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Financial distress, clinic attendance concerns and transport-support requests for long-acting injectable HIV options among people living with HIV and clients recruited through PrEP services in Uganda: a cross- sectional study

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Financial distress, clinic attendance concerns and transport-support requests for long-acting injectable HIV options among people living with HIV and clients recruited through PrEP services in Uganda: a cross-sectional study

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Abstract

Background: Long-acting injectable HIV products reduce daily medication demands but require scheduled clinic visits. We examined associations of financial distress with anticipated clinic attendance concern and requests for transport support among people living with HIV and clients recruited through pre-exposure prophylaxis services in Uganda.

Methods: In this exploratory analysis, we used a cross-sectional survey of 232 participants, comprising 116 people living with HIV and 116 clients recruited through PrEP services. Concern

about strict clinic attendance requirements was defined as concerned or highly concerned on a four-level item. Financial distress meant difficulties meeting basic needs sometimes, often or always during the previous three months. Modified Poisson models estimated prevalence ratios adjusted for service group, age group and sex. Secondary analyses examined food worry, meal skipping, transport mode, concern thresholds and service-support preferences.

Results: Overall, 109/232 participants (47.0%) reported attendance concern. Concern was more frequent with financial distress than without it (64.9% versus 41.1%, adjusted prevalence ratio 1.37, 95% confidence interval 1.02–1.84). Food worry showed an uncertain association (1.33, 0.99–1.80), while meal skipping showed no clear association (1.14, 0.83–1.56). Threshold-specific adjusted odds ratios for financial distress were 3.17 (1.40–7.17) for any response above not concerned, 2.12 (1.08–4.19) for concerned or highly concerned, and 1.04 (0.45–2.40) for highly concerned. Fourteen of 17 participants who walked reported concern (82.4%, adjusted prevalence ratio 1.58, 1.15–2.17). Participants with financial distress more often requested transport support (36.8% versus 8.0%, adjusted prevalence ratio 3.86, 1.91–7.81). Within-group estimates were larger among clients recruited through PrEP services (6.66) than among people living with HIV (1.94), with an interaction p-value of 0.09.

Conclusions: Financial distress was moderately associated with anticipated attendance concern and strongly associated with requesting transport support. Food-related measures provided weaker evidence. Injectable HIV service planning should assess financial and travel constraints alongside product preferences and evaluate practical support for scheduled visits.

Keywords: financial distress, long-acting injectables, HIV treatment, pre-exposure prophylaxis, clinic attendance, transport support, Uganda, cross-sectional study

Background

Regular access to HIV services depends partly on whether clients afford the journey, time away from work and other costs of attending care. In Uganda, transport costs compete with food and household expenses even when antiretroviral medicines are available without charge. Interviews

with clients in southwestern Uganda identified these competing demands as barriers to maintaining treatment and reaching clinics [1, 2]. Financial strain therefore deserves attention when services introduce products whose benefits depend on returning for scheduled administration.

Long-acting injectable products expand the options available for HIV treatment and prevention. Cabotegravir plus rilpivirine has maintained virological suppression among eligible people living with HIV, while injectable cabotegravir has demonstrated preventive efficacy among men, transgender women and cisgender women [3, 4, 5]. Twice-yearly lenacapavir has also demonstrated preventive efficacy in trials involving cisgender women and men and gender-diverse people [6, 7]. Treatment and prevention products differ in indication, dosing interval and clinical requirements. Their shared appeal is a reduction in daily pill taking, rather than removal of the need for continuing contact with health services.

The relationship between fewer medication doses and easier access is not automatic. Injectable regimens shift part of the adherence task from daily self-administration to keeping appointments. A person who welcomes relief from pill taking might still worry about finding transport money or arranging a visit around work and household responsibilities. Acceptability theory distinguishes anticipated burden from experienced use and recognises opportunity costs and intervention coherence as relevant to whether an intervention feels acceptable [8]. Attendance concern represents one aspect of this anticipated burden. It does not establish whether someone will miss an appointment after starting an injectable product.

Ugandan studies report interest in long-acting options alongside practical reservations. Qualitative research among people living with HIV with viraemia identified expected improvements in privacy and adherence, together with concerns about side effects, trust, stock-outs and monitoring [9]. Research involving people who had received injectable treatment documented positive experiences as well as service-delivery constraints and missed injection appointments [10]. A randomised trial extension in Uganda and Kenya found improved HIV prevention coverage when

injectable cabotegravir became available within a person-centred model offering a choice of prevention methods [11]. Interviews with recipients in this programme showed how reminders helped with appointment keeping, while unpredictable work and travel schedules remained difficulties for some participants [12].

Evidence from other settings also links injectable service delivery to financial and scheduling demands. HPTN 083-02 participants described financial constraints, travel and competing work commitments as barriers, while flexible scheduling and supportive clinical relationships facilitated attendance [13]. Studies of anticipated injectable treatment and prevention preferences identified costs and clinic visit frequency among participants' concerns [14, 15]. These findings establish the relevance of visit burden but do not quantify its association with financial distress among treatment and prevention clients recruited within the same Ugandan service setting.

Prevention-service populations also require careful definition. A Kampala survey included current oral PrEP users, people who had stopped PrEP and people who had not initiated it [16]. Ugandan research on injectable PrEP service preferences shows interest in accessible delivery locations and complementary services [17]. Grouping everyone recruited through prevention services as a current PrEP user would obscure this variation. Similarly, attendance concern and a request for transport support measure different responses to anticipated service demands, and neither should be interpreted as evidence of actual non-adherence.

Scheduled injection visits create practical questions for services introducing long-acting HIV options. Oral medication collected earlier sometimes provides continuity when a client misses a visit. Injectable delivery requires timely access to administration, or an appropriate alternative under product-specific missed-dose guidance. Our study relates household financial distress to anticipated appointment concern and requests for practical support within one cohort spanning treatment and prevention services. These outcomes complement willingness and readiness measures by identifying the service demands participants expect and the assistance they request.

This study examined the association between financial distress and concern about strict clinic attendance requirements for hypothetical long-acting injectable HIV options. We also examined food-related hardship, usual transport mode and the distribution of concern across the full response scale. Secondary exploratory analyses assessed requests for transport support and flexible appointments, and cost or transport as reasons for reluctance. By relating household circumstances to specific service preferences, the study addresses a practical question for implementation: which clients report concern about the visit requirements and what support do they request?

Methods

Study design and setting

We conducted a cross-sectional quantitative study within a broader mixed-methods project on long-acting injectable HIV options in Uganda. Participants were recruited at Mildmay Hospital Uganda, a specialised HIV care and research setting in Central Uganda, during 2026. Although the broader protocol included a second planned site, recruitment for this quantitative cohort took place at Mildmay.

Participants considered hypothetical injectable options. They did not initiate or receive a long-acting injectable product as part of this survey. The questions therefore measure anticipated concern and stated preferences. Reporting follows the Strengthening the Reporting of Observational Studies in Epidemiology framework [18]. This paper uses the main quantitative survey cohort, with a distinct question about financial circumstances and visit burden. It is not a new sample or a separate survey of the same service populations.

Participants and analytic cohort

The analytic cohort comprised 232 participants aged at least 15 years, including 116 people living with HIV and 116 clients recruited through PrEP services. We retained the exact participant identifiers used in the parent study. The verified survey export contained 251 unique records: 131 people living with HIV and 120 clients recruited through PrEP services. Of these, 232 matched

the saved parent-study roster. The remaining 19 comprised 15 people living with HIV and four clients recruited through PrEP services, including one current, one former and two never users of oral PrEP. All 251 records met the recorded age and service-group criteria and contained the variables required for the two financial distress models. The available files did not establish the original selection reason for each record outside the roster. We therefore describe roster membership without assigning unsupported eligibility or missingness exclusions. No additional complete-case exclusions occurred in the main models. Table S7 in Additional file 1 summarises record selection. The export count is not a recruitment denominator and does not establish a response rate.

The parent sample size targeted a two-group comparison of hypothetical acceptance, using expected proportions of 74% and 89% from a French survey [19], 80% power, a two-sided 5% significance level and an allowance for non-response, yielding 116 participants per group. The sample was not separately powered for financial distress, transport mode or interaction effects. Recruitment was organised by service population and age category. Among people living with HIV, younger and older participants were recruited during separate sessions, which limits interpretation of age associations. The available recruitment records did not establish implementation of the random selection procedure proposed in the protocol.

The prevention group included 55 current, 33 former and 28 never users of oral PrEP. Throughout the manuscript, clients recruited through PrEP services means all participants recruited through PrEP services, whether they were current, former or never users of oral PrEP. The term does not mean current PrEP users only. The parent questionnaire's facility-care item, Q03, recorded Yes for 200 participants and No for 32, all in the prevention group. We retained all 232 roster participants in the main analysis and restricted to the 200 affirmative responses in a sensitivity analysis. This restriction assesses the influence of the recorded care-status distinction without redefining the original cohort after reviewing results.

Data collection and measurement

Research assistants administered the structured electronic questionnaire using Open Data Kit. The research team developed the questionnaire specifically for this study. An English-language version appears in Additional file 2. The parent study materials describe interviews in English or Luganda, conducted privately after consent procedures. The parent study materials describe interviews in English or Luganda, conducted privately after consent procedures. Participants received an explanation distinguishing injectable HIV treatment from injectable HIV prevention before answering questions about willingness and perceptions. The survey covered demographic characteristics, household financial circumstances, food-related experiences, transport, willingness, readiness, conditions supporting acceptance and perceived risks. The study used individual questionnaire items for the measures in this paper. These were study-specific items rather than validated financial distress or food-insecurity scales.

The primary outcome was concern about strict clinic attendance requirements, recorded by Q43 on four ordered levels: not concerned, neutral, concerned and highly concerned. We classified concerned or highly concerned as attendance concern and combined not concerned with neutral as the comparison category. This definition captures expressed concern rather than observed clinic attendance, affordability of a particular journey, predicted non-adherence or clinical eligibility for an injectable product. The complete four-level distribution was retained for sensitivity analysis.

Financial distress, Q12, asked how often financial difficulties had affected the ability to meet basic needs, including food, transport, rent and healthcare, during the previous three months. Responses were never, rarely, sometimes, often or always. We compared sometimes, often or always with never or rarely. Financial distress was the main exposure in this analysis. We chose this focus after an initial analysis of both hardship measures, so the analysis is exploratory and its results describe observational associations. The frequency threshold stayed the same throughout the revised analyses.

Two secondary measures addressed food-related hardship. Q14 recorded worry about enough food for the respondent or household, using the same five frequency levels and the same binary threshold. We report a three-month recall period because this was the wording of the question, although its section heading referred to the past 30 days. Q13 asked whether the respondent or household had skipped meals or reduced portion sizes during the previous three months because of insufficient food or money. We verified its electronic coding against the data dictionary, with 1 meaning Yes and 0 meaning No. Meal skipping is a report of behaviour rather than worry, but it remains self-reported and does not establish a validated household food-insecurity classification.

Usual transport to the clinic, Q11, was grouped as walking, public transport, private vehicle or boda boda, a motorcycle taxi. No participant selected Other. We kept these modes separate because their costs and access implications differ. Public transport was the reference category in regression models. We recorded age as 15–24 versus at least 25 years and sex as male or female, matching the analytic coding of the parent cohort. Service group distinguished people living with HIV from clients recruited through PrEP services.

Q31 allowed multiple responses to conditions supporting acceptance. We examined selections of transport support and flexible appointments. All 232 participants had recorded Q31 responses. Q32 allowed multiple reasons for reluctance and applied to respondents whose willingness response was very unwilling, unwilling or neutral. We assessed cost or transport challenges among these 55 participants with recorded responses. For each item, a recorded parent response without the selected option meant the option was not selected. Missing parent responses would have been excluded rather than recoded as absence of a preference.

Statistical analysis

We summarised categorical variables as counts and percentages and age as the median and interquartile range. Proportion confidence intervals used the Wilson method. We examined attendance concern separately for financial distress, food worry and meal skipping. Each exposure

had its own crude model and a demographic-adjusted model containing service group, age group and sex. The hardship measures were not entered together, so the estimates describe their separate associations rather than effects independent of the other hardship measures.

Because attendance concern was common, we used Poisson regression with a log link and HC0 robust sandwich standard errors to estimate prevalence ratios and 95% confidence intervals [20, 21]. Adjustment used the same three demographic variables across exposure models, without selecting covariates by univariable p-values. This adjustment does not establish control of all confounding. We did not adjust for the aggregate perceived-risk score because it includes Q43, the outcome item.

Sensitivity analyses restricted the cohort to Q03 affirmative responses, redefined the outcome as highly concerned alone, and estimated marginal standardised prevalence ratios from logistic models adjusted for the same demographic variables. Logistic standardisation averaged predicted probabilities over the observed covariate distribution under each exposure category and divided these averages. Percentile confidence intervals used 1000 participant-level bootstrap samples. We also fitted a demographic-adjusted transport-mode model and applied the same logistic-standardisation approach to compare transport categories with public transport.

We fitted proportional-odds models to the four-level concern outcome as a sensitivity check. An approximate global test compared cumulative-logit slopes across the three response thresholds, using a stacked dataset and participant-clustered covariance to account for repeated cumulative outcomes. The test assessed all model slopes, rather than only the financial distress coefficient. Because equal slopes were not supported, we did not report a common ordinal odds ratio. Instead, separate demographic-adjusted logistic models estimated odds ratios for responses above not concerned, for concerned or highly concerned, and for highly concerned. These threshold-specific odds ratios are distinct from the prevalence ratios in the main analysis.

For transport support, we fitted a pooled modified Poisson model containing financial distress, service group, age group and sex. The pooled model assumes a common financial distress association across groups, and a non-significant interaction does not establish equal effects. A separate model added a financial distress by service-group interaction. We derived within-group contrasts and the ratio of those prevalence ratios using robust covariance. We interpreted the interaction estimate and its interval rather than differences in the significance of separate group estimates [22]. Requests for flexible appointments and cost or transport reasons were described by financial distress and service group, with exploratory Fisher exact tests.

After reviewing cohort selection, we added an exploratory sensitivity analysis using all 251 exported records meeting the recorded age and service-group criteria. We fitted the same modified Poisson models for attendance concern and transport-support requests, adjusted for service group, age group and sex, using HC0 robust standard errors. This check assesses sensitivity to roster restriction and does not reconstruct the original recruitment or selection process.

The choice of financial distress as the main exposure followed the first analysis, while meal skipping, transport, ordinal checks and service-support analyses were added during review. We made no multiplicity adjustment. We report estimates, confidence intervals and relevant two-sided p-values, with secondary findings labelled exploratory. The measured outcome, exposure and demographic variables had no missing values in the main models. Analyses used R version 4.3.2 with sandwich, ggplot2 and MASS. The archived analytic data and current raw source were reconciled for the retained identifiers and key study items before final reporting. The original estimates come from the study analysis in R. Expanded-cohort sensitivity checks used Python with NumPy and SciPy.

Results

Participant characteristics and attendance concern

The 232 participants had a median age of 26 years, with an interquartile range of 22–36 years. There were 107 participants aged 15–24 years (46.1%) and 128 female participants (55.2%). Financial distress was reported by 57 participants (24.6%), food worry by 48 (20.7%) and meal skipping or reduced portions by 46 (19.8%). Public transport was the most common travel mode, used by 154 participants (66.4%). Seventeen participants walked, 34 used boda bodas and 27 used private vehicles. Participant characteristics by service group appear in Table 1.

Overall, 109/232 participants reported attendance concern (47.0%). Responses were not concerned for 89 participants (38.4%), neutral for 34 (14.7%), concerned for 70 (30.2%) and highly concerned for 39 (16.8%). Concern was reported by 44/116 people living with HIV (37.9%) and 65/116 clients recruited through PrEP services (56.0%).

Financial distress and food-related measures

Attendance concern was reported by 37/57 participants with financial distress (64.9%) and 72/175 without it (41.1%). The crude prevalence ratio was 1.58 (95% CI 1.22–2.05). After adjustment for service group, age group and sex, the prevalence ratio was 1.37 (95% CI 1.02–1.84, p=0.039). Within service groups, concern was reported by 16/27 versus 28/89 people living with HIV (59.3% versus 31.5%), and 21/30 versus 44/86 clients recruited through PrEP services (70.0% versus 51.2%), with versus without financial distress (Figure 1). The full response distributions appear in Figure 2.

For food worry, concern was reported by 31/48 exposed participants (64.6%) and 78/184 comparison participants (42.4%). The crude prevalence ratio was 1.52 (95% CI 1.16–1.99), and the adjusted ratio was 1.33 (95% CI 0.99–1.80). For meal skipping or reduced portions, the adjusted ratio was 1.14 (95% CI 0.83–1.56). Crude and adjusted estimates appear in Table 2. In the main financial distress model, participants aged 15–24 years had an adjusted prevalence ratio

of 1.37 (95% CI 1.01–1.86) relative to older participants, and clients recruited through PrEP services had a ratio of 1.43 (95% CI 1.07–1.92) relative to people living with HIV.

Sensitivity analyses and concern thresholds

Restricting the analysis to the 200 participants who reported receiving care at the study facility (Q03 = Yes) yielded adjusted prevalence ratios of 1.51 for financial distress and 1.50 for food worry. The logistic-standardised financial distress ratio was 1.41 (95% CI 1.00–1.84), with an unrounded lower limit of 0.998. The corresponding food-worry estimate was 1.38 (95% CI 0.96–1.83), and the meal-skipping estimate was 1.17 (95% CI 0.79–1.60). Model comparisons appear in Figure 3 and Additional file 1, Table S1.

The approximate global proportional-odds tests returned p-values of 0.002 for the financial distress model, 0.009 for food worry and 0.017 for meal skipping. Financial distress was associated with greater odds of a response above not concerned (adjusted OR 3.17, 95% CI 1.40–7.17) and of concerned or highly concerned (2.12, 95% CI 1.08–4.19). For highly concerned alone, the adjusted OR was 1.04 (95% CI 0.45–2.40). The four-level distributions appear in Figure 2, and all threshold-specific estimates appear in Additional file 1, Table S2. Modified Poisson estimates for highly concerned alone were 1.03 for financial distress and 1.14 for food worry (Additional file 1, Table S1).

Transport mode

Concern was reported by 14/17 participants who walked (82.4%), 66/154 public-transport users (42.9%), 15/34 boda boda users (44.1%) and 14/27 private-vehicle users (51.9%). Relative to public transport, walking had an adjusted prevalence ratio of 1.58 (95% CI 1.15–2.17). Logistic standardisation yielded 1.74 (95% CI 1.17–2.43). The maximum fitted value in the modified Poisson transport model was 1.002, while the logistic model's fitted probabilities remained below one. Estimates for all transport categories appear in Additional file 1, Table S3.

Transport support and other service preferences

Participants reporting financial distress more often requested transport support than those without distress, 21/57 versus 14/175 (36.8% versus 8.0%). The pooled adjusted prevalence ratio was 3.86 (95% CI 1.91–7.81, p<0.001), with a maximum fitted value of 0.48. The within-group adjusted prevalence ratio was 6.66 (95% CI 2.27–19.57) among clients recruited through PrEP services and 1.94 (95% CI 0.68–5.49) among people living with HIV. The interaction ratio was 3.44 (95% CI 0.82–14.36, p=0.09). Descriptive counts and intervals appear in Figure 4, and pooled and interaction contrasts appear in Additional file 1, Table S4.

Flexible appointments were selected by 21/57 participants with distress and 41/175 without it (36.8% versus 23.4%, Fisher p=0.058). The corresponding proportions were 25.9% versus 14.6% among people living with HIV and 46.7% versus 32.6% among clients recruited through PrEP services. Among the 55 participants with neutral or unwilling responses and recorded reasons, cost or transport was selected by 7/18 participants with distress and 1/37 without it (38.9% versus 2.7%, Fisher p=0.001). All eight selections occurred among clients recruited through PrEP services. These counts, including zero-event strata, appear in Additional file 1, Table S5.

In the expanded-cohort sensitivity analysis, 118/251 participants reported attendance concern and 37/251 requested transport support. The adjusted financial distress prevalence ratios were 1.40 (95% CI 1.06–1.86) for concern and 4.17 (2.06–8.44) for transport support. Both estimates retained the direction of the main-cohort findings (Additional file 1, Table S8).

Discussion

Principal findings

Financial distress was associated with a moderately higher prevalence of concern about strict clinic attendance requirements for hypothetical injectable HIV options. Adjustment reduced the crude ratio from 1.58 to 1.37, indicating the relevance of measured demographic differences. Sensitivity analyses generally retained the direction of the association, although the logistic-

standardised interval included one before rounding. This supports a cautious interpretation of a modest association, rather than a strong or definitive explanation of attendance concern. The food-related findings were weaker, and the meal-skipping interval was compatible with both lower and higher concern.

The threshold analyses add detail to the binary outcome. Financial distress was associated with fewer participants being unconcerned and with greater odds of reporting concerned or highly concerned, but not with a higher prevalence of the most concerned category. This pattern helps explain why the binary association did not extend to highly concerned alone. It describes differences between respondents at one survey visit. It does not show individuals moving from one concern category to another, nor does it establish the mechanism underlying their responses. The rejected global slope-equality assumption also makes a single common ordinal odds ratio an unsuitable summary of these data.

Financial circumstances and anticipated visit burden

Our findings are consistent with Ugandan evidence showing how transport costs compete with other household needs [1, 2]. Financial distress in this survey explicitly included difficulties meeting transport and healthcare needs, making its association with attendance concern plausible. The measures partly overlap in their underlying content, which also deserves consideration: respondents acknowledging problems meeting basic needs might be more likely to recognise clinic attendance as burdensome. Shared reporting context and unmeasured vulnerability offer alternatives to a direct causal interpretation.

Research on injectable treatment has shown why reduced pill burden and concern about service access coexist. People living with HIV in Uganda valued privacy and easier medication taking but also identified system-level constraints [9, 10]. Studies in coastal Kenya and the United States reported similar trade-offs between convenience, discretion, injection experiences and service demands [23, 14]. The practical benefit of an injectable product therefore depends partly on the

delivery arrangement. Our contribution is to relate an explicit household financial measure to a specific concern about clinic attendance, and to the support clients would request, within a cohort spanning treatment and prevention services. A general willingness score does not tell a programme what support to offer. Concern about visits and requests for transport support point to forms of help that services can plan and cost before injectable delivery expands.

A companion analysis of readiness in the same survey also found a lower prevalence of readiness among participants reporting financial difficulties at least sometimes. The two analyses address different outcomes, but their shared cohort and exposure mean they are complementary observations rather than independent replication. Financial circumstances deserve attention in counselling about readiness and appointment requirements, while a request for support should not be interpreted as unwillingness to use an injectable option.[1]

Transport support and differences between service populations

The largest secondary association concerned requests for transport support. The pooled adjusted ratio of 3.86 and the difference between 36.8% and 8.0% indicate a substantial association between financial distress and a stated preference for practical assistance. This result gives the attendance finding a service-relevant context. It does not establish a causal sequence from distress to concern to support seeking, because all responses were collected together and no mediation

1Unpublished companion readiness analysis, Stephen Charles Olet and Wandera Uthmaan Muluga. The same parent cohort contributed 225 respondents with applicable readiness responses. Financial difficulties sometimes, often or always versus never or rarely were associated with lower readiness, demographic-adjusted PR 0.68 (95% CI 0.48–0.96). This companion manuscript is in preparation and shares the survey cohort. It is not independent replication.

analysis was undertaken. The support request also shares content with the financial distress item, which included transport among basic needs.

The estimate was larger among clients recruited through PrEP services, but the interval around the interaction was wide. It accommodated an interaction ratio below one as well as a large difference favouring a stronger association in prevention services. Statistical significance within clients recruited through PrEP services and its absence within people living with HIV do not demonstrate a difference between those groups [22]. The pooled common-effect estimate is a useful overall summary, accompanied by the interaction contrasts to show this uncertainty. It should not be used to conclude the groups have equal support needs or to restrict assistance to one population.

The prevention group included people with differing oral PrEP histories, and their service preferences might reflect varying experience of routine care. Ugandan studies have already described this heterogeneity and the importance of delivery locations and additional services [16, 17]. Experiences from the SEARCH programme and HPTN 083-02 support attention to reminders, work schedules, travel and flexible interactions with services [12, 13]. These findings provide context for our results, but trials with active follow-up and product access differ from a hypothetical survey. The current data do not identify which support package would improve persistence in routine Ugandan services.

The cost-or-transport reason for reluctance points in the same direction but rests on eight selections among 55 respondents. Restricting this question to neutral or unwilling respondents produces a selected denominator, so it should not be compared directly with support preferences among all 232 participants. The zero selections among people living with HIV also came from only 12 respondents. Neither the small p-value nor the absence of a selection in this small subgroup establishes a population difference. Flexible appointment requests were more frequent

with distress, but the descriptive test and group-specific comparisons did not provide clear evidence of an association.

Food-related findings and transport mode

The food findings do not support treating all hardship indicators as interchangeable. Food worry showed an elevated estimate with an interval crossing one, while meal skipping or reduced portions showed a smaller, imprecise association. The lack of a clear meal-skipping association does not establish absence of food-related difficulty. With 46 exposed participants and a single item, the study had limited precision and no validated severity measure. Worry and reported food reduction also capture different experiences. Broader financial distress includes several competing needs, potentially making it more directly relevant to anticipated clinic access than either food item alone.

Longitudinal Ugandan research has linked food insecurity measured with a validated scale to antiretroviral adherence and clinical outcomes [24]. Our findings address a different outcome, anticipated attendance concern for an injectable option, in a mixed treatment and prevention cohort. They therefore neither confirm nor refute those clinical associations. The heading inconsistency around the food-worry recall period introduces additional measurement uncertainty. Future work should use consistent recall periods and established measures of food insecurity alongside direct indicators of travel cost and time.

Participants who walked reported more concern than public-transport users, and the association retained its direction under both regression approaches. Walking might represent limited ability to pay for transport, a lengthy journey, physical effort or other unmeasured circumstances. It might also reflect living near the clinic, so the mode alone does not distinguish these explanations. Ugandan research found measured travel distance to be more informative for missed visits than self-reported travel factors [25]. Our 17-person walking subgroup is too small to support a precise

assessment of these mechanisms or a service rule based on transport mode. The finding is a signal for further inquiry, with distance, time, physical mobility and cost recorded directly.

Implications for service planning

Services introducing injectable HIV products should ask about the practical requirements of return visits alongside product preference. A brief discussion of travel costs, work commitments, household demands and appointment flexibility would help identify support needs before initiation. Possible responses include targeted transport assistance, scheduling within clinically appropriate dosing windows, reminders and coordination of visits with other care. These are candidates for evaluation, rather than interventions whose effectiveness this survey established. Flexible appointments must remain compatible with the specific product's administration schedule and missed-dose guidance.

Support should follow an assessment of individual circumstances rather than an assumption based on treatment or prevention status. The uncertain interaction supports keeping both populations within needs assessment. Accessible delivery models also require attention to staff availability, medication access and workflow, as reported in an implementation study in a US safety-net system [26]. Differences in funding and service organisation limit direct transfer of this model to Uganda, but the distinction between a product's efficacy and a service's capacity to deliver it remains relevant. Prospective implementation research should measure actual injection attendance, persistence, patient costs, satisfaction and equity when comparing support arrangements. WHO now recommends twice-yearly lenacapavir as an additional HIV prevention option [27], so programmes planning its introduction will need to budget for the clinic visits each injection requires as well as for the product.

Strengths and limitations

The study retained the exact parent-cohort identifiers, verified item coding, reconciled raw and archived values and reported results across several analytic approaches. Separate food measures,

threshold-specific concern estimates and service-support preferences broaden the interpretation beyond a single dichotomised association. Reporting the weaker and null findings alongside the financial distress result reduces selective emphasis. These strengths do not remove the limitations of the sample and measures.

First, the design is cross-sectional. Temporal order, causation and mediation cannot be established. Second, concern and support preferences were hypothetical, with no recorded initiation, delayed injection, missed visit or persistence outcome. Third, Q43 is a single concern item rather than a validated access-barrier scale. Financial distress and food experiences were also self-reported and might share reporting influences with the outcome. The survey did not establish measurement equivalence across the two populations, and documentation of item development and language equivalence was limited.

Fourth, the age association requires particular caution. Younger and older people living with HIV were recruited during separate sessions. Age and recruitment session were therefore inseparable within this group, and adjustment for service group does not remove session-related differences in attendance patterns, interviewer context or participants reached. The younger-age estimate should not be interpreted as an independent age effect. Fifth, equal allocation to the two service populations and recruitment through one service setting limit generalisation. The overall prevalence is a summary of this selected cohort, not an estimate weighted to the local clinic population or to Uganda. The original reasons for omitting 19 exported records from the parent roster remained undocumented. Including these records in an exploratory sensitivity analysis preserved both financial distress associations, but this does not resolve the parent selection history.

Sixth, the main models adjusted for service group, age group and sex but not all relevant determinants of financial circumstances and access. Residual confounding by employment, household resources, distance, current PrEP history and prior service experiences remains possible. Seventh, financial distress was chosen as the main exposure after the initial analysis, and

several secondary analyses followed review. No adjustment for multiple testing was made. Borderline intervals require particular restraint, while small subgroups and the interaction estimate have limited precision. The 32 recorded Q03 negative responses also warrant caution about the facility-care status of the prevention group. Their exclusion in sensitivity analysis did not reverse the financial distress association, but it does not resolve the original recruitment and care-status discrepancy.

Conclusions

Financial distress was moderately associated with anticipated concern about clinic attendance for long-acting injectable HIV options. The concern pattern involved fewer unconcerned responses without a corresponding association with highly concerned responses. Food-related measures provided weaker evidence, and the walking result remained exploratory. Financial distress was also associated with requesting transport support, with a larger estimate among clients recruited through PrEP services but uncertain evidence of a difference between groups. Injectable service planning should assess financial and travel needs alongside treatment and prevention preferences, then evaluate whether practical appointment support improves attendance and equitable access.

List of abbreviations

aPR, adjusted prevalence ratio. ART, antiretroviral therapy. CI, confidence interval. HIV, human immunodeficiency virus. IQR, interquartile range. LAI, long-acting injectable. OR, odds ratio. PLHIV, people living with HIV. PR, prevalence ratio. PrEP, pre-exposure prophylaxis. RSTMH, Royal Society of Tropical Medicine and Hygiene.

Declarations

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki and its applicable amendments. The Mildmay Uganda Research Ethics Committee approved the parent study, reference MUREC-2026-1828. Adult participants provided written informed consent. Participants

aged 15–17 years provided written assent together with written consent from a parent or legal guardian. Interviews took place privately, and the analytic data were de-identified.

Clinical trial number: not applicable.

Consent for publication

Not applicable. The manuscript reports aggregate data and contains no identifiable participant information.

Availability of data and materials

The aggregate results and statistical methods supporting this manuscript are included in the article and Additional file 1. The participant-level dataset contains sensitive HIV-related information and is not included in this package. Access requests should be directed to the corresponding author and remain subject to the study custodian's permissions and applicable ethical and data-governance requirements.

Competing interests

The authors declare no competing interests.

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Authors' contributions

SCO led the statistical analysis, interpreted the findings and drafted the manuscript. WUM and DMU led the parent study’s conception, protocol development and funding acquisition, and contributed to interpretation of the findings and manuscript revision. MN, FM, RM and FA contributed to interpretation of the findings and manuscript revision. CN, AM, SO, CDS and SK

provided intellectual input, reviewed the interpretation and public health implications of the findings, and critically revised the manuscript.

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Additional files

Additional file 1: Additional_file_1_Supplementary_Tables.docx. Supplementary estimates and diagnostics. Table S1 reports binary sensitivity models, Table S2 reports threshold-specific concern odds ratios, Table S3 reports transport-mode estimates, Table S4 reports pooled and interaction transport-support contrasts, Table S5 reports service preference counts and Wilson intervals, and Table S6 reports proportional-odds and fitted-value diagnostics. Table S7 summarises record selection and analysis denominators. Table S8 reports the expanded-cohort sensitivity analysis.

Figure legends

Figure 1. Clinic attendance concern by financial distress within service groups

Proportions reporting concerned or highly concerned about strict clinic attendance requirements, stratified by financial distress and service population. Financial distress means sometimes, often or always, compared with never or rarely. Points show proportions and error bars show 95% confidence intervals. Labels report concerned/n. PLHIV denotes people living with HIV. Clients

recruited through PrEP services are all participants recruited through PrEP services, including current, former and never users of oral PrEP.

Figure 2. Four-level attendance concern responses by financial distress

Stacked bars show the percentage in each original Q43 category within financial distress and service-group strata. Counts beneath bars show each stratum's sample size. These are cross-sectional distributions, not changes within participants. Financial distress means sometimes or more often, compared with never or rarely.

Figure 3. Attendance concern estimates across binary modelling approaches

Prevalence ratios from four approaches: unadjusted (crude); adjusted for service group, age group and sex; adjusted and restricted to participants who reported receiving care at the study facility; and standardised from adjusted logistic regression models (marginal standardisation), for financial distress, food worry and meal skipping or reduced portions. Adjustment includes service group, age group and sex. The restricted models include the 200 participants who answered Yes to the facility-care question (Q03). Standardised confidence intervals use 1000 participant-level bootstrap replicates. The vertical line denotes a prevalence ratio of one. Ordinal odds ratios are reported separately in Additional file 1.

Figure 4. Service-support preferences by financial distress within service groups

Points show selections of transport support and flexible appointments by financial distress, with Wilson 95% confidence intervals and selected/n labels. Respondents selected multiple conditions. Each denominator includes those with a recorded Q31 response. The graph shows unadjusted proportions. Adjusted transport-support contrasts and the service-group interaction are reported in Additional file 1. Financial distress means sometimes or more often, compared with never or rarely.

559 **Tables**

560 **Table 1. Participant characteristics by service group**

Characteristic	Overall (n=232)	PLHIV (n=116)	clients recruited through PrEP services (n=116)
Age in years, median (IQR)	26 (22–36)	26.5 (21.75–38.25)	26 (22–33)
Age 15–24 years	107 (46.1)	52 (44.8)	55 (47.4)
Age ≥25 years	125 (53.9)	64 (55.2)	61 (52.6)
Female	128 (55.2)	79 (68.1)	49 (42.2)
Male	104 (44.8)	37 (31.9)	67 (57.8)
Financial distress, sometimes or more	57 (24.6)	27 (23.3)	30 (25.9)
Financial distress, never or rarely	175 (75.4)	89 (76.7)	86 (74.1)
Food worry, sometimes or more	48 (20.7)	23 (19.8)	25 (21.6)
Food worry, never or rarely	184 (79.3)	93 (80.2)	91 (78.4)
Meal skipping or reduced portions	46 (19.8)	19 (16.4)	27 (23.3)
No meal skipping or portion reduction	186 (80.2)	97 (83.6)	89 (76.7)
Walking	17 (7.3)	7 (6.0)	10 (8.6)
Public transport	154 (66.4)	92 (79.3)	62 (53.4)
Private vehicle	27 (11.6)	6 (5.2)	21 (18.1)
Boda boda	34 (14.7)	11 (9.5)	23 (19.8)
Reported receiving care at the study facility (Q03): yes	200 (86.2)	116 (100.0)	84 (72.4)
Reported receiving care at the study facility (Q03): no	32 (13.8)	0 (0.0)	32 (27.6)
Concern about strict clinic attendance: not concerned	89 (38.4)	58 (50.0)	31 (26.7)

Characteristic	Overall (n=232)	PLHIV (n=116)	clients recruited through PrEP services (n=116)
Concern about strict clinic attendance: neutral	34 (14.7)	14 (12.1)	20 (17.2)
Concern about strict clinic attendance: concerned	70 (30.2)	25 (21.6)	45 (38.8)
Concern about strict clinic attendance: highly concerned	39 (16.8)	19 (16.4)	20 (17.2)

Values are n (%) unless stated otherwise. Percentages use each column denominator. IQR, interquartile range. PLHIV, people living with HIV. Financial distress and food worry compare sometimes, often or always with never or rarely over three months. Meal skipping refers to a Yes answer to the question on skipping meals or reducing portions (Q13). The facility-care question (Q03) asked whether the participant received care at the study facility. Clients recruited through PrEP services are all participants recruited through PrEP services: 55 current, 33 former and 28 never users of oral PrEP. No Other transport response was recorded. No values were missing for these variables.

Table 2. Crude and adjusted prevalence ratios for clinic attendance concern

Comparison	Concern, exposed vs comparison	Crude PR (95% CI)	Adjusted PR (95% CI)	p
Financial distress (main exposure)	37/57 (64.9%) vs 72/175 (41.1%)	1.58 (1.22–2.05)	1.37 (1.02–1.84)	0.039
Food worry (secondary)	31/48 (64.6%) vs 78/184 (42.4%)	1.52 (1.16–1.99)	1.33 (0.99–1.80)	0.060
Meal skipping or portion reduction (secondary)	26/46 (56.5%) vs 83/186 (44.6%)	1.27 (0.94–1.71)	1.14 (0.83–1.56)	0.422
clients recruited through PrEP services vs PLHIV	65/116 (56.0%) vs 44/116 (37.9%)	1.48 (1.11–1.96)	1.43 (1.07–1.92)	0.016

Comparison	Concern, exposed vs comparison	Crude PR (95% CI)	Adjusted PR (95% CI)	p
Age 15–24 vs ≥25 years	62/107 (57.9%) vs 47/125 (37.6%)	1.54 (1.17–2.03)	1.37 (1.01–1.86)	0.043
Female vs male	59/128 (46.1%) vs 50/104 (48.1%)	0.96 (0.73–1.26)	0.97 (0.74–1.28)	0.843

The outcome is being concerned or highly concerned about strict clinic attendance requirements (Q43). Each hardship measure was fitted in a separate model adjusted for service group, age group and sex, n=232 with 109 events. Covariate adjusted estimates are from the main financial distress model. Crude covariate intervals use the binary modified Poisson HC0-equivalent log-prevalence-ratio variance. Financial distress and food worry compare sometimes or more with never or rarely. PR, prevalence ratio. CI, confidence interval. Financial distress was chosen as the main exposure after the initial analysis. No multiplicity adjustment was applied. Age and recruitment sessions were inseparable among PLHIV.

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Figures



Figure 1

Clinic attendance concern by financial distress within service groups

Proportions reporting concerned or highly concerned about strict clinic attendance requirements, stratified by financial distress and service population. Financial distress means sometimes, often or always, compared with never or rarely. Points show proportions and error bars show 95% confidence intervals. Labels report concerned/n. PLHIV denotes people living with HIV. Clients recruited through PrEP services are all participants recruited through PrEP services, including current, former and never users of oral PrEP.

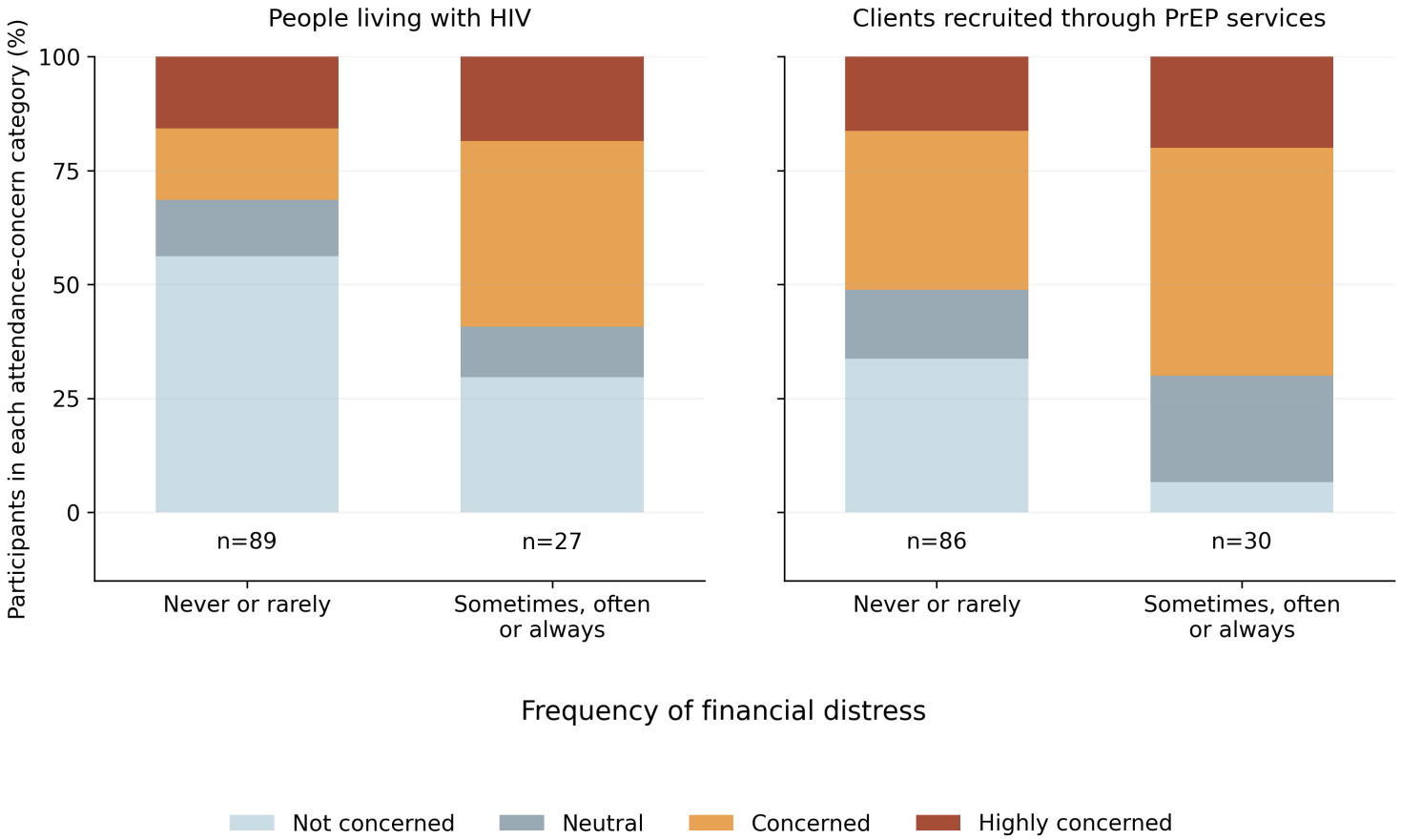


Figure 2

Four-level attendance concern responses by financial distress

Stacked bars show the percentage in each original Q43 category within financial distress and service-group strata. Counts beneath bars show each stratum's sample size. These are cross-sectional distributions, not changes within participants. Financial distress means sometimes or more often, compared with never or rarely.

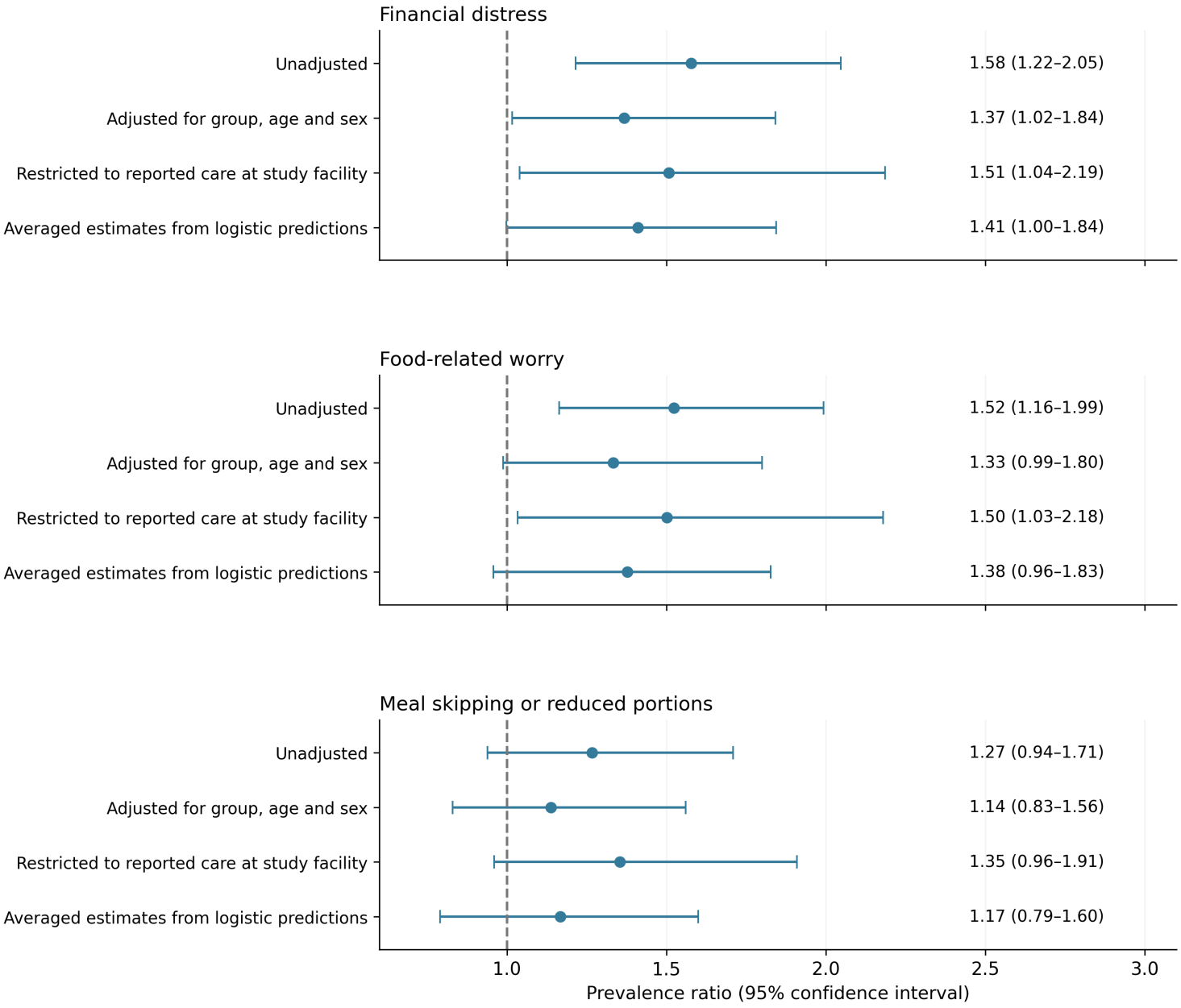


Figure 3

Attendance concern estimates across binary modelling approaches

Prevalence ratios from four approaches: unadjusted (crude); adjusted for service group, age group and sex; adjusted and restricted to participants who reported receiving care at the study facility; and standardised from adjusted logistic regression models (marginal standardisation), for financial distress, food worry and meal skipping or reduced portions. Adjustment includes service group, age group and sex. The restricted models include the 200 participants who answered Yes to the facility-care question (Q03). Standardised confidence intervals use 1000 participant-level bootstrap replicates. The vertical line denotes a prevalence ratio of one. Ordinal odds ratios are reported separately in Additional file 1.

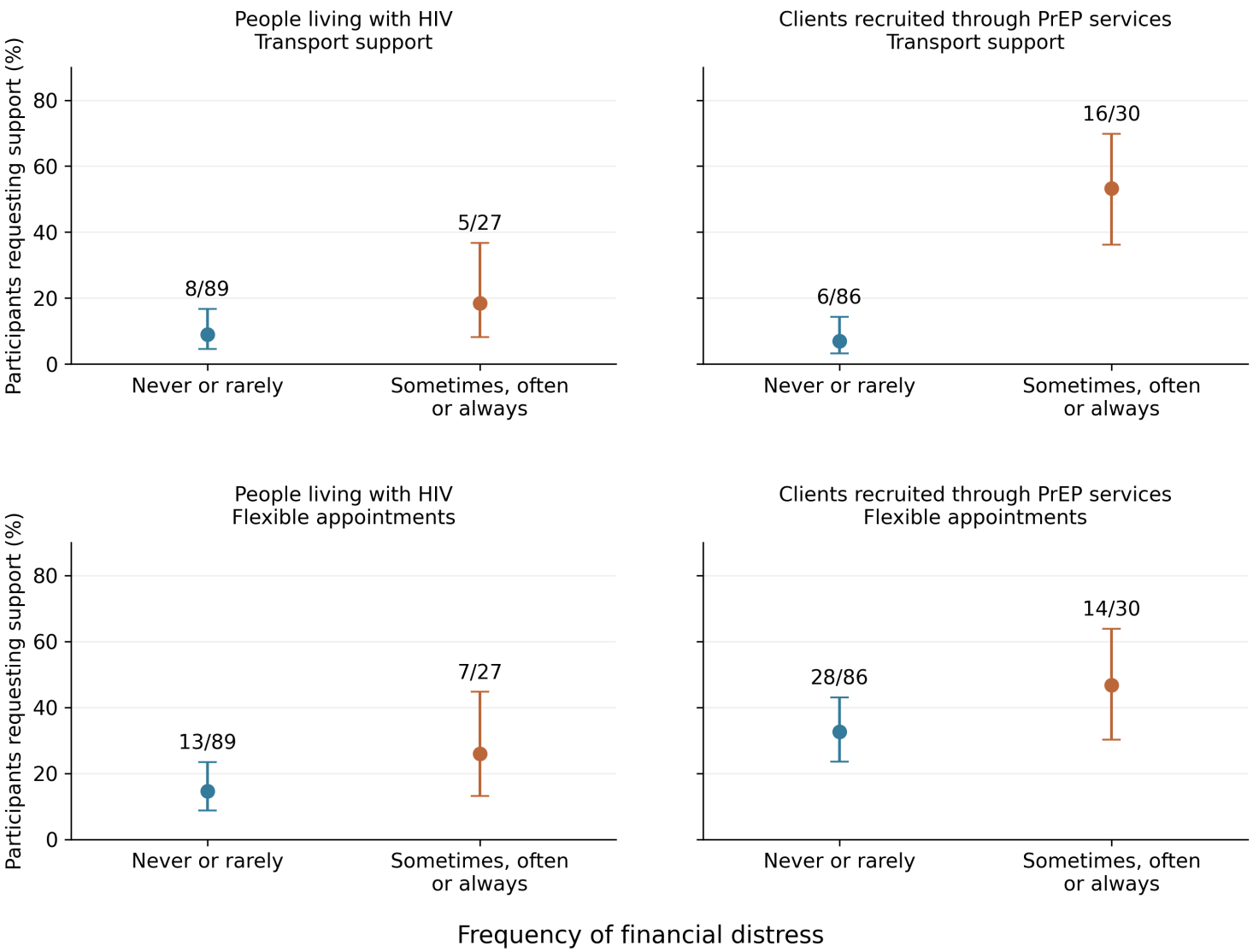


Figure 4

Service-support preferences by financial distress within service groups

Points show selections of transport support and flexible appointments by financial distress, with Wilson 95% confidence intervals and selected/n labels. Respondents selected multiple conditions. Each denominator includes those with a recorded Q31 response. The graph shows unadjusted proportions. Adjusted transport-support contrasts and the service-group interaction are reported in Additional file 1. Financial distress means sometimes or more often, compared with never or rarely.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Table1.docx
- Table2.docx

- FinancialAttendanceMildmayAnalysis.r
- ExpandedCohortSensitivity.py
- FinancialDistressReferences.ris
- FinancialAttendanceMildmayAnalysis.txt
- Additionalfile1SupplementaryTables.docx
- Additionalfile2StudyQuestionnaire.docx