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Food Insecurity and Intimate Partner Violence in Mwanza, Tanzania: A Longitudinal Analysis

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Introduction: Food insecurity is a potential predictor of intimate partner violence. This study (1) describes the prevalence of food insecurity and various forms of intimate partner violence experience among women in Mwanza, Tanzania; and (2) assesses the effect of food insecurity and hunger on various forms of women's experience of intimate partner violence longitudinally.

Methods: Women (aged 18–70 years) who reported being in a relationship in the past 12 months, who had participated in the control arms of two randomized controlled trials conducted as part of the MAISHA study were interviewed at four time points (N=1,004 at baseline in 2017). Analyses were conducted in 2022. Associations between food insecurity exposures and intimate partner violence outcomes were assessed, and univariate random effect logistic models were conducted to identify relevant sociodemographic variables (including age, education level, and SES) that were statistically significant. Multivariable random effects logistic models were conducted, including time as a fixed effect, to calculate odds ratios indicating associations between food insecurity exposures and intimate partner violence outcomes.

Results: Prevalence of food insecurity was 47.7%, 55.6%, 47.2%, and 50.8% for each of the 4 waves, respectively, with significant difference in proportion of food insecurity between baseline and Wave 2. Multivariable random effects models indicated that food insecurity was associated with increased odds of exposure to all forms of intimate partner violence outcomes, and hunger was significantly associated with increased odds of experience of all intimate partner violence outcomes, apart from controlling behaviors.

Conclusions: Results from this longitudinal analysis of food insecurity and women's reports of intimate partner violence experience in a low- and middle-income country setting indicate that food insecurity is significantly associated with all forms of intimate partner violence, apart from controlling behaviors, among women in this sample in Mwanza, Tanzania. Policy and programmatic implications include the need for integrated intimate partner violence prevention programming to take into account household food needs.

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INTRODUCTION

Intimate partner violence (IPV), defined as behavior perpetrated by a current or former intimate partner that causes physical, psychological, or sexual harm, is widespread globally.[1] Evidence increasingly suggests that food insecurity is not only a predictor of women's experience of IPV in high-income settings,[2,3] but also in low- and middle-income countries (LMICs).[4–6] A recent meta-analysis of 21 studies suggests that food insecurity was associated with double the odds of women experiencing IPV in LMICs.[7] The Food and Agriculture Organization defines *food insecurity* as when a person lacks regular access to enough safe and nutritious food for normal growth and development and an active and healthy life.[8] Food insecurity can be measured in various ways, and definitions of food insecurity are usually inclusive of hunger.[9]

Food insecurity and hunger may be associated with IPV through several pathways as argued by existing economic and sociologic theories. Men may feel it represents failure on their part to uphold their role of main breadwinner, thus threatening the established gender norms of men's dominance, resulting in IPV to re-establish the gender hierarchies, as proposed by the resource and the gendered resource theory.[10,11] Food insecurity is also known to increase the risk of poor mental health, which, in turn, results in increased perpetration and experience of IPV.[11,12] Women experiencing food insecurity may be more economically dependent on their male partners, as it makes them less likely to leave their abusive relationship because of reliance on their male partner for food access for themselves and their children.[13,14] Food insecurity therefore may be a proxy for poverty in many contexts but also likely to have impacts beyond.[15,16] For example, food insecurity may have long-lasting impacts on health, including cognition and mental health conditions, which can persist even when poverty is potentially transient or cyclical. Food insecurity can result in malnutrition, which can further fuel poverty through reduced capacity to work.[17] The evidence-base on poverty as a risk factor for women's experience of IPV is mixed, and further explication of how or if, food insecurity, in particular, acts as a risk factor is needed. Higher levels of resource availability (i.e., reduced food insecurity) are often related to factors associated with more equitable gender norms, such as education, which in turn, are associated with lower levels of IPV.

IPV and food insecurity are both high in Tanzania, with a prevalence of past year physical and/or sexual IPV among women aged 15–49 years of 24% and a lifetime prevalence of 38%.[1] Child stunting, a marker of food insecurity, varies regionally, from 56% in Rukwa region and 39% in Mwanza region to 15% in Dar es Salaam; whereas 45% of women nationally are anemic, and nearly 10% are underweight.[18]

Existing evidence from LMIC settings examining the association between food insecurity and IPV has primarily used cross-sectional studies, providing only a snapshot of an association at 1 time point. As such, this longitudinal study of women in Mwanza, Tanzania, provides a unique opportunity to examine the relationship between food insecurity and various forms of IPV over time.

METHODS

Study Population

This study was conducted in Mwanza city, north-west Tanzania. Mwanza is Tanzania's second largest city and a major business and trade hub, attracting migration from nearby regions for income generation and employment opportunities. According to the 2015–2016 Demographic and Health Survey, 67% of women in Mwanza were employed and 46% had completed primary school level education.

The MAISHA longitudinal study is based on 2 cluster RCTs, which were conducted in Mwanza city in north-west Tanzania to evaluate the impact of a social empowerment intervention on women's experience of past year IPV.[19,20] The sample in this study consists of the control arms of both RCTs. Briefly, during the first trial (CRT01), 66 established microfinance groups (n=1,049 women) were enrolled between September 2014 and July 2015,[19] and during the second trial (CRT02), 66 neighborhood groups (n=1,265 women) were formed between September 2015 and February 2017.[20] For CRT01, microfinance groups were selected for the study if they had (1) <30 active members in the group, (2) a good loan repayment record, and (3) a minimum of 70% of active members consenting to participate in the study. Women had to be aged ≥18 years. In CRT02, neighborhood groups were formed specifically for the purposes of the study through community meetings to identify and inform potentially eligible women. For eligibility, women had to be (1) aged 20–50 years, (2) not formally employed, (3) resident in Mwanza for at least two years, (4) not a member of a formal microfinance group in the past 12 months, and (5) fluent in Swahili.

Before randomization, women in both trials were interviewed at baseline (Wave 1). Half the groups in each trial (n=33) were then randomly allocated to receive the intervention immediately and half (n=33) were allocated to the control group. Outcomes were

assessed two years after the intervention (29 months after randomization, Wave 2). At trial follow-up, control arm women in both trials were asked if they were willing to participate in a follow-up study (the MAISHA Longitudinal study). Those who consented were interviewed again at 41 months and 53 months (Wave 3 and Wave 4, respectively).

This analysis only includes women who reported being in a relationship in the past 12 months, as past year IPV exposure was only assessed among women who had been in a relationship in the last 12 months. Women were asked: *Are you married or currently living with a man?* if they responded no, they were asked: *Have you been in a relationship with a man in the past 12 months?*

Interviews were conducted face-to-face by female interviewers who had received training in interviewing techniques and principles and safety considerations for interviewing women about IPV. The survey tool was developed in English, translated into Swahili, and then independently translated back into English. Interviews were conducted in Swahili, in private locations, lasting 1.5–2 hours. The survey included questions on economic activity and empowerment, social support, child discipline, partner characteristics, IPV experience, and food insecurity. The responses were directly entered onto tablet computers and data were uploaded daily.

Measures

The IPV outcome measure was assessed by items from the WHO Multi-Country Study Instrument[21]; women's experiences of male-perpetrated physical, sexual, economic, and emotional IPV and controlling behaviors in the past 12 months were assessed (Appendix File, available online, for specific items). A composite variable, physical and/or sexual violence in the past 12 months, was also created. As IPV was always assessed for the last 12 months, the recall period was consistent across the 4 waves.

Food insecurity can be assessed in multiple ways, using a range of scales and items.[22] In this study, the primary focus of the survey was IPV, and an extensive battery of food consumption items could not be included. Therefore, the survey instrument included two items related to food insecurity. The first item, operationalized as food insecurity, asked the following question to tap into food access and how financial need may impact food access: *In the past 12 months, have you had trouble buying food or other necessities for your family?* At baseline, for CRT01, the response categories were *happened* and *never happened*. At baseline for CRT02 and in all other waves for both trial groups, the response categories were *never*, *once*, *few times*, and *many times*. The food insecurity variable was dichotomized, in which women who reported having difficulty buying food or other necessary items in the past 12 months were considered as food insecure. Hunger was operationalized using the second item, which asked the following question to capture the food consumption of the individual respondent and/or her children: *In the past 12 months, have you or your children gone a whole day without eating anything because there was not enough food in the house?* The response options were the same, and the response was similarly dichotomized.

Several sociodemographic variables were explored as covariates and potential confounders of the association between food insecurity and IPV, including women's age, marital status (married or cohabiting with a man versus not currently married or cohabiting), education level (primary level and below versus secondary level and above), and employment in the past 12 months. Household SES was derived using a structural equation model from 19 indicators collected in the questionnaire, including education, ownership of household items, and household earnings. These sociodemographic variables were explored as covariates, given the evidence that these factors could be confounders of the relationship between food insecurity and IPV.[7]

Statistical Analysis

The analysis was conducted using Stata (Version 17, College Station, TX: StataCorp LLC.). Descriptive statistics were calculated using proportions and means, and sociodemographic characteristics of the sample were compared by food insecurity and hunger status. Prevalence of food insecurity and hunger at each wave was calculated and tested for difference in proportions, by comparing Wave 1 versus Wave 2, Wave 1 versus Wave 3, and Wave 1 versus Wave 4 using McNemar's chi-square test. To assess the linear trend of food insecurity and hunger prevalence and changes over time, random effects regression models were used, which account for correlations between waves of data collection measured at several time points, using concurrent food insecurity and IPV status. Prevalence of each form of IPV by food insecurity and hunger status for each wave was calculated. Each separate IPV outcome was treated as a binary variable. Univariate random effect logistic models were fitted for each IPV outcome, to identify relevant sociodemographic variables that were statistically significant and included these statistically significant variables at the univariate level in multivariable models. The final adjusted models are random effects logistic models, with time as a fixed effect, assessing associations between food insecurity status and concurrent IPV status. A sensitivity analysis was conducted, running multinomial models with food insecurity categorized as a categorical

variable, and obtained consistent results. Intraclass correlation coefficients (ICCs) obtained from the multilevel logistic regression models were used for examining within-person changes in IPV over time through partitioning between- and within-person variation in reported IPV. The ICCs were calculated for each form of IPV using models that adjusted for factors that showed association with IPV.

The WHO recommendations on researching violence against women were used to ensure ethical conduct of this study, which included obtaining informed consent, minimizing harm and distress, and providing intensive training to interviewers to enable them to ask sensitive questions concerning violence.[23] The longitudinal study received ethical approval from the Tanzanian National Health Research Ethics Committee of the National Institute for Medical Research, the London School of Hygiene and Tropical Medicine, and the Ludwig-Maximilians-University.

RESULTS

The sample size of women aged between 18 to 70 (mean age=33.6; SD=10.7) years, who reported having been partnered in the past 12 months was 1,004 at Wave 1; 892 at Wave 2; 867 at Wave 3; and 836 at Wave 4. The retention rate was >85% in all the waves, and there was no significant difference between the observed women and those lost to follow-up. There were no significant differences in key demographic characteristics, main exposures, and IPV experience between women lost to follow-up and women who stayed in the study. The main reasons for loss to follow-up were death, migration, or withdrawal from the study.

At baseline, 479 (41.71%) women were categorized as food insecure and 137 (13.65%) as experiencing hunger. Table 1 shows the bivariate analysis between food insecurity and hunger by demographic characteristics. There was a significant difference in the proportion in SES for

Table 1. Sociodemographic Characteristics at Baseline by Food Insecurity and Hunger

Characteristics	Overall N=1,004	Food insecurity, *n* (%) 479 (47.7)	Hunger, *n* (%) 137 (13.7)
MAISHA trials enrolment			
Microfinance group (CRT01 enrolment)	428 (42.6)	**168 (35.1)**	50 (36.5)
Not in microfinance (CRT02 enrolment)	576 (57.4)	311 (64.9)	87 (63.5)
Age (years)			
Mean (SE)	33.6 (10.7)	34.8 (8.6)	35.3 (9.1)
Women's age group, years			
18–30	306 (30.5)	147 (30.7)	42 (30.7)
30–39	389 (38.7)	195 (40.7)	56 (40.9)
40–49	241 (24.0)	109 (22.8)	30 (21.9)
50+	68 (6.8)	28 (5.8)	9 (6.6)
Marital status			
Currently married/living with man as if married	859 (85.6)	**398 (85.1)**	**108 (78.8)**
Not currently married/living with a man as married	145 (14.4)	81 (16.9)	29 (21.2)
Woman's education			
None/primary incomplete	164 (16.3)	103 (21.5)	**47 (34.3)**
Primary complete	588 (58.6)	280 (58.5)	71 (51.8)
Secondary level or higher	252 (25.1)	96 (20.0)	19 (13.9)
Woman worked for money in the past 12 months			
Yes	873 (86.9)	390 (91.8)	**121 (88.3)**
No	131 (13.1)	35 (8.2)	16 (11.7)
Social Economic Status quantile score			
First quantile (lowest)	200 (19.9)	**133 (27.8)**	**53 (38.7)**
Second quantile	188 (18.7)	93 (13.48)	24 (17.5)
Third quantile	223 (22.2)	100 (20.9)	24 (17.5)
Fourth quantile	212 (21.1)	90 (18.8)	18 (13.1)
Fifth quantile	181 (18.0)	63 (13.1)	18 (13.1)

Note: Boldface indicates statistical significance ($p<0.05$, differences in proportion between covariates and food insecurity or hunger).

Table 2. Food Insecurity and Hunger Prevalence at Each Wave

Exposure type	Baseline N=1,004	Wave-2 N=892	Wave-3 N=867	Wave-4 N=836	Trend test	χ^2 test (Panel model)
Food insecurity	479 (47.7)	496 (55.6)[a]	409 (47.2)	425 (50.8)	0.8024	**<0.0001**
Hunger	137 (13.6)	154 (17.3)[a]	61 (7.0)[a]	50 (6.0)[a]	**<0.0001**	**<0.0001**

Note: Boldface indicates statistical significance ($p<0.05$).
[a]Test for difference in proportion- McNemar's chi-squared, all proportions provide comparisons to baseline proportions.

both women experiencing food insecurity and those experiencing hunger ($p<0.005$).

Table 2 displays that the prevalence of food insecurity was 47.7%, 55.6%, 47.2%, and 50.8% for each of the 4 waves, respectively, with significant difference in proportion of food insecurity between baseline and Wave 2. Table 3 includes bivariate associations between food insecurity and IPV, and it shows exposure to each type of IPV by food insecurity status at each wave. Prevalence of IPV exposure was consistently higher among the food insecure than the non–food insecure women in all 4 waves.

Prevalence of hunger was 13.6%, 17.3%, 7.09%, and 6.0% at each of the 4 waves, respectively, with significant differences in proportion, trend over time, and change over time. Table 3 shows exposure to each of the types of IPV by hunger status at each wave, in which Waves 1 and 3 were significantly associated.

In multivariable random effects models (Table 4), controlling for variables that were found to be significant at the univariate level with each form of IPV, food insecurity was significantly associated with increased odds for all IPV experiences: physical (AOR=1.75, 95% CI=1.38, 2.22), sexual (AOR=2.35, 95% CI=1.81, 3.05), economic (AOR=2.61, 95% CI=2.13, 3.20), emotional (AOR=1.92, 95% CI=1.60, 2.31), controlling behavior (AOR=1.31, 95% CI=1.07, 1.60), and physical and/or sexual IPV (AOR=1.94, 95% CI=1.56, 2.42). For hunger, also shown in Table 4, multivariable random effects models showed significant associations with all forms of IPV exposure except controlling behaviors: physical (AOR=1.67, 95% CI=1.20, 3.32), sexual (AOR=2.05, 95% CI=1.43, 2.92), economic (AOR=3.00, 95% CI=2.22, 4.06), emotional (AOR=2.13, 95% CI=1.59, 2.86), and physical and/or sexual IPV (AOR=1.94, 95% CI=1.56, 2.42).

The ICCs ranged from 0.37 to 0.52, which is consistent with strong correlation in IPV over time. Approximately, from 37% to 52% of the overall variance in IPV was between-persons, suggesting that substantial (48%–63%) variation in IPV over time was at the within-person level.

DISCUSSION

In this longitudinal study of women's experiences of food insecurity and IPV in Mwanza, Tanzania, 47.7% reported food insecurity and 13.6% reported hunger in the last 12 months at baseline. All forms of IPV measured in this study were significantly associated with food insecurity, and all forms, apart from controlling behaviors, were significantly associated with hunger, even after adjusting for relevant sociodemographic variables.

For both food insecurity and hunger, the strongest association emerged with economic IPV, indicating that, in this context, both may create household environments in which financial stress, limited resources, and lack of access to enough nutritious food result in partner's utilization of economic IPV. Although definitions and measures vary, there is increasing recognition that economic IPV significantly impacts women's well-being and health.[24,25] Economic IPV may serve to further reinforce women's food insecurity and economic marginalization, reducing opportunities for help-seeking and access to services and increasing future exposure to IPV. Evidence from high-income settings indicates that economic abuse increases financial dependence on an abuser and makes it less likely for women to escape a violent relationship.[26] The extent to which food insecurity and economic IPV are intertwined, reinforce women's dependence on abusive partners and reduce opportunities for women to leave violent relationships, and it is an important area of future research in LMIC settings.

The finding that hunger was not associated with controlling behaviors requires further consideration as it contradicts existing evidence from South Africa.[10] One potential reason is that controlling behavior was so highly prevalent in this population that household food insecurity status does not influence perpetration of controlling behaviors, or it is that male partners perceive it as beneficial if women start contributing to the household finances and thereby food through working outside the house.

Results for multivariable analyses for both food insecurity and hunger were largely consistent, indicating that a range of manifestations of food insecurity are important to consider as risk factors for IPV. Although a dose-response relationship between the food insecurity measures and IPV outcomes might have been expected, these results indicate that even a lack of nutritious food

Table 3. Food Insecurity and Hunger and Past Year IPV Exposures by Wave

Type of IPV	Food insecurity								Hunger							
	Baseline (N=1,004)		Wave-2 (N=892)		Wave-3 (N=867)		Wave-4 (N=836)		Baseline (N=1,004)		Wave-2 (N=892)		Wave-3 (N=867)		Wave-4 (N=836)	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Physical IPV	**138 (28.8)****	101 (19.2)	**128 (25.8)****	71 (17.9)	**93 (22.7)****	57 (12.4)	**74 (17.4)****	34 (8.3)	**50 (36.5)****	189 (21.8)	40 (26.0)	159 (21.5)	**23 (37.7)****	127 (15.8)	8 (16.0)	100 (12.7)
Sexual IPV	**126 (26.3)****	81 (15.4)	**137 (27.6)****	59 (14.9)	**91 (22.2)****	39 (8.5)	**74 (17.4)****	34 (8.3)	**56 (40.9)****	151 (17.4)	43 (27.9)	153 (20.7)	**15 (24.6)***	115 (14.3)	10 (20.0)	98 (12.5)
Economic IPV	**201 (41.9)****	117 (22.3)	**225 (45.4)****	106 (26.8)	**178 (43.5)****	113 (24.7)	**180 (42.3)****	80 (19.5)	**71 (51.8)****	247 (51.8)	**98 (63.6)****	528 (71.4)	**39 (63.9)****	252 (31.3)	**32 (64.0)****	228 (29.0)
Emotional IPV	**257 (53.6)****	192 (36.6)	**263 (53.0)****	150 (37.9)	**238 (58.2)****	178 (38.9)	**257 (60.5)****	192 (46.7)	**88 (64.2)****	361 (41.6)	**89 (57.8)****	324 (43.9)	**41 (67.2)****	375 (46.5)	31 (62.0)	418 (53.2)
Controlling behaviors	240 (70.9)	276 (71.6)	355 (71.6)	270 (68.2)	280 (68.5)	299 (65.3)	**279 (65.6)****	227 (55.2)	**108 (78.8)***	608 (70.1)	98 (63.6)	527 (71.4)	43 (70.5)	536 (66.5)	32 (64.0)	474 (60.3)
Physical And/or sexual IPV	**193 (40.3)****	144 (27.4)	**193 (38.9)****	104 (26.3)	**136 (33.2)****	76 (16.6)	**118 (27.8)****	63 (15.3)	**70 (51.1)****	267 (30.8)	55 (35.7)	242 (32.8)	**28 (45.9)****	184 (22.8)	15 (30.0)	166 (21.1)

Note: Boldface indicates statistical significance (*p<0.05; **p<0.01).
IPV, intimate partner violence.

Table 4. Longitudinal Associations Across All 4 Waves Between Food Insecurity and Hunger and IPV Outcomes

Type of IPV	Food insecurity					Hunger				
	Unadjusted OR (95% CI)	p-Value	AOR (95% CI)	p-Value	ICC	Unadjusted OR (95% CI)	p-value	AOR (95% CI)	p-Value	ICC
Physical IPV	**1.87 (1.48, 2.37)**	**<0.0001**	**1.75 (1.38, 2.22)**[a]	**<0.0001**	0.41	**1.85 (1.33, 2.57)**	**<0.0001**	**1.67 (1.20, 3.32)**[a]	**0.002**	0.42
Sexual IPV	**2.46 (1.90, 3.18)**	**<0.0001**	**2.35 (1.81, 3.05)**[b]	**<0.0001**	0.51	**2.16 (1.52, 3.06)**	**<0.0001**	**2.05 (1.43, 2.92)**[b]	**<0.0001**	0.52
Economic IPV	**2.73 (2.24, 3.34)**	**<0.0001**	**2.61 (2.13, 3.20)**[c]	**<0.0001**	0.39	**3.22 (2.39, 4.34)**	**<0.0001**	**3.00 (2.22, 4.06)**[c]	**<0.0001**	0.41
Emotional IPV	**1.91 (1.59, 2.30)**	**<0.0001**	**1.92 (1.60, 2.31)**[d]	**<0.0001**	0.37	**2.18 (1.62, 2.93)**	**<0.0001**	**2.13 (1.59, 2.86)**[d]	**<0.0001**	0.38
Controlling behaviors	**1.28 (1.05, 1.57)**	**0.015**	**1.31 (1.07, 1.60)**[e]	**0.010**	0.41	1.11 (.81, 1.52)	0.515	1.15 (.84, 1.57)[e]	0.390	0.41
Physical and/or sexual IPV	**2.07 (1.66, 2.57)**	**<0.0001**	**1.94 (1.56, 2.42)**[f]	**<0.0001**	0.46	**1.84 (1.34, 2.53)**	**<0.0001**	**1.94 (1.56, 2.42)**[f]	**<0.0001**	0.47

Note: Boldface indicates statistical significance (p<0.05).
Time is included as a fixed effect.
[a]Controlling for age, education level and SES.
[b]Controlling for age, marital status and SES.
[c]Controlling for age, education level, SES and earning money in the past 12 months.
[d]Controlling for age.
[e]Controlling for age and education level.
[f]Controlling for age, education level and SES.
ICC, intraclass correlation coefficient; IPV, intimate partner violence.

or stress associated with being able to buy food is linked to increased IPV. Therefore, measures of food insecurity must consider household food access alongside measures of hunger and nutrient intake.

Findings indicate that effective IPV prevention programming requires engaging with household food insecurity. In 2022, high inflation levels globally and conflict in Ukraine and its impact on food production triggered high food prices and reduced food availability, which will likely have significant impacts on food insecurity globally, especially in LMICs. Economic instability and shifts in global supply chains, because of the coronavirus disease 2019 (COVID-19), and major climate events resulting from climate change, such as flooding and drought, are associated with increased food insecurity. The impacts on IPV may be substantial and should inform integrated IPV prevention programming that addresses household food needs alongside other evidence-based IPV prevention activities. Although some economic interventions to prevent IPV have focused on increasing women's employment and livelihood opportunities, interventions could also directly target food insecurity in the form of in-kind food transfers and supplementary nutrition assistance programs.[2]

Limitations

These results should be interpreted in the light of the following limitations. The analysis cannot provide for causal certainty. The measure of food insecurity and hunger is a self-reported, not validated, proxy measure reported by the woman, which does not reflect overall household food insecurity or food consumption. Although not validated, the included items capture different aspects of food insecurity that represent distinct dimensions. Given the sampling procedures, the results may not be generalizable beyond women in Mwanza, Tanzania, and the results may be biased owing to the presence of unmeasured confounders. Despite these limitations, this analysis is, to the best of our knowledge, the first longitudinal study of food insecurity and women's IPV experiences in an LMIC setting. The study expands the existing evidence-base by indicating strength of association between food insecurity and a range of types of IPV, as well as providing much-needed evidence focusing on women's reports of food insecurity and IPV experience.

CONCLUSIONS

Results from this analysis of food insecurity and IPV experience among women in Mwanza, Tanzania, indicate that food insecurity is longitudinally associated with multiple forms of IPV, particularly economic IPV. Although previous longitudinal data on this topic have been drawn primarily from high-income contexts, and most existing evidence on food insecurity and IPV among women in LMIC settings is cross-sectional, this study provides evidence of a longitudinal association between food insecurity in an LMIC context.

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SUPPLEMENTAL MATERIAL

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REFERENCES

1. Sardinha L, Maheu-Giroux M, Stöckl H, Meyer SR, García-Moreno C. Global, regional, and national prevalence estimates of physical or sexual, or both, intimate partner violence against women in 2018. *Lancet.* 2022;399(10327):803–813. https://doi.org/10.1016/S0140-6736(21)02664-7.
2. Conroy AA, Cohen MH, Frongillo EA, et al. Food insecurity and violence in a prospective cohort of women at risk for or living with HIV in the U.S. *PLoS One.* 2019;14(3):e0213365. https://doi.org/10.1371/journal.pone.0213365.
3. Leddy AM, Zakaras JM, Shieh J, et al. Intersections of food insecurity, violence, poor mental health and substance use among U.S. women living with and at risk for HIV: evidence of a syndemic in need of attention. *PLoS One.* 2021;16(5):e0252338. https://doi.org/10.1371/journal.pone.0252338.
4. Diamond-Smith N, Conroy AA, Tsai AC, Nekkanti M, Weiser SD. Food insecurity and intimate partner violence among married women in Nepal. *J Glob Health.* 2019;9(1):010412. https://doi.org/10.7189/jogh.09.010412.

5. Fong S, Gupta J, Kpebo D, Falb K. Food insecurity associated with intimate partner violence among women in Abidjan, Cote d'Ivoire. *Int J Gynaecol Obstet.* 2016;134(3):341–342. https://doi.org/10.1016/j.ijgo.2016.03.012.
6. Willie TC, Kershaw TS, Callands TA. Examining relationships of intimate partner violence and food insecurity with HIV-related risk factors among young pregnant Liberian women. *AIDS Care.* 2018;30(9):1156–1160. https://doi.org/10.1080/09540121.2018.1466983.
7. Hatcher AM, Page S, Aletta van Eck L, et al. Systematic review of food insecurity and violence against women and girls: mixed methods findings from low- and middle-income settings. *PLOS Glob Public Health.* 2022;2(9):e0000479. https://doi.org/10.1371/journal.pgph.0000479.
8. Hunger and food insecurity 2022. Food and Agriculture Organization. https://www.fao.org/hunger/en/. Accessed November 6, 2022.
9. FAO. IFAD. UNICEF. WFP. WHO. The state of food security and nutrition in the world 2020. Transforming food systems for affordable healthy diets. Rome, Italy: Food and Agriculture Organization of the United Nations; 2020. https://www.unicef.org/media/72676/file/SOFI-2020-full-report.pdf. Accessed November 6, 2022 .
10. Awungafac G, Mugamba S, Nalugoda F, et al. Household food insecurity and its association with self-reported male perpetration of intimate partner violence: a survey of two districts in central and western Uganda. *BMJ Open.* 2021;11(3):e045427. https://doi.org/10.1136/bmjopen-2020-045427.
11. Hatcher AM, Stöckl H, McBride RS, Khumalo M, Christofides N. Pathways from food insecurity to intimate partner violence perpetration among peri-urban men in South Africa. *Am J Prev Med.* 2019;56(5):765–772. https://doi.org/10.1016/j.amepre.2018.12.013.
12. Hatcher AM, Neilands TB, Rebombo D, Weiser SD, Christofides NJ. Food insecurity and men's perpetration of partner violence in a longitudinal cohort in South Africa. *BMJ Nutr Prev Health.* 2022;5(1):36–43. https://doi.org/10.1136/bmjnph-2021-000288.
13. Vyas S, Watts C. How does economic empowerment affect women's risk of intimate partner violence in low and middle income countries? A systematic review of published evidence. *J Int Dev.* 2009;21(5):577–602. https://doi.org/10.1002/jid.1500.
14. Miller CL, Bangsberg DR, Tuller DM, et al. Food insecurity and sexual risk in an HIV endemic community in Uganda. *AIDS Behav.* 2011;15(7):1512–1519. https://doi.org/10.1007/s10461-010-9693-0.
15. Power EM. Economic abuse and intra-household inequities in food security. *Can J Public Health.* 2006;97(3):258–260. https://doi.org/10.1007/BF03405600.
16. Ricks JL, Cochran SD, Arah OA, Williams JK, Seeman TE. Food insecurity and intimate partner violence against women: results from the California Women's Health Survey. *Public Health Nutr.* 2016;19(5):914–923. https://doi.org/10.1017/S1368980015001986.
17. Maitra C. *A Review of Studies Examining the Link Between Food Insecurity and Malnutrition*. Rome, Italy: Food and Agriculture Organization of the United Nations; 2018. https://www.fao.org/3/CA1447EN/ca1447en.pdf. Accessed November 6, 2022.
18. Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC). [Tanzania Mainland, Ministry of Health (MoH) [Zanzibar]. National Bureau of Statistics (NBS). Office of the Chief Government Statistician (OCGS). ICF. Tanzania Demographic and Health Survey and Malaria Indicator Survey (TDHS-MIS) 2015-16. Rockville, MD: MoHCDGEC, MoH, NBS, OCGS, and ICF; 2016. https://www.dhsprogram.com/pubs/pdf/SR233/SR233.pdf. Accessed November 6, 2022.
19. Kapiga S, Harvey S, Mshana G, et al. A social empowerment intervention to prevent intimate partner violence against women in a microfinance scheme in Tanzania: findings from the MAISHA cluster randomised controlled trial. *Lancet Glob Health.* 2019;7(10):e1423–e1434. https://doi.org/10.1016/S2214-109X(19)30316-X.
20. Harvey S, Abramsky T, Mshana G, et al. A cluster randomised controlled trial to evaluate the impact of a gender transformative intervention on intimate partner violence against women in newly formed neighbourhood groups in Tanzania. *BMJ Glob Health.* 2021;6(7):1–13. https://doi.org/10.1136/bmjgh-2020-004555.
21. WHO. WHO multi-country study on women's health and domestic violence against women : initial results on prevalence, health outcomes and women's responses. Geneva, Switzerland: WHO; 2005. https://apps.who.int/iris/handle/10665/43309. Accessed November 6, 2022.
22. de Haen H, Klasen S, Qaim M. What do we really know? Metrics for food insecurity and undernutrition. *Food Policy.* 2011;36(6):760–769. https://doi.org/10.1016/j.foodpol.2011.08.003.
23. Watts C, Heise L, Ellsberg M, Garcia-Moreno C. *Putting women's safety first: ethical and safety recommendations for research on domestic violence against women*. Geneva, Switzerland: WHO; 1999. https://apps.who.int/iris/handle/10665/65893. Accessed November 6, 2022.
24. Postmus JL, Nikolova K, Lin HF, Johnson L. Women's economic abuse experiences: results from the UN multi-country study on men and violence in Asia and the pacific. *J Interpers Violence.* 2022;37(15–16):NP13115–NP13142. https://doi.org/10.1177/08862605211003168.
25. Postmus JL, Hoge GL, Breckenridge J, Sharp-Jeffs N, Chung D. Economic abuse as an invisible form of domestic violence: a multicountry review. *Trauma Violence Abuse.* 2020;21(2):261–283. https://doi.org/10.1177/1524838018764160.
26. McLaren H. Domestic violence, housing and employment: workers' perspectives on employment assistance in supported accommodation. *Aust J Soc Issues.* 2013;48(4):415–433. https://doi.org/10.1002/j.1839-4655.2013.tb00291.x.