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Ease of marital communication and depressive symptom severity among men and women in rural Uganda: cross-sectional, whole-population study

Jordan Jurinsky[1], **Jessica M. Perkins**[1,2,*], **Bernard Kakuhikire**[3], **Viola N. Nyakato**[3], **Charles Baguma**[3], **Justin D. Rasmussen**[4], **Emily N. Satinsky**[5], **Phionah Ahereza**[3], **Justus Kananura**[3], **Carolyn M. Audet**[2,6], **David R. Bangsberg**[3,7], **Alexander C. Tsai**[3,5,8,9]

[1]Peabody College, Vanderbilt University, Nashville, TN, USA

[2]Vanderbilt Institute for Global Health, Vanderbilt University Medical Center, Nashville, TN, USA

[3]Mbarara University of Science and Technology, Mbarara, Uganda

[4]Duke University, Durham NC, USA

[5]Center for Global Health, Massachusetts General Hospital, Boston MA USA

[6]University of Witwatersrand, Johannesburg, South Africa

[7]Oregon Health & Science University-Portland State University School of Public Health, Portland, OR, USA

[8]Harvard Medical School, Boston, MA, USA

[9]Mongan Institute, Massachusetts General Hospital, Boston MA USA

Abstract

Purpose: Depression is a major contributor to the global burden of disease. The extent to which marital communication may influence depression in contexts with little mental health support is unknown.

[*]**Corresponding author:** Dr. Jessica M. Perkins, jessica.m.perkins@vanderbilt.edu, Phone: (615) 875-3289, Fax: 615-343-2661.

Conflicts of interest
The authors declare that they have no conflict of interest.

DECLARATIONS
Availability of data and material
Upon request

Code availability
Upon request

Ethical approval: Approval was obtained from the ethics committees of Massachusetts General Hospital, Mbarara University of Science and Technology, and Vanderbilt Human Research Protections. The study also received clearance from the Uganda National Council of Science and Technology and the Research Secretariat in the Office of the President of the Republic of Uganda. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

Consent to participate: Written informed consent or a thumbprint indicating consent to participate was obtained from each participant.

Consent to publish: Written informed consent or a thumbprint indicating consent to have related data published was obtained from each participant.

Methods: We conducted a whole-population study of married adult residents of eight villages in a rural region of southwestern Uganda. Depression symptom severity was measured using a modified version of the Hopkins Symptom Checklist for Depression, with >1.75 classified as a positive screen for probable depression. Respondents were asked to report about ease of marital communication ('never easy', 'easy once in a while', 'easy most of the time' or 'always easy'). Sex-stratified, multivariable Poisson regression models were fit to estimate the association between depression symptom severity and marital communication.

Results: Among 492 female and 447 male participants (response rate = 96%), 23 women and 5 men reported communication as 'never easy' and 154 women and 72 men reported it as 'easy once in a while'. Reporting communication as 'never easy' was associated with an increased risk of probable depression among women (adjusted relative risk [ARR], 2.06; 95% confidence interval [CI], 1.08–3.93, $p = 0.028$) and among men (ARR, 7.10; 95% CI, 1.70–29.56, $p = 0.007$).

Conclusion: In this whole-population study of married adults in rural Uganda, difficulty of marital communication was associated with depression symptom severity. Additional research is needed to assess whether communication training facilitated by local leaders or incorporated into couples-based services might be a novel pathway to address mental health burden.

Keywords

marital support; communication; emotional support; mental health; psychological distress; depression

INTRODUCTION

Depression is the leading cause of disability worldwide and a major contributor to the overall global burden of disease [1]. High rates of depression have been indicated across sub-Saharan Africa. For example, one study in southwest Uganda diagnosed 21% of randomly sampled adults with depression [2] while another study in a different region of Uganda found the overall prevalence of probable depression to be 17% (with rates greater among women compared with men) [3]. Similarly, research conducted in rural Rwanda diagnosed 15% of randomly selected adults from a rural area with current major depression [4]. Across five HIV-endemic districts in Botswana, 25% of women and 31% of men had symptoms of probable depression [5].

Depression remains significantly underdiagnosed and undertreated, particularly among people who live in rural or in otherwise resource-limited settings [6–8]. Less than 25% of people in low- and middle-income countries with a mental health disorder receive treatment or other services [9]. Upstream interventions to reduce depression symptom severity are needed. Past research has identified socioeconomic status, food insecurity, water insecurity, violence, HIV status, and substance use as important drivers of depression symptoms [6, 10–22]. Perceived social support is also critical for psychological well-being, independent from actual or observable support, especially among women [23–25].

People who receive emotional support – a form of social support defined by expressions of compassion, sympathy, concern, and esteem for others – are known to have better mental health outcomes compared with people who do not [26, 27]. Emotional support operates

by diminishing negative feelings that often accompany exposure to stress or negative life events [28]. The marital relationship can be a strong source of emotional support [29]. Communication within the marital relationship plays a vital role in the functioning and perception of emotional support [27, 30–34]. Prior research from high-income countries has shown that poor marital partner support and poor marital well-being are associated with depression [e.g., 35, 36, 37]. Marital communication as a mechanism for that support has been under-investigated as a potential driver of mental health problems, particularly in low- and middle-income countries.

No studies have assessed the influence of marital communication on psychological wellbeing in a context like Uganda, where years lived with compromised health due to depressive disorders is among the highest in the world [38]. Although the government has made strides in developing programs to identify and address mental health needs [39–41], less than 0.1% of the Ugandan gross domestic product is spent on its mental health system, including human resources for mental health [42, 43]. Rural areas, in particular, lack funding and resources, with the majority of national mental health funding invested in the national mental health hospital in Kampala [42]. Moreover, mental illness stigma is a strong and prevalent barrier to treatment in Uganda [44, 45]. Continued research and investment in sustainable solutions to support psychological well-being in this context are needed.

Assessing the influence of marital relationship factors, such as marital communication, on mental health outcomes is important due to the pervasiveness of marriage as an institution across the world. Moreover, limited availability of mental health services in a context like Uganda necessitate addressing factors such as marital communication that can be attended to in community-based, rather than clinic-based, settings. Thus, this study estimates the association between marital communication and depression symptom severity in a general population of adults in rural Uganda. The association is estimated separately for men and women because traditional gender roles in Ugandan culture and in the marital relationship may govern experiences of marital communication differently for men and women [46].

METHOD

Population and procedure

The whole-population parent study targeted all permanent adult residents (18 years and older) across eight villages within a rural administrative sub-unit of Rwampara District in Uganda, roughly 270 km southwest of the capital [47]. Subsistence agriculture provides the primary source of income and nutrition, and both food and water insecurity are common [20, 21, 48]. This study focused on all married adults and adults living together as if married. The parent study recorded people with either of these two marital statuses together as one subcategory of marital status per the local custom. Hereafter, all participants are referred to as “married”. In 2011–2012, trained research assistants speaking the local language (Runyankore) conducted one-on-one survey interviews with all eligible participants. Individuals were approached either at their home (most often) or at their place of work. Respondents provided written informed consent or, if unable to sign, indicated consent with a thumbprint with an eyewitness present.

Ethical approval was granted by the Committee on Use of Human Subjects at Harvard University, the Partners Human Research Committee at Massachusetts General Hospital, the Research Ethics Committee at the Mbarara University of Science and Technology, and the Vanderbilt Human Research Protections Program. Consistent with national guidelines, we also obtained clearance for the study from the Uganda National Council of Science and Technology and the Research Secretariat in the Office of the President.

Measures

Depression symptom severity was assessed via a modified version of the Hopkins Symptom Checklist for Depression (HSCL-D), which has been previously validated with participants in Uganda [49]. The HSCL-D was then translated into Runyankore and adapted for use in this context [20, 49–52]. Participants indicated how often over the last seven days they had experienced each of 16 items. The four response options ranged from ‘Not at all (1)’ to ‘Extremely often (4)’. The score for depression symptom severity was calculated as the mean across all items. Higher scores represented greater severity. A binary variable was created where scores > 1.75 were classified as screening positive for probable depression [20, 50, 51, 53, 54].

Ease of marital communication was assessed by asking, “How often is it easy for you to talk about issues with your spouse or main partner?”. Response options included ‘Never’, ‘Once in a while’, ‘Most of the time’, and ‘Always’. Six participants (1%) had a missing response. Due to skewed data, we also created a binary measure to represent marital communication as easy (representing easy most of the time and always easy) or difficult (representing never easy and easy once in a while).

Food insecurity was assessed with the Household Food Insecurity Access Scale (HFIAS) previously adapted for use in Uganda [20, 55]. Participants stated how often in the last 30 days they had experienced nine different food insecurity-related situations using a 4-point scale ranging from ‘never’ to ‘often’. We summed the items’ scores to create a single score measure where higher values represented greater food insecurity (no missingness was permitted, maximum = 27). Then, raw scale scores were transformed using a validated scoring algorithm, and participants were assigned to categories of food insecurity severity: ‘none’ (food secure), ‘mildly food insecure’, ‘moderately food insecure’, and ‘severely food insecure’ [55].

Self-reported HIV serostatus was recorded as positive vs. negative/unknown. Self-reported alcohol use frequency in the past 12 months was coded as ≥ 2 times per week vs. less often or never. Women reported whether their husband perpetrated at least one out of eight types of physical or sexual violence against them in a typical month. Finally, sociodemographic information was recorded including age, education (primary education or less vs. secondary education or more), tribe (Banyankole vs. other), religion (Protestant, Catholic, Muslim, and other), and household wealth quintile. Household wealth was measured via a household asset index created through a principal components analysis on twenty-six variables representing aspects of household assets/characteristics [56]. The first principal component was retained to define the asset index [57], which was then recoded as quintiles. The total number of household members was recorded as well as village of residence.

Analyses

All analyses were conducted for men and women separately because past work has found sex-based differences in depression, associated risk factors, and marital well-being [18, 20, 24, 58–62]. We examined the prevalence of probable depression and of difficult marital communication across explanatory factors, and then fit regression models to estimate the association between depression outcomes and marital communication. Previous literature suggests assessing depression either in terms of a probable clinical diagnosis or in terms of symptom severity [63]. Thus, we used the binary indicator of probable depression as the outcome in modified Poisson regression models and the continuous measure of depression symptom severity as the outcome in linear regression models. All models included ease of marital communication as the main explanatory variable of interest and also adjusted for food insecurity, HIV status, intimate partner violence, alcohol use, and other sociodemographic factors. Analyses were conducted using Stata version 16.1 [64]. Finally, to assess the robustness of our findings to potential unobserved confounding, we calculated the *e* value: the minimum strength of association on the risk ratio scale that an unobserved confounder would need to have with both the exposure (communication) and the outcome (probable depression) to completely account for the estimated association, conditional on the other included factors [65, 66].

RESULTS

Of the 1,747 people eligible for the parent study, 1,616 were interviewed (response rate of 96%). There were 971 married respondents, of which 939 (97%) had complete data about depression and marital communication and therefore formed the analytic sample (representing 492 women and 447 men). Of these, 210 (43%) women and 77 (17%) men were under the age of 30. Among men, 114 (26%) reported consuming alcohol at least twice per week, whereas only 6 women reported consuming alcohol at least twice per week. One hundred sixty-one women (33%) reported that their husband perpetrated at least one type of physical or sexual violence against them at least once per month.

The mean level of depression symptom severity in this population was greater among women compared with men (*mean*=1.52 vs. *mean*=1.32, $t = 7.04$, $p < 0.001$). Additionally, more women compared with men had probable depression (121 [25%] vs. 53 [12%], $\chi^2 = 25.2$, $p < 0.001$). Regarding women's reports about marital communication, 23 (5%) reported communication as never easy, 154 (31%) reported it as easy once in a while, 62 (13%) reported it as easy most of the time, and 253 (51%) reported it as always easy. Among men, 5 (1%) reported marital communication as never easy, 72 (16%) reported it as easy once in a while, 74 (17%) reported it as easy most of the time, and 296 (66%) reported it as always easy. When using the binary easy versus difficult marital communication variable, more than twice as many women (177 [36%]) compared with men (77 [17%]) reported difficult marital communication ($\chi^2 = 41.7$, $p < 0.001$). Table 1 provides the distributions of the study population, probable depression, and difficult marital communication across sociodemographic factors among women and men separately.

At the bivariate level using both the binary probable depression and communication variables, 64 out of 177 women who reported difficult communication had probable

depression whereas 57 out of 315 women who reported easy communication had probable depression (36% vs. 18%, $\chi^2 = 19.9$, $p < 0.001$). In contrast, 13 out of 77 men who reported difficult communication had probable depression and 40 out of 370 men who reported easy communication had probable depression (17% vs. 11%, $\chi^2 = 2.2$, $p = 0.134$).

At the multivariable level, modified Poisson regression estimates indicated that women who reported marital communication as never easy, and those who reported it as easy once in a while, had greater relative risk of having probable depression compared with women who reported marital communication as always easy (Table 2). Specifically, the adjusted relative risk (ARR) for women reporting communication as never easy was 2.06 (95% CI 1.08–3.93, $p = 0.028$), and the ARR for women reporting it as easy once in a while was 1.87 (95% CI 1.27–2.75, $p = 0.002$). The *e*values associated with these estimates were 3.54 and 3.15, indicating that a hypothetical confounder would need to have strong associations with both marital communication and depression (greater than these estimates on the risk ratio scale) to completely explain away the observed association among women, conditional on other factors included in the model. Among men, the only evidence of an association between probable depression and marital communication was for those reporting communication as never easy (ARR=7.10; 95% CI 1.70–29.56, $p = 0.007$) though there were very few men in this subgroup.

Linear regression results indicated a similar pattern of findings for women and men with one exception: the point estimate for women who reported marital communication as “never easy” was imprecisely estimated ($b = 0.32$, 95% CI - 0.03 to 0.66, $p = 0.070$). However, this might be attributable to the skewed nature of marital communication responses for women (Online Resource - 1).

DISCUSSION

In this population-based sample of married adults in rural Uganda, reporting marital communication to be difficult was associated with probable depression and depression symptom severity, particularly for women. This novel study provides initial evidence of a link between marital communication and depression symptoms among a general population of women and men in a context where the burden of poor mental health is high and mental health resources are scarce. Results complement a study of couple-level dynamics in Malawi, which found that equity and unity within a marriage were associated with lower levels of depression symptoms, and that this relationship was stronger for women compared with men [61].

Research indicates that women in Uganda and many other contexts experience depression at higher rates compared with men and are negatively affected by gendered norms about marital roles [18, 20, 24, 58, 60, 62, 67–69]. Traditional marriage practices in Uganda, such as the use of the ‘bride-price’, have also been linked to negative health consequences for women [70].While men in this context can easily leave a marriage if they wish (and often are legally entitled to the home and children if they do), women have less flexibility to change their marital circumstances [46, 67, 68]. Easy marital communication could be a key pathway through which women perceive emotional support from their partner,

which in turn could influence their psychological well-being. Other relationship aspects such as overall marital quality, trust, and empathy, may also play a role. However, only a few studies have studied these kinds of relationship dynamics within the context of sub-Saharan Africa [71–73]. Additionally, instrumental support or perceived capability to provide financial resources for one's household may drive psychological well-being for men more so than communication or other relationship dynamics [21]. Alternatively, men and women may perceive labor, roles, power, and resources available within the marriage differently [56], which could contribute to differing effects on communication and support and thus psychological well-being. Qualitative and mixed methods research approaches may reveal further insight into these dynamics. For example, a mixed methods study in Uganda found that traditional gender and cultural norms influenced how women experienced domestic violence and navigated HIV serostatus disclosure [74]. Another qualitative study on communication around family planning found that perceived gender norms inhibited communication among couples in Kenya [75].

If future research supports an association between communication and depression, then interventions designed to improve depression symptoms by addressing marital communication may be less stigmatizing than more direct messaging about mental health in this context. Local community leaders (e.g., elders, community group leaders, and religious leaders) could be trained in communication interventions as a way to address the burden of mental health issues in their community. These leaders are often the main sources of support for marital distress and mental health-related issues in resource-limited settings, particularly in rural areas [3, 42, 76–78]. For example, in Kenya, interventions delivered by lay-members of religious congregations have demonstrated initial success in improving family communication [79–81]. Similarly, opportunities for collaboration may exist with traditional and/or faith healers who could be trained to screen for probable depression and then facilitate discussion or practice around improving marital communication [82]. Including a gender equity component to such trainings may help limit the potential reinforcement of gender-inequitable norms that negatively affect depression and communication, particularly for women. For example, "gender-transformative" health interventions aim to shift norms of masculinity to be more gender equitable and have been associated with increased protective sexual behaviors and contraception use, decreased partner violence, more gender equitable attitudes, and reduced STI/HIV transmission [83, 84]. Programs targeting intimate partner violence prevention can also work to improve couples communication and mental health [85].

While women's empowerment interventions and couples-based health services already include professional and peer counseling to improve underlying gender imbalances and other issues affecting women's mental health, these kinds of programs could also include guided discussion targeting marital communication. An experimental study in Iran, for example, found that couples-based training in marital communication skills improved marital satisfaction and reduced depression and anxiety among pregnant women [86]. Development of marital communication interventions could be especially helpful for facilitating discussions about sensitive topics that are themselves associated with gender norms. For example, couples-based HIV testing, counseling, and linkage to care services [e.g., 87, 88, 89] could include a component targeting marital communication. Couples-

based family planning and antenatal care services represent another setting for this kind of complementary communication intervention [89]. Local health care providers could be trained in techniques to improve marital communication as part of counseling conversations.

Interpretation of our findings is subject to several limitations. First, the single-item measure used to assess marital communication may represent only one of several ways that partners perceive receiving emotional support within the marital relationship. Future studies should identify other pathways of emotional support and also specify what types of issues married men and women identify as easy or difficult to talk about with their marital partner(s). Additionally, for men who have multiple wives, marital communication with each wife may interact to influence depression symptoms. In a subsequent wave of data collection in the parent study, only 10 men had a second wife, limiting our ability to account for any such interaction. Second, depression symptom severity data are self-reported and are subject to possible misreporting. However, the HSCL-D measure used in this study had been previously adapted for use in southwest Uganda among Runyankore speakers, and the prevalence rates of probable depression found here are consistent with previously published studies from Uganda [3, 20, 90]. Third, other important factors may confound the association estimated in our analysis. However, the calculated *e* values suggest that any such confounding would need to be strong to explain away the observed estimates. Future studies should explore the extent to which gender norms and related aspects of the marital relationship (e.g., reasons for entering the marriage, duration of relationship, financial decision-making ability, economic dependence, and agreement on household roles) confound the association between marital communication and depression symptoms. Finally, the study was cross-sectional, which precludes our ability to make assessments about causality. Depression symptom severity may lead to difficult marital communication, difficult marital communication may lead to increased depression symptom severity, or the relationship may be bidirectional. Causal investigations exploring the mechanisms linking depression and marital communication, such as stress, are needed as well as qualitative investigations of the dynamics between gender roles, marital communication, and mental health.

CONCLUSION

Among married adults in rural Uganda, women and men who thought communication with their marital partner was never easy were at higher risk for depression regardless of socioeconomic status, HIV status, intimate partner violence, food insecurity, alcohol use, and other factors. Interventions addressing marital communication alongside other issues, such as gender norms and economic dependence, may help reduce aspects of marital and family life strain that contribute to depression symptom severity among women. Given the ubiquity of marriage as an institution globally, these findings may also indicate widespread applicability of such an intervention. The burden of disability due to depression is especially high in Uganda where mental health resources are scarce. Further research is needed on whether marital communication interventions conducted by local leaders or incorporated into existing couples-based health programs reduce depression symptoms, particularly among women.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Probable depression and difficult marital communication among married adults in Rwampara District, southwest Uganda.

	Women						Men					
	Whole population sample		Symptoms indicate probable depression		Reported difficult marital communication		Whole population sample		Symptoms indicate probable depression		Reported difficult marital communication	
	N	(%)[a]	n	(%)	n	(%)	N	%	n	(%)	n	(%)
Total	492	(100%)	121	(25%)	177	(36%)	477	(100%)	53	(12%)	77	(17%)
Husband perpetrates physical or sexual violence against participant at least once per month												
No	313	(64%)	65	(21%)	96	(31%)	-	-	-	-	-	-
Yes	161	(33%)	50	(31%)	71	(44%)	-	-	-	-	-	-
Consumes alcohol ≥2 times per week on average												
No	483	(98%)	120	(25%)	173	(36%)	327	(73%)	32	(10%)	55	(17%)
Yes	6	(1%)	0	(0%)	2	(33%)	114	(26%)	18	(16%)	19	(17%)
HIV Status												
Negative or unknown	456	(93%)	105	(23%)	158	(35%)	409	(91%)	45	(11%)	75	(18%)
Positive	34	(7%)	15	(44%)	19	(56%)	36	(8%)	8	(22%)	2	(6%)
Food insecurity												
None	101	(21%)	10	(10%)	30	(30%)	123	(28%)	6	(5%)	22	(18%)
Mild	86	(17%)	15	(17%)	22	(26%)	93	(21%)	5	(5%)	8	(9%)
Moderate	183	(37%)	38	(21%)	69	(38%)	142	(32%)	20	(14%)	19	(13%)
Severe	119	(24%)	56	(47%)	55	(46%)	84	(19%)	21	(25%)	27	(32%)
Age												
Less than 30 years old	210	(43%)	52	(25%)	90	(43%)	77	(17%)	10	(13%)	15	(19%)
30–39 years old	122	(25%)	34	(28%)	43	(35%)	133	(30%)	13	(10%)	25	(19%)
40–49 years old	88	(18%)	14	(16%)	26	(30%)	114	(26%)	13	(11%)	16	(14%)
50 + years old	69	(14%)	21	(30%)	18	(26%)	119	(27%)	16	(13%)	21	(18%)
Tribe												
Other	62	(13%)	18	(29%)	25	(40%)	20	(4%)	2	(10%)	3	(15%)

	Women						Men					
	Whole population sample		Symptoms indicate probable depression		Reported difficult marital communication		Whole population sample		Symptoms indicate probable depression		Reported difficult marital communication	
	N	(%)[a]	n	(%)	n	(%)	N	%	n	(%)	n	(%)
Banyankole	426	(87%)	103	(24%)	150	(35%)	420	(94%)	50	(12%)	73	(17%)
Religion												
Protestant	342	(70%)	93	(27%)	118	(35%)	313	(70%)	38	(12%)	56	(18%)
Catholic	122	(25%)	21	(17%)	49	(40%)	105	(23%)	12	(11%)	20	(19%)
Muslim	7	(1%)	2	(29%)	1	(14%)	7	(2%)	1	(14%)	1	(14%)
Other	14	(3%)	5	(36%)	5	(36%)	12	(3%)	2	(17%)	0	(0%)
Education												
Primary or less	367	(75%)	100	(27%)	139	(38%)	303	(68%)	40	(13%)	52	(17%)
Secondary or more	121	(25%)	21	(17%)	37	(31%)	129	(29%)	13	(10%)	24	(19%)
Household asset quintiles												
1st (poorest)	82	(17%)	29	(35%)	35	(43%)	77	(17%)	12	(16%)	9	(12%)
2nd	90	(18%)	22	(24%)	30	(33%)	83	(19%)	8	(10%)	19	(23%)
3rd	112	(23%)	23	(21%)	46	(41%)	99	(22%)	15	(15%)	15	(15%)
4th	107	(22%)	21	(20%)	40	(37%)	101	(23%)	11	(11%)	16	(16%)
5th (least poor)	101	(21%)	26	(26%)	26	(26%)	87	(19%)	7	(8%)	18	(21%)
Number of household members other than self and spouse												
1–3	354	(72%)	84	(24%)	126	(36%)	319	(71%)	38	(12%)	56	(18%)
4–6	106	(22%)	31	(29%)	45	(42%)	102	(23%)	12	(12%)	15	(15%)
7+	32	(7%)	6	(19%)	6	(19%)	26	(6%)	3	(12%)	6	(23%)

[a]Percentages across categories within a variable may not add up to 100% due to missing data.

Note: Difficult marital communication was defined as reporting communication to be never easy or easy once in a while.

Table 2.

Modified Poisson regression models estimating the association between marital communication and probable depression among married adults across eight villages in Rwampara District, southwest Uganda.

	Women (n=461)			Men (n=411)		
	ARR	**(95% CI)**	***p***	**ARR**	**(95% CI)**	***p***
Frequency of easy marital communication						
Never	2.06	(1.08, 3.93)	0.028	7.10	(1.70, 29.56)	0.007
Once in a while	1.87	(1.27, 2.75)	0.002	0.74	(0.33, 1.65)	0.460
Most of the time	1.41	(0.84, 2.37)	0.195	0.59	(0.28, 1.26)	0.172
Always	REF	-	-	REF	-	-
Husband perpetrates physical or sexual violence against participant (vs. no violence perpetration)	1.12	(0.81, 1.54)	0.502	-	-	-
Consumes alcohol 2+ times per week on average (vs. does not)	-	-	-	1.66	(0.93, 2.99)	0.089
Positive HIV status (vs. negative or unknown)	1.26	(0.82, 1.94)	0.298	1.87	(0.90, 3.92)	0.096
Food insecurity						
None	REF	-	-	REF	-	-
Mild	1.85	(0.89, 3.83)	0.098	1.19	(0.36, 4.00)	0.774
Moderate	1.89	(0.97, 3.67)	0.060	2.85	(1.16, 6.98)	0.022
Severe	3.59	(1.86, 6.92)	<0.001	5.90	(2.55, 13.67)	<0.001
Age						
Less than 30 years old	REF	-	-	REF	-	-
30–39 years old	0.98	(0.66, 1.44)	0.906	0.72	(0.33, 1.59)	0.419
40–49 years old	0.68	(0.37, 1.26)	0.221	0.70	(0.30, 1.67)	0.423
50+ years old	1.43	(0.87, 2.34)	0.156	1.05	(0.42, 2.63)	0.921
Belongs to Banyankole tribe (vs. other)	0.82	(0.52, 1.30)	0.410	1.07	(0.31, 3.63)	0.920
Religion						
Protestant	REF	-	-	REF	-	-
Catholic	0.55	(0.32, 0.94)	0.030	1.27	(0.69, 2.33)	0.447
Muslim	1.39	(0.55, 3.51)	0.488	2.20	(0.40, 12.23)	0.367
Other	1.05	(0.40, 2.77)	0.920	1.80	(0.59, 5.45)	0.301
Received more than primary education (vs. primary or less)	0.75	(0.45, 1.24)	0.260	0.90	(0.49, 1.65)	0.737
Asset quintile						

	Women (n=461)			Men (n=411)		
	ARR	**(95% CI)**	***p***	**ARR**	**(95% CI)**	***p***
1st (poorest)	0.73	(0.45, 1.19)	0.208	1.02	(0.43, 2.44)	0.961
2nd	0.57	(0.34, 0.97)	0.038	0.68	(0.24, 1.95)	0.476
3rd	0.61	(0.37, 1.01)	0.053	1.17	(0.50, 2.75)	0.711
4th	0.64	(0.37, 1.09)	0.098	0.89	(0.36, 2.20)	0.807
5th (least poor)	REF	-	-	REF	-	-
Number of household members other than self and spouse						
1–3	REF	-	-	REF	-	-
4–6	1.29	(0.85, 1.95)	0.237	0.88	(0.43, 1.79)	0.723
7+	0.76	(0.30, 1.94)	0.568	0.63	(0.17, 2.30)	0.482

Notes: Each column represents one multivariable Poisson regression model fitted to the data. Models include robust standard errors and village-level fixed effects. *ARR* = Adjusted relative risk ratio. *CI* = Confidence Interval