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Who cares, who pays and who decides? Gendered Health and Care Responsibilities in the Lake Victoria Basin, Kenya

Jane Owenga

owengajane55@gmail.com

Jaramogi Oginga Odinga University of Science and Technology

Erick Okuto

Jaramogi Oginga Odinga University of Science and Technology

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Abstract

Background

Household health and care responsibilities are structured by gender, yet responsibility, decision authority, service access and financial protection are often treated as equivalent. This study examined reproductive-health responsibility, healthcare decisions, home care, insurance, medical payment and coping in Kenya's Lake Victoria Basin.

Methods

A quantitative baseline survey included 1,718 respondents (835 women and 883 men) from nine counties. Analysis combined sex-disaggregated descriptive statistics, robust multivariable regression, supervised machine learning and Bernoulli latent-class analysis. Five fixed profiles were compared by sex, age, education and geography and linked to external health and financing outcomes.

Results

Overall, 56.2% reported a previous-year health check-up, 38.0% had medical insurance and 81.8% paid part or all of their medical expenses. Female respondents had higher adjusted wife-only responsibility breadth for reproductive health (β = 0.56, 95% CI 0.35–0.76), healthcare decisions (β = 0.37, 95% CI 0.31–0.43), medical-finance decisions (β = 0.76, 95% CI 0.64–0.88) and care governance (β = 0.62, 95% CI 0.49–0.74), but lower odds of medical insurance (aOR = 0.79, 95% CI 0.63–0.99). Random-forest models showed useful cross-validated discrimination for check-up, insurance, personal payment and distress financing (AUC = 0.803–0.815). Five profiles were identified: shared responsibility without wife-only attribution (25.2%), mixed wife and shared responsibility (34.9%), wife-centred health and home care (11.6%), home-care intensive with stronger insurance connection (18.2%), and diffuse or limited health-decision responsibility (10.1%). Profile membership varied by sex (Cramér's V=.284), transect (.187) and county (.273). Female respondents had markedly greater relative risk of the wife-centred profile rather than the shared-responsibility profile (RRR = 9.33, 95% CI 5.65–15.38). In external analyses, Profile 4 had higher caregiver-selection breadth (β = 0.50, 95% CI 0.17–0.83), whereas Profiles 3 and 4 used fewer medical-financing sources than Profile 1 (β=−0.28 and − 0.48, respectively).

Conclusion

Women's responsibility for health and care was substantial, but responsibility did not consistently translate into shared authority, insurance access or financial protection. Policies should recognize, reduce and redistribute unpaid care, expand equitable insurance coverage, support joint but non-coercive household decision-making, and strengthen early and financially protected care seeking.

1. Background

Health and care work is organized through both formal systems and households. When public systems are weak or inaccessible, households absorb part of the burden through unpaid nursing, supervision, transport, treatment decisions and the mobilisation of money. This burden is not gender-neutral. WHO estimates that women perform 76% of unpaid care work globally and argues that chronic underinvestment in health systems transfers additional care obligations to women, constraining paid work and weakening gender equality (World Health Organization [WHO], 2019, 2024). Evidence on unpaid work also links unequal care burdens with poorer mental well-being and quality of life, although the strength of this relationship varies across settings (Seedat & Rondon, 2021). Household care should therefore be analysed both as a contribution to family well-being and as a possible source of time poverty, economic constraint and unequal exposure to health-system gaps.

A central analytical problem is the tendency to collapse responsibility, decision-making autonomy and empowerment into a single dimension. A woman may provide care, arrange a clinic visit or pay a medical bill without controlling household resources or having the final say in treatment. Conversely, a jointly reported decision may conceal unequal influence. A systematic review found that women's healthcare autonomy is shaped by education, employment, household wealth, residence, culture and partners' characteristics, and that autonomy is associated with healthcare use and treatment (Idris et al., 2023). Kenyan qualitative evidence further shows that women's agency is relational: household finance, spousal communication, transport costs, waiting times and service availability can either support or restrict healthcare decisions (Olwanda et al., 2024). Multicountry evidence from sub-Saharan Africa similarly links women's household decision-making autonomy with health insurance enrolment, but the relationship remains socially and geographically heterogeneous (Zegeye et al., 2023). These findings support a relational approach that distinguishes who performs a task, who decides, who pays and who has access to protective resources.

Reproductive-health decisions provide a particularly important example. Across sub-Saharan Africa, education, employment, media exposure, antenatal-care contact and household circumstances are associated with married women's decision-making power regarding family planning (Demissie et al., 2022). Insurance coverage is also associated with the timeliness of antenatal care, suggesting that decision capacity and financing protection jointly shape service use (Aboagye et al., 2022). In Kenya, qualitative research has shown that maternal-health agency is influenced by individual confidence, household financial relations, spousal communication, gender norms and health-system barriers such as distance, transport cost and long waiting times (Olwanda et al., 2024). Yet reproductive-health responsibility should not automatically be interpreted as autonomy: responsibility can reflect socially assigned obligation, while autonomy concerns the ability to act on informed preferences without restriction.

Health insurance adds a second layer of complexity. In Kenya, coverage has historically remained limited and unequally distributed, while out-of-pocket payments continue even among insured households

(Mugo, 2023). Evidence from western Kenya found especially low insurance coverage among women of reproductive age and strong socioeconomic gradients in enrolment (Ambalu et al., 2023). A mixed-method study of 1,773 rural households in western Kenya reported only 12% insurance coverage, premiums that were unaffordable for most households, and persistent out-of-pocket and catastrophic spending among insured and uninsured groups (Maritim et al., 2023). Across sub-Saharan Africa, insurance enrolment is associated with decision-making autonomy, education, wealth, employment and community socioeconomic position (Zegeye et al., 2023). However, cross-country findings are not uniform: a Rwandan analysis found that commonly used empowerment indicators did not translate straightforwardly into higher insurance use, demonstrating that scheme design and national context matter (Kawuki et al., 2022). Insurance access, responsibility for maintaining cover and responsibility for paying medical bills should therefore be analysed separately.

The financial consequences of illness extend beyond insurance status. Kenyan households finance care through taxes, insurance contributions and direct out-of-pocket spending, and insurance may coexist with substantial personal expenditure (Mugo, 2023). National evidence shows that out-of-pocket payments can produce catastrophic and impoverishing effects, especially among poorer households (Salari et al., 2019). In rural western Kenya, households spent an average of 12% of their budgets on healthcare, while 12% experienced catastrophic health expenditure despite the presence of insurance for some households (Maritim et al., 2023). Borrowing, savings, asset sales and fundraising can help households obtain treatment, but they may also transfer health shocks into debt, depleted assets or social obligations. Without expenditure thresholds and household consumption data, such responses should be described as coping strategies rather than automatically labelled catastrophic expenditure or resilience.

This study addresses four gaps. First, it distinguishes wife-only, husband-only and shared or either-partner responsibility across reproductive health, healthcare decisions, medical finance and home-care governance. Second, it separates responsibility from insurance, payment and service use. Third, it identifies multidimensional household profiles rather than imposing a single empowerment index. Fourth, it links the profiles to external care and financing outcomes while preserving their nominal, non-hierarchical interpretation. The analysis is guided by Moser's distinction between practical gender needs and strategic gender interests and by the capacities-and-vulnerabilities approach, which directs attention to the resources and constraints that shape household responses to stress (Anderson & Woodrow, 1989; Moser, 1993).

The study therefore asked: (1) How are health, care and medical-finance responsibilities distributed between women, men and shared arrangements? (2) How are these patterns associated with respondent sex, insurance, preventive care and medical payment? (3) What latent household profiles characterize the combined responsibility, insurance and payment indicators? and (4) How do the fixed profiles relate to illness, care engagement and medical-financing strategies?

2. Materials and methods

2.1 Study area

The study was conducted in nine counties within Kenya's Lake Victoria Basin and organised into three ecological transects. The Northern transect followed the Nzoia and Yala river basins and comprised Trans Nzoia, Busia, Kakamega and Siaya counties; the Middle transect extended from the Mau highlands to the Kano Plains and comprised Kericho and Kisumu counties; and the Southern transect followed the Kuja river basin and comprised Homa Bay, Nyamira and Migori counties. The transect design captured ecological and livelihood variation across the basin, including differences in elevation, settlement patterns, farming systems, fisheries, water and wetland dependence, infrastructure, market access, climate exposure and information environments (Fig. 1).

2.2 Study design

This was a household survey where quantitative data was collected.

2.3 Participants and analytical populations

The survey included 1,718 respondents: 883 men and 835 women. Full-sample analyses used all respondents with observed outcomes. Conditional modules were preserved rather than coding ineligible respondents as zero: medical-cover analyses were restricted to 653 insured respondents, and actual medical-financing analyses were restricted to 1,405 respondents who reported paying part or all of their medical expenses.

2.4 Measures

Responsibility items identified the household member selected for reproductive-health activities, children's health and household management, decisions about seeking and completing a doctor visit, hypothetical decisions concerning budgets, savings, borrowing and asset sales for medical expenses, and home-care or caregiver governance. Explicit categories for husband only, wife only, both partners and either partner were retained. Wife-only and shared/either breadth were calculated separately for reproductive health, healthcare decisions, medical-finance decisions and care governance. Reproductive-health items were interpreted as perceived household norms because they were asked universally and were not screened for individual pregnancy or service eligibility.

Healthcare and financing measures included previous-year health check-up, medical insurance, personal payment of medical expenses, medical-cover breadth among insured respondents, and actual use of savings, borrowing, asset sale and fundraising among medical-expense payers. Distress medical financing was defined transparently as use of borrowing, asset sale or fundraising. Household illness and current-care breadths reflected the number of reported conditions and were treated as household-level indicators rather than individual diagnoses or measures of severity.

2.5 Statistical analysis

The analysis proceeded in linked stages. Descriptive statistics and unadjusted tests compared responsibility and health outcomes by respondent sex. OLS models with HC1 robust standard errors estimated adjusted associations for responsibility breadths; logistic generalised linear models with HC1 robust standard errors estimated binary outcomes. Primary models adjusted for respondent sex, ordinal education, age group and transect. County replaced transect in sensitivity specifications because counties are nested within transects.

Four supervised classifiers: conventional logistic regression, L2-penalised logistic regression, random forest and gradient boosting were compared using stratified five-fold cross-validation. Performance was assessed using area under the receiver-operating-characteristic curve, Brier score, log loss and balanced accuracy. Outcome-derived predictors were excluded.

Unsupervised analysis used eight binary indicators covering wife-only and shared/either reproductive responsibility, healthcare decisions, home care, insurance and personal medical payment. Bernoulli latent-class models containing two to six classes were compared using log likelihood, Bayesian information criterion, entropy, class size, stability and substantive interpretability. A five-profile solution was retained for parsimony and interpretability. Respondent sex, age, education, county and transect were excluded from profile formation and used only in external comparisons. K-means clustering provided a robustness check. Fixed profiles were subsequently linked to external outcomes using Kruskal–Wallis tests, chi-square tests with Cramér's V, OLS HC1 models and logistic HC1 models.

2.6 Ethics and permissions

Ethical approval number ERC 43/5/24 – 06 for the household survey was obtained from the JOOUST institutional ethics review committee prior to data collection. The broader programme also operated under NACOSTI Research Licence No. NACOSTI/P/23/25192. Written informed consent was obtained from all participants before enrolment, and all analyses were conducted using de-identified data.

3. Results

3.1 Sample and core health outcomes

The analytical sample comprised 1,718 respondents. As summarised in Table 1, 56.2% reported a previous-year health check-up, 38.0% had medical insurance and 81.8% reported paying part or all of their medical expenses. Distress medical financing was reported by 57.2% of the 1,405 medical-expense payers.

Table 1
Analytical populations and principal health and financing outcomes

Indicator	Population	N	Positive N	Percent
Female respondent	Full sample	1,718	835	48.6
Male respondent	Full sample	1,718	883	51.4
Previous-year health check-up	Full sample	1,718	966	56.2
Medical insurance	Full sample	1,718	653	38.0
Personal payment of medical expenses	Full sample	1,718	1,405	81.8
Distress medical financing	Medical-expense payers	1,405	804	57.2

Percentages for conditional outcomes use the relevant eligible population.

3.2 Gendered responsibility, insurance and payment

Table 2 shows that female respondent status was associated with higher wife-only responsibility breadth across all four domains after adjustment. Female respondents simultaneously reported lower shared/either breadth. The largest adjusted difference concerned hypothetical medical-finance decisions (β = 0.76), followed by care governance (β = 0.62), reproductive-health responsibility (β = 0.56) and healthcare decisions (β = 0.37). Female respondents had lower adjusted odds of medical insurance (aOR = 0.79, 95% CI 0.63–0.99), while their odds of a previous-year check-up and personal medical payment did not differ significantly from men.

Table 2
Adjusted female–male associations for principal outcomes

Outcome	Estimate type	Estimate	95% CI	p-value
Wife-only reproductive-health responsibility	β	0.56	0.35 to 0.76	< .001
Shared/either reproductive-health responsibility	β	−0.49	−0.70 to −0.28	< .001
Wife-only healthcare-decision responsibility	β	0.37	0.31 to 0.43	< .001
Shared/either healthcare-decision responsibility	β	−0.23	−0.31 to −0.15	< .001
Wife-only medical-finance decision responsibility	β	0.76	0.64 to 0.88	< .001
Shared/either medical-finance decision responsibility	β	−0.43	−0.61 to −0.26	< .001
Wife-only care-governance responsibility	β	0.62	0.49 to 0.74	< .001
Shared/either care-governance responsibility	β	−0.39	−0.55 to −0.24	< .001
Previous-year health check-up	aOR	1.03	0.83 to 1.27	.805
Medical insurance	aOR	0.79	0.63 to 0.99	.036
Personal payment of medical expenses	aOR	0.85	0.66 to 1.11	.231
Distress medical financing	aOR	0.79	0.63 to 0.99	.041

Models adjusted for respondent sex, ordinal education, age group and transect. β denotes an OLS coefficient; aOR denotes an adjusted odds ratio.

Figure 2 consolidates these gendered patterns. It shows that the higher wife-only breadths reported by female respondents were not simply mirrored by equal increases in shared responsibility. Access, payment and financing also followed different patterns, reinforcing the distinction between responsibility and protection.

3.3 Predictive performance

Random forest produced the highest cross-validated AUC for all four predictive outcomes: 0.810 for health check-up, 0.815 for medical insurance, 0.803 for personal medical payment and 0.805 for distress medical financing. Balanced accuracy ranged from 0.703 to 0.736. These results indicate useful non-linear predictive structure but do not alter the explanatory interpretation of the regression models.

3.4 Health and care profiles

The five-profile latent-class solution is presented in Table 3. The largest profile combined wife-specific and shared responsibility (34.9%). One quarter of respondents belonged to a profile characterised by shared responsibility without wife-only attribution. Wife-centred health and home care represented 11.6%, while a home-care-intensive profile with stronger insurance connection represented 18.2%. A smaller diffuse profile showed limited healthcare-decision responsibility.

Table 3
Selected five-profile solution

Profile	Profile name	N	Percent	Mean posterior probability
1	Shared responsibility without wife-only attribution	433	25.2	0.985
2	Mixed wife and shared responsibility	599	34.9	0.953
3	Wife-centred health and home-care responsibility	200	11.6	0.974
4	Home-care intensive with stronger insurance connection	312	18.2	0.965
5	Diffuse and limited health-decision responsibility	174	10.1	0.988

Profiles are nominal configurations and should not be interpreted as an empowerment or welfare hierarchy.

Figure 3 displays the conditional probabilities that define the five profiles. Wife-only and shared/either responsibility coexisted in some configurations, demonstrating that household roles were not reducible to a simple binary opposition.

Profile membership differed significantly by respondent sex ($\chi^2[4] = 138.56$, $p<.001$, Cramér's $V=.284$), age group ($\chi^2[16] = 72.20$, $p<.001$, $V=.102$), transect ($\chi^2[8] = 120.66$, $p<.001$, $V=.187$) and county ($\chi^2[32] = 513.76$, $p<.001$, $V=.273$). In adjusted multinomial analysis, female respondents had markedly higher relative risk of belonging to the wife-centred profile rather than Profile 1 (RRR = 9.33, 95% CI 5.65–15.38). The estimate remained similar when county replaced transect (RRR = 9.43, 95% CI 5.62–15.82).

3.5 External health and financing relevance

Fixed profile assignments were associated with selected external outcomes. Relative to Profile 1, Profile 2 had lower adjusted odds of a previous-year health check-up (aOR = 0.70, 95% CI 0.53–0.92) but higher odds of borrowing for medical expenses (aOR = 1.49, 95% CI 1.09–2.05). Profile 4 had a higher caregiver-selection criteria breadth (β = 0.50, 95% CI 0.17–0.83), a lower medical-financing breadth (β=−0.48, 95% CI − 0.64 to − 0.32), lower odds of borrowing (aOR = 0.56, 95% CI 0.37–0.84) and lower odds of fundraising (aOR = 0.44, 95% CI 0.23–0.86). Selected profile–outcome associations are summarised in Table 4.

Table 4
Selected adjusted external-outcome associations for fixed profiles

Outcome	Profile contrast	Estimate type	Estimate	95% CI	p-value
Previous-year health check-up	Profile 2 vs 1	aOR	0.70	0.53 to 0.92	.011
Caregiver-selection criteria breadth	Profile 4 vs 1	β	0.50	0.17 to 0.83	.003
Caregiver-selection criteria breadth	Profile 5 vs 1	β	−1.07	−1.49 to −0.66	< .001
Medical-financing breadth	Profile 3 vs 1	β	−0.28	−0.48 to −0.08	.006
Medical-financing breadth	Profile 4 vs 1	β	−0.48	−0.64 to −0.32	< .001
Borrowing for medical expenses	Profile 2 vs 1	aOR	1.49	1.09 to 2.05	.013
Borrowing for medical expenses	Profile 4 vs 1	aOR	0.56	0.37 to 0.84	.005
Fundraising for medical expenses	Profile 4 vs 1	aOR	0.44	0.23 to 0.86	.016

Models adjusted for respondent sex, ordinal education, age group and transect. Profile 1 is the reference.

Figure 4 integrates descriptive and adjusted evidence on illness, care engagement, health check-up and financing. The profiles differed more clearly in caregiver-selection and financing responses than in household illness breadth, supporting their interpretation as responsibility-and-coping configurations rather than disease-burden classes.

4. Discussion

4.1 Responsibility did not equal authority

The most consistent finding was that female respondents attributed more health, finance and care responsibility to wives and less responsibility to shared/either arrangements. This pattern persisted after adjustment and was reinforced by the wife-centred latent profile. The result is consistent with systematic-review evidence that women's healthcare autonomy is embedded within education, employment, wealth, partner characteristics and sociocultural norms rather than being an isolated personal attribute (Idris et al., 2023). It also aligns with multicountry evidence that women's family-planning decision power varies by education, work, media exposure and contact with health services (Demissie et al., 2022), and with Kenyan qualitative evidence showing that household finance, spousal

communication and health-system constraints shape women's capacity to act on maternal-health decisions (Olwanda et al., 2024).

However, the present findings caution against interpreting responsibility as empowerment. Moser's framework distinguishes practical responsibilities that sustain household functioning from strategic changes that alter gendered power relations (Moser, 1993). Wife-only responsibility for arranging care, making hypothetical finance decisions or supervising caregivers may satisfy immediate household needs while leaving the underlying distribution of time, income and authority unchanged. WHO's care-economy analysis similarly argues that feminized unpaid care can sustain health systems while constraining women's paid employment and well-being (WHO, 2024). The negative association between female respondent status and shared/either breadth therefore suggests that women's responsibility was often concentrated rather than collectively distributed.

4.2 Shared responsibility was heterogeneous

The mixed wife-and-shared profile was the largest class, and a separate shared-responsibility profile included one quarter of the sample. These findings show that households cannot be classified simply as male-dominated or female-led. Shared responsibility may reflect genuine collaboration, task-specific substitution or ambiguous reporting. Systematic-review evidence identifies joint decision-making as potentially beneficial, but also shows that autonomy is shaped by family, community and cultural conditions (Idris et al., 2023). Kenyan qualitative work likewise demonstrates that relational agency can be supported by respect and spousal communication yet restricted by financial dependence or the need for partner approval (Olwanda et al., 2024). The implication is methodological as well as substantive: surveys should retain separate categories for wife-only, husband-only, both partners and either partner and complement them with questions on final authority, disagreement and control of resources.

4.3 Care work was visible but remained undervalued

The wife-centred and home-care-intensive profiles demonstrate that home care was not a marginal household activity. WHO has argued that women's unpaid health and social care forms an insecure foundation for health systems, and that weak systems transfer additional work to households and particularly to women (WHO, 2019, 2024). Evidence synthesised by Seedat and Rondon (2021) also links unpaid domestic and care work with poorer mental well-being and quality of life. The present report-level narratives similarly described women as primary carers of children, older people, persons with disabilities and sick household members. This convergence strengthens the interpretation of care responsibility as a possible time, health and livelihood constraint.

At the same time, care should not be framed only as victimhood. Family care can express social commitment, expertise and agency. The policy challenge is to recognise and support care while reducing and redistributing avoidable burdens. Relevant measures include community-based respite and referral support, stronger primary care, accessible rehabilitation and chronic-care services, social protection for high-care households, and gender-transformative engagement of men. Such approaches are consistent

with WHO's call to measure, value and invest in all forms of health and care work and to strengthen public systems so that unpaid household care does not substitute for essential services (WHO, 2024).

4.4 Insurance access and decision-making were connected but not interchangeable

Female respondents had lower adjusted odds of insurance even though they reported higher wife-only responsibility across health and finance domains. This mismatch supports the study's central argument: being responsible for health does not guarantee access to protective resources. Kenyan evidence shows that insurance remains socially stratified and that insured households can still incur substantial out-of-pocket expenditure (Ambalu et al., 2023; Maritim et al., 2023; Mugo, 2023). The rural western Kenya study by Maritim et al. (2023) found low coverage, widespread premium unaffordability and similar impoverishing effects of out-of-pocket spending among insured and uninsured households. Multicountry evidence has linked decision-making autonomy with insurance enrolment (Zegeye et al., 2023), while the Rwandan study by Kawuki et al. (2022) found a more complex relationship between empowerment indicators and insurance use. Scheme design, compulsory versus voluntary enrolment, employment structure and household registration practices can therefore mediate the connection between autonomy and coverage.

The results also reinforce the distinction between holding insurance, maintaining cover and paying medical bills. Insurance policy should therefore move beyond household-head enrolment assumptions. Registration, contribution and benefit communication should reach women directly, preserve continuity through employment and marital transitions, and reduce administrative dependence on another household member. Insurance expansion should also be assessed for benefit adequacy, because Kenyan studies show that insurance can coexist with high out-of-pocket payments, incomplete benefit coverage and weak financial protection (Maritim et al., 2023; Mugo, 2023; Oyando et al., 2023).

4.5 Medical financing profiles reflected coping rather than financial protection

Personal payment was common, and more than half of medical-expense payers used at least one distress-oriented financing mechanism. Profile differences in borrowing, asset sale, fundraising and financing breadth show that households mobilised resources in different ways. These strategies may enable treatment, but they can also transfer health shocks into debt, depleted assets or social obligations. Kenyan studies have documented catastrophic and impoverishing effects of out-of-pocket healthcare payments and continuing financial vulnerability among insured households (Maritim et al., 2023; Salari et al., 2019). Because the present survey did not measure expenditure shares relative to consumption, it appropriately avoids labelling these responses catastrophic expenditure. Financial protection requires evidence about both the source and magnitude of spending.

The finding that Profile 2 had higher borrowing odds but lower preventive check-up odds suggests a potentially reactive pattern in which households mobilise funds after health needs become acute. In

contrast, Profile 4 combined stronger insurance connection, higher caregiver-selection breadth and lower borrowing or fundraising odds. This profile should not be ranked as more empowered or resilient, but it illustrates how insurance and organised care arrangements may reduce reliance on emergency financing. Aboagye et al. (2022) found that insurance was associated with more timely antenatal care across sub-Saharan Africa. Kenyan qualitative evidence also shows that transport costs, waiting times, staff shortages and household responsibilities can delay women's care seeking even when they recognise the need for services (Olwanda et al., 2024).

4.6 Geographic variation points to systems, not county rankings

Profile membership varied by transect and county, and county differences were almost as strong as respondent-sex differences. These patterns likely reflect differences in service availability, insurance enrolment, livelihoods, settlement patterns and local norms. The systematic review by Idris et al. (2023) identified residence and region as recurrent determinants of healthcare autonomy, while Kenyan qualitative evidence shows that distance, transport cost, facility workload and staff availability can shape women's ability to seek care (Olwanda et al., 2024). The present county differences should not be interpreted as performance rankings because the survey was not designed for representative county benchmarking. Instead, the findings support place-sensitive implementation of community health, insurance outreach and caregiver support within common gender-equity principles.

4.7 Added value of combined analytical methods

The regression models identified adjusted associations, supervised learning demonstrated useful predictive structure, and latent-class analysis revealed configurations that variable-by-variable models could not capture. Random-forest AUCs of 0.803–0.815 indicate that combinations of demographic, geographic and responsibility variables contained meaningful information about check-up, insurance, payment and distress financing. Nonetheless, prediction is not explanation: feature importance may reflect interaction or correlation rather than causality. The manuscript therefore treats machine learning as complementary to, not a substitute for, theory-led regression, established evidence on gendered autonomy and financial protection (Idris et al., 2023; Maritim et al., 2023).

4.8 Strengths and limitations

Strengths include a large sex-disaggregated sample across nine counties, explicit preservation of shared responsibility categories, conditional denominators for insurance and financing modules, robust adjusted models, cross-validated prediction, latent profiles and external profile validation. The analysis also avoided constructing a universal empowerment index where the measures represented distinct processes. This multidimensional approach responds to evidence that women's healthcare agency is relational and that insurance status alone does not guarantee effective financial protection (Idris et al., 2023; Maritim et al., 2023; Olwanda et al., 2024).

Several limitations require emphasis. The cross-sectional design precludes causal inference. Responsibility items were respondent reports and did not pair spouses within the same household. Some reproductive-health and caregiver-governance items were universally or hypothetically worded and therefore measure perceived norms rather than verified behaviour. Household illness items did not identify the affected person or clinical severity. Distress financing was a transparent coping proxy rather than a catastrophic-expenditure measure. The latent-class solution was selected partly for parsimony even though a six-class model had a lower BIC.

5. Conclusions and implications

Health and care responsibility in the Lake Victoria Basin was strongly gendered. Women were more likely to be associated with wife-only reproductive-health, healthcare-decision, medical-finance and care-governance responsibility, yet they had lower insurance access. Household profiles showed that wife-centred, shared and mixed arrangements coexisted and were linked to different preventive-care and financing patterns.

Policy should avoid assuming that greater responsibility automatically represents empowerment. A gender-responsive agenda should: recognize and measure unpaid health and care work; reduce avoidable care burdens through stronger primary and community care; redistribute care through constructive male engagement; expand direct and continuous insurance access for women; promote joint but non-coercive household decisions; and strengthen financial protection so that treatment does not depend on borrowing, asset sale or fundraising. Future research should use paired household data, time-use measures, expenditure thresholds and transcript-level qualitative evidence to determine how responsibility becomes either agency or burden.

Declarations

Ethics approval and consent to participate

The study received Ethics approval number ERC 43/5/24 – 06 from JOOUST and Research Licence No. NACOSTI/P/23/25192 (Ref. 637533) from the National Commission for Science, Technology and Innovation (NACOSTI). Informed consent was obtained from participants and confidentiality principle was adhered to.

Consent for publication

Not applicable to de-identified survey data. Any future use of verbatim qualitative quotations will require confirmation that consent permitted publication.

Competing interests

The authors declare that they have no competing interests, subject to confirmation by all co-authors.

Use of artificial intelligence

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to assist with language refinement, manuscript organisation, and formatting. The authors independently reviewed and verified all AI-assisted outputs and remain fully responsible for the accuracy, integrity, interpretation, and conclusions of the work. ChatGPT was not used to generate primary data, conduct the statistical analysis, determine the study findings, or make scientific decisions.

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Authors' contributions

JO conceived and designed the study, contributed to the development of the study framework and interpretation of the findings, and critically revised the manuscript. AO contributed to the study conception and design, interpretation of findings, and critical revision of the manuscript. DO contributed to the study design, interpretation of findings, and manuscript review. EO contributed to the study design, interpretation of findings, and critical revision of the manuscript. EM contributed to the study design with particular emphasis on financial and household economic dimensions, interpretation of medical-financing findings, and manuscript review. DA contributed to the study design, data collection, interpretation of findings, and critical revision of the manuscript. DO contributed to field implementation, data collection, interpretation of findings, and manuscript review. BM contributed to the study conceptualization, interpretation of gender and community-level findings, and critical revision of the manuscript. SA contributed to the study design, digital and information systems aspects of the research, data management, and manuscript review. SL contributed to data management, information systems and digital aspects of the study, interpretation of findings, and manuscript review. CO contributed to the study design, integration of environmental and livelihood perspectives, interpretation of findings, and critical revision of the manuscript. JM contributed to the study design, integration of agricultural, food-system and livelihood perspectives, interpretation of findings, and manuscript review. GA contributed to the study conception and design, coordination of the research programme, interpretation of findings, and critical revision of the manuscript. EO contributed to statistical methodology, formal statistical analysis, machine-learning and latent-class analyses, interpretation of statistical findings, preparation of tables and figures, and critical revision of the manuscript. All authors contributed to the interpretation of the results, critically reviewed the manuscript for important intellectual content, approved the final version, and agreed to be accountable for all aspects of the work

Availability of data and materials

The de-identified analytical dataset and reproducibility notebooks are held by the study team and may be made available subject to institutional approval, ethical requirements and data-sharing agreements.

References

1. Aboagye RG, Okyere J, Ahinkorah BO, Seidu A-A, Zegeye B, Amu H, Yaya S (2022) Health insurance coverage and timely antenatal care attendance in sub-Saharan Africa. BMC Health Serv Res 22:181. https://doi.org/10.1186/s12913-022-07601-6
2. Ambalu R, Rashid S, Atwa S, Otira M, Ndolo L et al (2023) Factors related to women's use of health insurance cover in Navakholo, Kakamega County, Kenya: Sub-county level results based on community household register. BMC Public Health 23:576. https://doi.org/10.1186/s12889-023-15270-1
3. Anderson MB, Woodrow PJ (1989) Rising from the ashes: Development strategies in times of disaster. Westview
4. Creswell JW, Plano Clark VL (2018) Designing and conducting mixed methods research, 3rd edn. SAGE
5. Demissie GD, Akalu Y, Gelagay AA, Alemnew W, Yeshaw Y (2022) Factors associated with decision-making power of married women to use family planning in sub-Saharan Africa: A multilevel analysis of demographic health surveys. BMC Public Health 22:837. https://doi.org/10.1186/s12889-022-13251-4
6. Idris IB, Hamis AA, Md Bukhori AB, Hoong DCC, Yusop H, Shaharuddin MA-A, Fauzi NAFA et al (2023) Women's autonomy in healthcare decision making: A systematic review. BMC Women's Health 23:643. https://doi.org/10.1186/s12905-023-02792-4
7. Jaramogi Oginga Odinga University of Science and Technology (2022) Gender analysis baseline report for the JOOUST–VLIR-UOS programme [Unpublished institutional report]
8. Kawuki J, Gatasi G, Sserwanja Q (2022) Women empowerment and health insurance utilisation in Rwanda: A nationwide cross-sectional survey. BMC Women's Health 22:378. https://doi.org/10.1186/s12905-022-01976-8
9. Maritim B, Koon AD, Kimaina A, Lagat C, Riungu E, Laktabai J, Ruhl LJ, Kibiwot M, Scanlon ML, Goudge J (2023) It is like an umbrella covering you, yet it does not protect you from the rain': A mixed methods study of insurance affordability, coverage, and financial protection in rural western Kenya. Int J Equity Health 22:27. https://doi.org/10.1186/s12939-023-01837-2
10. Moser CON (1993) Gender planning and development: Theory, practice and training. Routledge
11. Mugo MG (2023) The impact of health insurance enrollment on health outcomes in Kenya. Health Econ Rev 13:42. https://doi.org/10.1186/s13561-023-00454-7

12. Olwanda E, Opondo K, Oluoch D, Croke K, Maluni J, Jepkosgei J, Nzinga J (2024) Women's autonomy and maternal health decision making in Kenya: Implications for service delivery reform—A qualitative study. BMC Women's Health 24:181. https://doi.org/10.1186/s12905-024-02965-9
13. Oyando R, Were V, Koros H, Mugo R, Kamano J, Etyang A, Murphy A, Hanson K, Perel P, Barasa E (2023) Evaluating the effectiveness of the National Health Insurance Fund in providing financial protection to households with hypertension and diabetes patients in Kenya. Int J Equity Health 22:107. https://doi.org/10.1186/s12939-023-01923-5
14. Salari P, Di Giorgio L, Ilinca S, Chuma J (2019) The catastrophic and impoverishing effects of out-of-pocket healthcare payments in Kenya, 2018. BMJ Global Health 4(6):e001809. https://doi.org/10.1136/bmjgh-2019-001809
15. Seedat S, Rondon M (2021) Women's wellbeing and the burden of unpaid work. BMJ, 374, n1972. https://doi.org/10.1136/bmj.n1972
16. World Health Organization (2019) Delivered by women, led by men: A gender and equity analysis of the global health and social workforce. World Health Organization
17. World Health Organization (2024) Fair share for health and care: Gender and the undervaluation of health and care work. World Health Organization
18. Zegeye B, Idriss-Wheeler D, Ahinkorah BO, Ameyaw EK, Seidu A-A, Adjei NK, Yaya S (2023) Association between women's household decision-making autonomy and health insurance enrollment in sub-Saharan Africa. BMC Public Health 23:610. https://doi.org/10.1186/s12889-023-15434-z

Figures

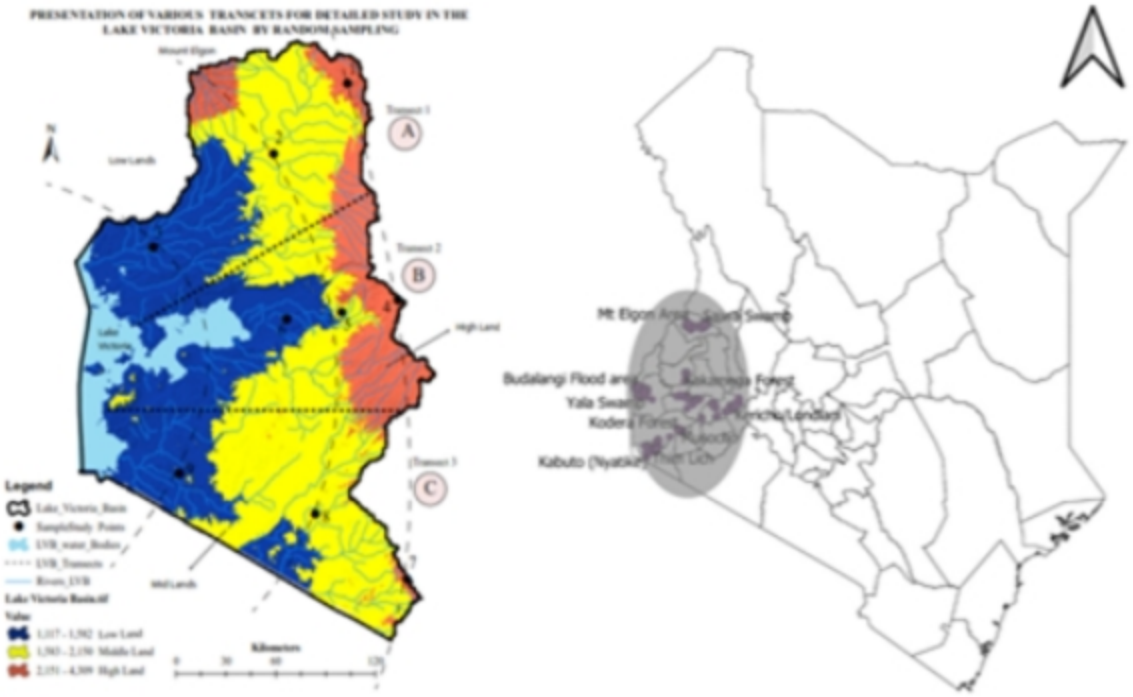


Figure 1

Study area in Kenya's Lake Victoria Basin.

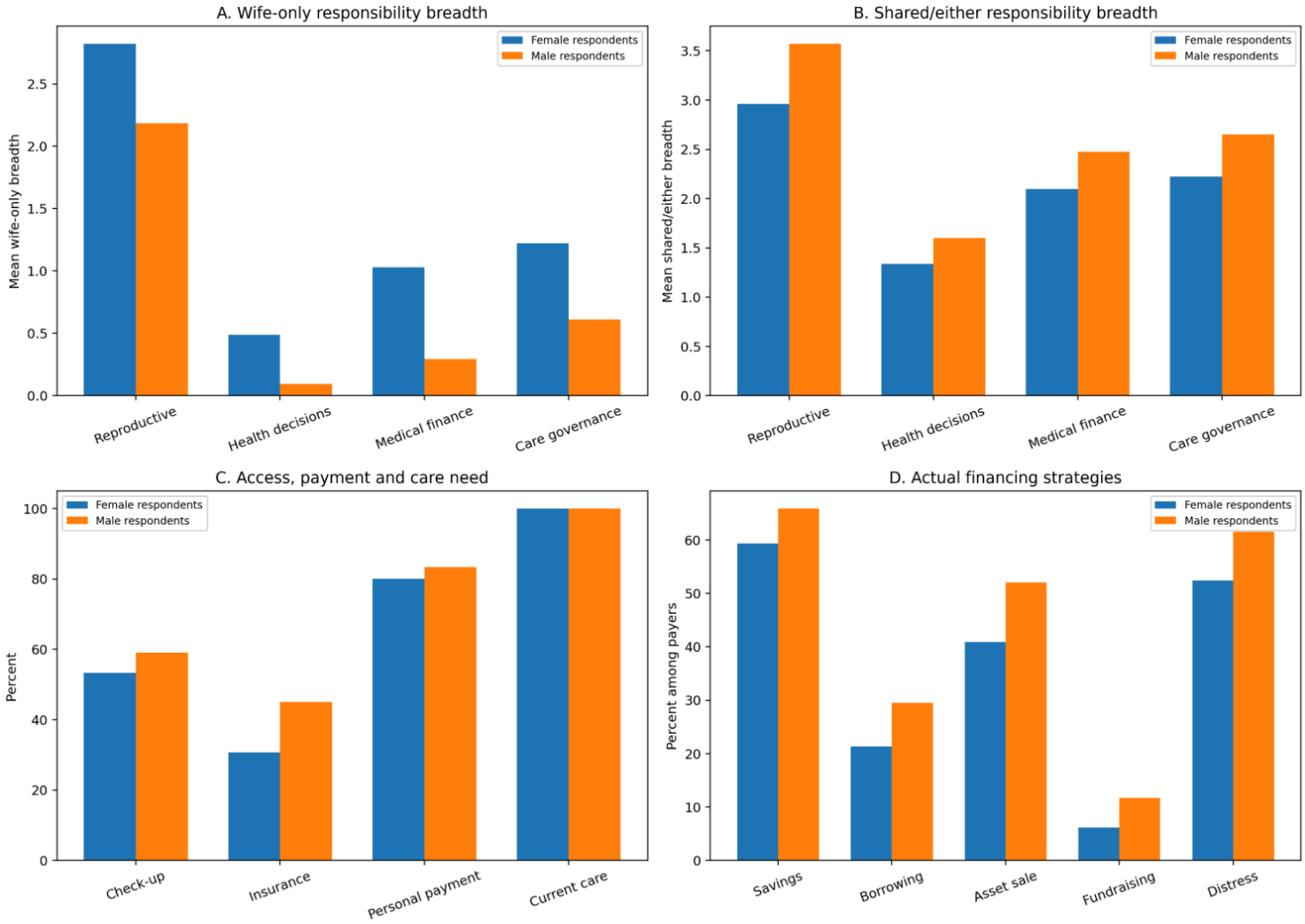


Figure 2

Combined gendered responsibility, healthcare access, payment and financing patterns.

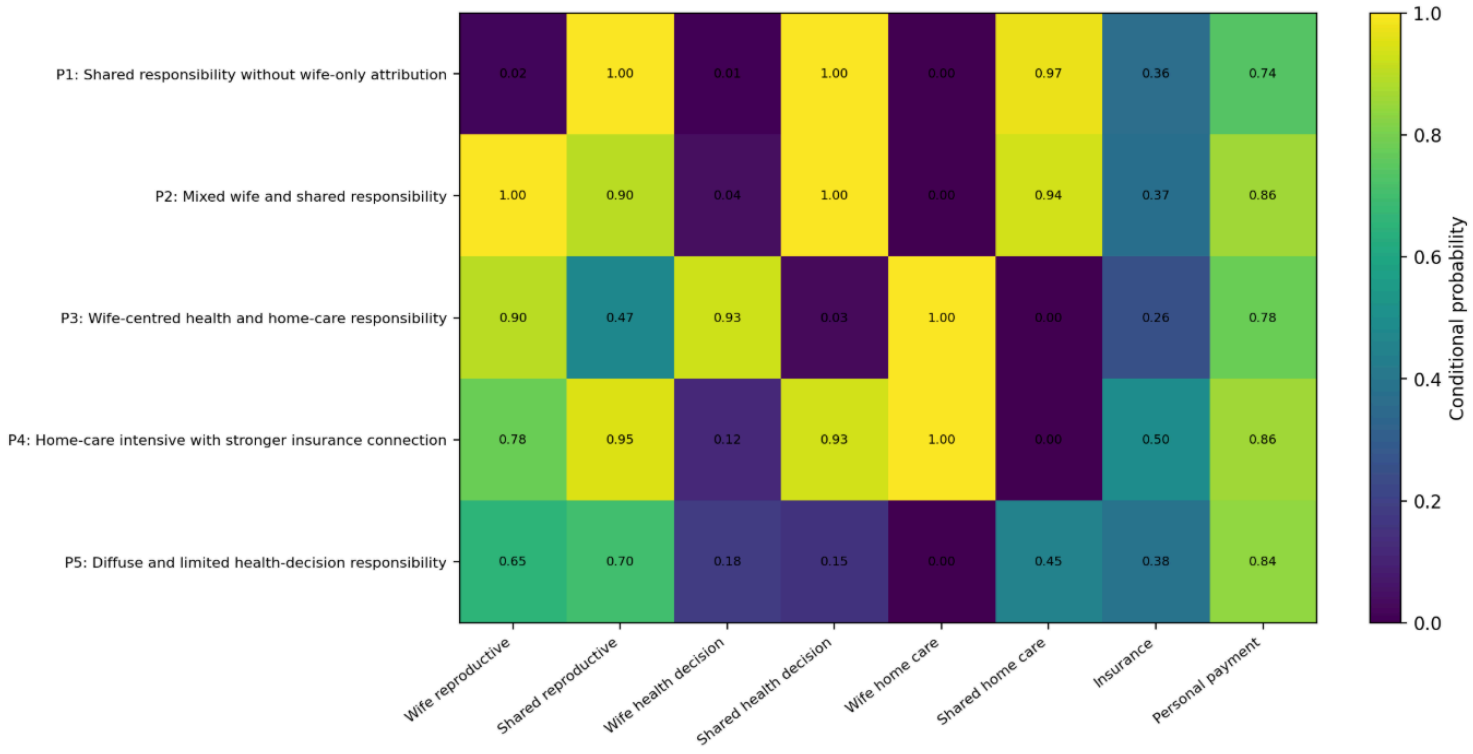


Figure 3

Conditional probabilities defining the five health, care, insurance and payment profiles.

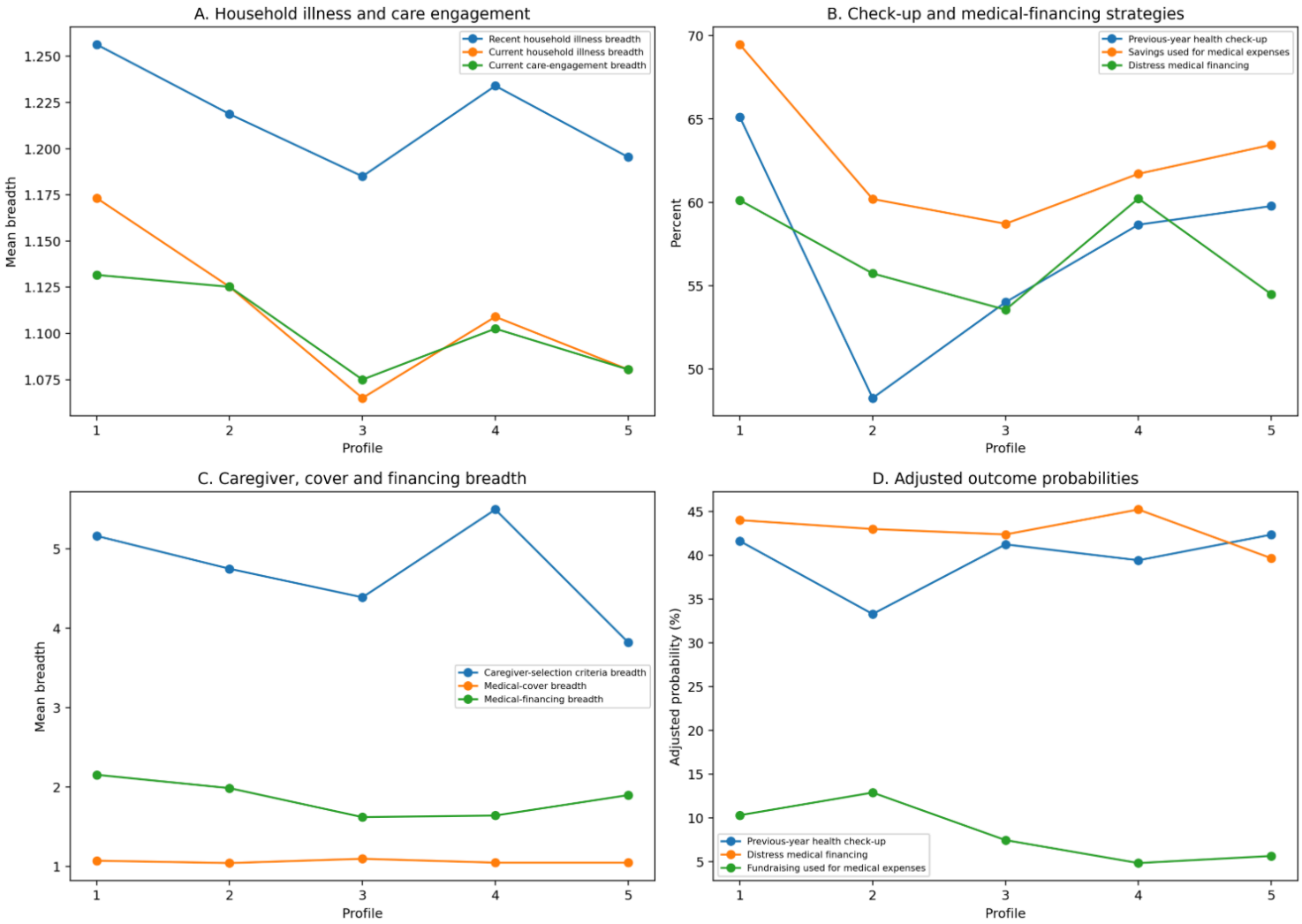


Figure 4

External relevance of fixed health, care and household-welfare profiles.