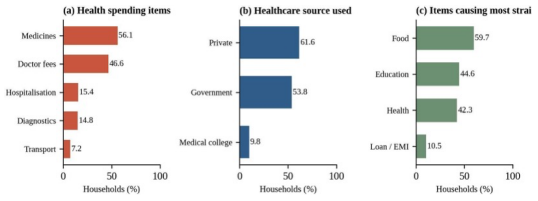
Mean monthly household expenditure was ₹11,811 (SD ₹7,675); about half of households (49.2%) spent less than ₹10,000 and the distribution was right-skewed (Figure 1a). Expenditure rose steadily with income (Figure 2a), and mean savings tracked income closely, exceeding expenditure only in the top income class.Health expenditure averaged ₹2,787 per month and accounted for 23.6% of aggregate expenditure; 8.5% of households spent ₹5,000 or more (Figure 1b).

Figure 1. Distribution of households (N = 305) by (a) total monthly expenditure and (b) monthly health expenditure.

The health burden was strongly regressive (Figure 2b). The median share of income spent on health fell from 40.0% in households earning below ₹5,000 to 5.0% in the ₹40,000–60,000 class (Kruskal–Wallis H = 170.0, $p < 0.001$; Spearman ρ between income and health share = -0.72). This gradient is the pattern described in studies of OOP payments in India, where poorer households bear a larger proportional burden.[9,10] Because income and expenditure were recorded in classes, these ratios are approximate and should be read as orders of magnitude.

Figure 2. (a) Mean monthly expenditure and savings and (b) median health expenditure as a percentage of income, by monthly household income class.

The composition of health spending points to recurring outpatient costs rather than episodic inpatient care (Figure 3a): medicines/drugs (56.1%) and doctor consultation fees(46.6%) were reported far more often than hospitalisation (15.4%), diagnostic tests



(14.8%) or medical transport (7.2%). Private clinics and hospitals were used by 61.6% of households, more than government hospitals or primary health centres (53.8%) (Figure 3b). Food (59.7%), education (44.6%) and health (42.3%) were the items most often reported as causing financial strain (Figure 3c), so health competes directly with other essentials.

Figure 3. Composition of household health spending and financial strain (N = 305; multiple responses, percentages do not sum to 100): (a) items of health expenditure, (b) source of healthcare used and (c) items causing most financial strain.

Financial protection was weak (Table 2). Two-thirds of households (67.2%) had no health insurance, a further 15.1% did not know their status, and 33.1% reported catastrophic health expenditure in the previous year, a lower figure than reported among COVID-19 inpatients in Kerala.[13] Self-reported catastrophic spending did not differ by income class ($p = 0.44$), and it was more common among insured (50.0%) than uninsured or unaware households (29.5%; $\chi Z(1) = 7.55$, $p = 0.006$). This should not be read as insurance causing hardship: households with ongoing illness are more likely to enrol, and schemes that mainly cover hospital admission leave outpatient and medicine costs uncovered, consistent with evidence that public schemes give limited financial risk protection.[11] Only 14.1% reported regular check-ups, and 66.2% said their expenditure had risen over three years.

3.3 Determinants of household expenditure

Table 3. Bivariate associations with total monthly household expenditure (N = 305)

Factor	Test	Statistic	*p*	Effect size
Household income	Spearman ρ	0.628	<0.001	Strong
Average monthly savings	Spearman ρ	0.466	<0.001	Moderate
Monthly health expenditure	Spearman ρ	0.403	<0.001	Moderate
Education of head (ordinal)	Spearman ρ	0.183	0.001	Weak
Age of head	Spearman ρ	-0.004	0.942	Negligible
Income class × expenditure class	χZ (df = 30)	304.0	<0.001	V = 0.45
Occupation (7 groups)	Kruskal–Wallis	H(6) = 31.36	<0.001	εZ = 0.085
Education (4 levels)	Kruskal–Wallis	H(3) = 11.37	0.010	εZ = 0.025
Gender of head (male vs female)	Mann–Whitney	U = 13,068	0.005	r = 0.18
Family type (joint vs nuclear)	Mann–Whitney	U = 11,986	0.129	r = 0.10

Source: Computed from primary survey data. ρ = Spearman rank correlation; V = Cramér's V (45% of cells had expected counts below 5, so the χZ is interpreted with caution); εZ = epsilon-squared; r = rank-biserial correlation.

Expenditure was most strongly associated with income (ρ = 0.63), followed by savings (ρ = 0.47) and health expenditure (ρ = 0.40); education showed a weak positive association (ρ = 0.18, $p = 0.001$) and age none (ρ = - 0.00, $p = 0.942$) (Table 3). Mean expenditure differed by occupation: it was highest in government/pension households (₹14,000) and own-business households (₹13,786), and lowest in households with unemployed or non-working heads (₹5,375). It rose with education from ₹10,071 (below 10th standard) to ₹14,038 (postgraduate), and was higher in male-headed (₹12,553) than female-headed households (₹10,636). Joint families spent more than nuclear families (₹12,917 vs ₹11,152), but the difference was not significant ($p = 0.129$).

Table 4. OLS regression of monthly household expenditure (₹ 000), robust (HC3) standard errors (N= 305)

Variable	Model 1: B (SE)	*p*	Model 2: B (SE)	*p*
Constant	3.608* (1.627)	0.027	4.992** (1.699)	0.004
Household income (₹ 000)	0.253** (0.028)	<0.001	0.206** (0.030)	<0.001
Monthly health expenditure (₹ 000)	0.411** (0.132)	0.002	0.121 (0.156)	0.440
Average monthly savings (₹ 000)	—	—	0.192** (0.057)	<0.001
Education of head (1–4 ordinal)	0.141 (0.415)	0.734	-0.114 (0.406)	0.779
Age of head (decades)	0.030 (0.272)	0.911	-0.101 (0.266)	0.704
Joint family (1 = joint)	1.399 (0.787)	0.076	1.241 (0.786)	0.115
Female head (1 = female)	0.202 (0.739)	0.785	-0.098 (0.730)	0.893
Occupation: Own business	1.410 (0.877)	0.109	1.453 (0.833)	0.082
Occupation: Private sector	1.047 (1.085)	0.336	1.322 (1.064)	0.215
Occupation: Agriculture	0.896 (1.086)	0.410	0.521 (1.081)	0.630
Occupation: Government / pension	2.327 (1.461)	0.112	2.163 (1.247)	0.084
Occupation: Unemployed / not working	-1.646 (1.035)	0.113	-1.682 (0.963)	0.082
Occupation: Other	-0.171 (2.041)	0.933	-0.284 (1.698)	0.867
R^2 / adjusted R^2	**0.468 / 0.446**		**0.503 / 0.480**	
F (df)	**21.39 (12, 292)**	**<0.001**	**22.62 (13, 291)**	**<0.001**

Source: Computed from primary survey data. B = unstandardised coefficient (₹ 000 of monthly expenditure per unit); reference category for occupation: daily wage labour. * $p < 0.05$; ** $p < 0.01$. Model 1 excludes savings. Maximum VIF = 1.71 (Model 1) and 2.08 (Model 2).

Both regression models were significant (Table 4). In Model 1, each additional ₹1,000 of monthly income was associated with ₹253 higher expenditure (B = 0.253, $p < 0.001$) and each additional ₹1,000 of health expenditure with ₹411 higher total expenditure (B = 0.411, $p = 0.002$), the latter partly mechanical because health spending is itself a component of total expenditure. Education, age and gender were not significant, nor were occupation or family type at the 5% level; the model explained 46.8% of the variance (adjusted $RZ = 0.446$). In Model 2, income (B = 0.206, $p < 0.001$) and savings (B = 0.192, $p < 0.001$) were significant, whereas health expenditure lost significance (B = 0.121, $p = 0.440$); explained variance rose to 50.3% (adjusted $RZ = 0.480$). Occupation terms remained borderline, with unemployed or non-working households spending about ₹1,682 less than daily wage households ($p = 0.082$). These findings were robust. With log-transformed expenditure, income and savings remained significant and unemployed or non-working status was associated with about 42% lower expenditure ($RZ = 0.414$). In the ordered logit model, the odds of a higher expenditure class rose with income (OR per ₹1,000 = 1.069, 95% CI 1.050–1.088), savings (OR = 1.060, 1.027–1.095) and, marginally, health expenditure (OR = 1.126, 1.001–1.267, $p = 0.047$), and were lower for unemployed or non-working households (OR = 0.259, 0.088–0.766); McFadden pseudo-RZ = 0.205. Results were unchanged when the top income class was valued at ₹60,000 or ₹85,000, and in the larger sample complete on model variables (n = 326; income B = 0.198, savings B = 0.196, both $p \leq 0.001$).

3.4 Discussion

Income was the dominant determinant of expenditure, in line with consumption theory and with evidence that poor households spend most of any additional income.[1,3,20] The marginal propensity to spend of roughly 0.2–0.25 implies that a considerable part of extra income is saved, which fits the close tracking of savings and income in Figure 2a. The positive coefficient for savings should not be read causally: because income was recorded in broad classes, savings probably proxy for permanent income, assets or under-reported earnings.[3] The weak role of education once income was controlled suggests that its influence operates mainly through earnings,[6,21] and the lower unadjusted spending of female-headed households disappeared after controlling for income, pointing to an income gap rather than a difference in spending behaviour. The health findings matter most for policy. Health spending is largely need-driven: it was positively related to total expenditure, but its independent effect was fragile once financial capacity was held constant, while its burden fell disproportionately on the poorest households, whose median share of income spent on health was more than seven times that of the ₹40,000–60,000 class. As medicines and consultations dominate this spending, strengthening public provision of essential medicines and outpatient care, extending insurance to cover them, and raising awareness of existing schemes would reduce regressive OOP payments more directly than inpatient-focused cover.[11,29] Livelihood and employment support remain central because unemployed or non-working households spent least and had the weakest capacity to absorb health costs.

This study has limitations. The cross-sectional design supports association, not causation. Monetary variables were self-reported in classes and converted to midpoints, which introduces measurement approximation;[24] some respondents who reported no regular savings still gave a savings amount, and the open-ended top classes rest on an assumption, although results were insensitive to it. Health expenditure is part of total expenditure, and catastrophic expenditure was self-reported rather than calculated with the

capacity-to-pay method.[15,29] Household size was not recorded, about two-fifths of households came from three panchayats, and complete-case analysis retained 87.6% of responses. The findings should therefore not be generalised to all rural Kerala.

4. CONCLUSION

Among 305 rural households in Malappuram, expenditure was driven chiefly by income, with savings acting as a marker of financial capacity; education, age, gender and family type had no independent effect. Health spending was dominated by recurring medicine and consultation costs, fell most heavily on low-income households, and was poorly cushioned by insurance. Income security, wider coverage of outpatient care and essential medicines, and better awareness of insurance schemes are the main policy priorities.

REFERENCES

1. Deaton A. The analysis of household surveys: a microeconometric approach to development policy. Baltimore: Johns Hopkins University Press; 1997.
2. Deaton A, Muellbauer J. Economics and consumer behavior. Cambridge: Cambridge University Press; 1980.
3. Friedman M. A theory of the consumption function. Princeton: Princeton University Press; 1957.
4. Modigliani F, Brumberg R. Utility analysis and the consumption function: an interpretation of cross-section data. In: Kurihara KK, editor. Post-Keynesian economics. New Brunswick: Rutgers University Press; 1954. p. 388-436.
5. Deaton A, Paxson C. Economies of scale, household size, and the demand for food. J Polit Econ. 1998;106(5):897-930.
6. Becker GS. Human capital: a theoretical and empirical analysis, with special reference to education. 3rd ed. Chicago: University of Chicago Press; 1993.
7. Deaton A, Drèze J. Poverty and inequality in India: a re-examination. Econ Polit Wkly. 2002;37(36):3729-3748.
8. Dev SM, Ravi C. Poverty and inequality: all-India and states, 1983-2005. Econ Polit Wkly. 2007;42(6):509-521.
9. Berman P, Ahuja R, Bhandari L. The impoverishing effect of healthcare payments in India: new methodology and findings. Econ Polit Wkly. 2010;45(16):65-71.
10. Garg CC, Karan AK. Reducing out-of-pocket expenditures to reduce poverty: a disaggregated analysis at rural-urban and state level in India. Health Policy Plan. 2009;24(2):116-128. DOI: 10.1093/heapol/czn046
11. Selvaraj S, Karan AK. Why publicly-financed health insurance schemes are ineffective in providing financial risk protection. Econ Polit Wkly. 2012;47(11):60-68.
12. Daivadanam M, Thankappan KR, Sarma PS, Harikrishnan S. Catastrophic health expenditure and coping strategies associated with acute coronary syndrome in Kerala, India. Indian J Med Res. 2012;136(4):585-592.
13. Thomas R, Jacob QM, Raj Eliza S, Mini M, Jose J, Sobha A. Financial burden and catastrophic health expenditure associated with COVID-19 hospitalizations in Kerala, South India. Clinicoecon Outcomes Res. 2022;14:439-446. DOI: 10.2147/CEOR.S365999
14. National Statistical Office. Key indicators of social consumption in India: health, NSS 75th round (July 2017-June 2018). New Delhi: Ministry of Statistics and Programme
15. Xu K, Evans DB, Kawabata K, Zeramdini R, Klavus J, Murray CJL. Household catastrophic health expenditure: a multicountry analysis. Lancet. 2003;362(9378):111-117. DOI: 10.1016/S0140-6736(03)13861-5
16. Wagstaff A, van Doorslaer E. Catastrophe and impoverishment in paying for health care: with applications to Vietnam 1993-1998. Health Econ. 2003;12(11):921-934. DOI: 10.1002/hec.776
17. Drèze J, Sen A. An uncertain glory: India and its contradictions. Princeton: Princeton University Press; 2013.
18. Rajan SI, Zachariah KC. Emigration and remittances: new evidences from the Kerala Migration Survey, 2018. CDS Working Paper No. 483. Thiruvananthapuram: Centre for Development Studies; 2019.
19. Adams RH Jr, Cuecuecha A. Remittances, household expenditure and investment in Guatemala. World Dev. 2010;38(11):1626-1641. DOI: 10.1016/j.worlddev.2010.03.003
20. Banerjee AV, Duflo E. The economic lives of the poor. J Econ Perspect. 2007;21(1):141-168. DOI: 10.1257/jep.21.1.141
21. Cutler DM, Lleras-Muney A. Understanding differences in health behaviors by education. J Health Econ. 2010;29(1):1-28. DOI: 10.1016/j.jhealeco.2009.10.003
22. Thorat S, Newman KS, editors. Blocked by caste: economic discrimination in modern India. New Delhi: Oxford University Press; 2010.
23. International Labour Organization.

Women and men in the informal economy: a statistical picture. 3rd ed. Geneva: International Labour Office; 2018.
24. Heitjan DF, Rubin DB. Ignorability and coarse data. Ann Stat. 1991;19(4):2244-2253.
25. Little RJA, Rubin DB. Statistical analysis with missing data. 3rd ed. Hoboken: Wiley; 2019.
26. Cohen J. Statistical power analysis for the behavioral sciences. 2nd ed. Hillsdale: Lawrence Erlbaum Associates; 1988.
27. Long JS, Ervin LH. Using heteroscedasticity consistent standard errors in the linear regression model. Am Stat. 2000;54(3):217-224.
28. O'Brien RM. A caution regarding rules of thumb for variance inflation factors. Qual Quant. 2007;41(5):673-690.
29. O'Donnell O, van Doorslaer E, Wagstaff A, Lindelow M. Analyzing health equity using household survey data: a guide to techniques and their implementation. Washington DC: World Bank; 2008.