



Posttraumatic stress and depression among women in Kenya's informal settlements: risk and protective factors

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ABSTRACT

Background: Approximately 56% of Kenya's population resides in informal settlements (UN-Habitat, 2016). Female residents experience a range of psychosocial stressors including chronic poverty and high rates of interpersonal violence. Despite evidence that this population has some of the worst physical health outcomes in the country (APHRC, 2014), few studies have evaluated their mental health status and its correlates.

Objective: The purpose of this study was to identify risk and protective factors associated with mental health problems (posttraumatic stress & depression) among women living in informal settlements in Kenya. Hypothesized risk factors included economic stress, a history of experiencing childhood abuse and sexual violence, as well as partner-perpetrated psychological and physical abuse. Hypothesized protective factors were supportive relationships with family members and friends and having a sense community connection.

Method: Local community health workers were trained to collect data via individual interviews using validated measures. Participants were recruited using systematic random sampling in two informal settlements in Nakuru County. We used path analysis to test the hypothesized model among a sample of 301 women.

Results: The model had an excellent fit ($\chi^2 = 13.391$, $df = 8$, $p = .099$; GFI = .99; CFI = .99; RMSEA = .05) and explained 25% of the variance in PTSS and 28% of the variance in depression. All predictor variables except support from friends were statistically significant in the expected direction. Specifically, economic stress, childhood abuse, sexual violence, as well as physical and psychological abuse from one's partner had significant positive associations with PTSS and depression. Having supportive family members and a sense of being part of the community had significant negative associations with symptoms.

Conclusions: Results highlight the importance of addressing intimate partner and other forms of interpersonal violence in these settings and hold implications for tailoring interventions for this marginalized population.

Estrés postraumático y depresión en mujeres de asentamientos informales en Kenia: Factores protectores y de riesgo

Antecedentes: Aproximadamente, el 56 % de la población de Kenia vive en asentamientos informales (Naciones Unidas, 2015). Las mujeres que viven en estos asentamientos experimentan un amplio espectro de estresores psicosociales, incluyendo a la pobreza crónica y a altos niveles de violencia interpersonal. Pese a que existe evidencia respecto a que esta población tiene los peores indicadores de salud física (Centro de Investigación sobre la Población y Salud Africanas, 2012), son muy pocos los estudios que han evaluado el estado de su salud mental y factores relacionados.

Objetivo: El objetivo de este estudio fue el de identificar factores protectores y de riesgo asociados a problemas de salud mental (estrés postraumático y depresión) en mujeres que viven en asentamientos informales en Kenia. Los factores de riesgo hipotéticos fueron el estrés económico, el antecedente de haber experimentado abuso infantil y violencia sexual, así como el haber experimentado abuso psicológico y físico por parte de la pareja. Los factores protectores hipotéticos fueron las relaciones interpersonales de soporte con familiares y amigos y el tener una sensación de conexión con la comunidad.

Métodos: Se capacitó a los trabajadores de salud mental comunitaria locales en la recolección de datos a través de entrevistas individuales y el uso de escalas validadas. Se reclutó a las participantes mediante un muestreo por aleatorización sistemática realizado en dos asentamientos informales en el condado de Nakuru. Se realizaron análisis de ruta para evaluar el modelo hipotetizado en una muestra de 301 mujeres.

Resultados: El modelo mostró un encaje excelente ($\chi^2 = 13.391$, $df = 8$, $p = .099$; GFI = .99; CFI = .99; RMSEA = .05) y explicó el 25 % de la varianza en los síntomas de estrés traumático (PTSS) y el 28 % de la varianza en los de depresión. Todas las variables predictivas, a excepción del soporte por parte de los amigos, resultaron ser estadísticamente significativas en la dirección esperada. De manera específica, el estrés económico, el abuso infantil, la violencia sexual y el abuso físico y psicológico por parte de la propia pareja mostraron

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关键词

非正式住区; 肯尼亚; 亲密伴侣暴力; 抑郁; 创伤后应激

HIGHLIGHTS

- More than 2/3 of women in Kenya's informal settlements report intimate partner violence and elevated psychological distress.
- Economic stress adds an additional risk, whereas support from family and community connection appear to be protective.

asociaciones positivas significativas con los PTSS y de la depresión. El tener soporte por parte de los miembros de la familia y el tener un sentido de pertenencia a la comunidad mostraron asociaciones negativas significativas con los síntomas.

Conclusiones: Los resultados enfatizan la importancia de abordar la violencia ejercida por la pareja y otras formas de violencia interpersonal en estos escenarios, además de tener implicancias para el diseño de intervenciones específicas para estas poblaciones excluidas.

肯尼亚非正规住区女性创伤后应激和抑郁: 风险和保护因素

背景: 肯尼亚约有56%的人口居住在非正规住区中 (UN, 2015)。女性居民经历了包括长期贫困和高比例人际暴力在内的各种社会心理应激源。尽管有证据表明该人群中一些人具有该国最差的身体健康状况 (APHRC, 2012), 但很少有研究评估其心理健康状况及其相关因素。

目的: 本研究旨在识别肯尼亚非正规住区女性心理健康问题 (创伤后应激和抑郁) 相关的风险和保护因素。假设的风险因素包括经济压力, 经历过儿童虐待和性暴力的历史以及伴侣实施的心理和身体虐待。假设的保护因素是与家人和朋友的支持性关系, 以及与社区的联系。

方法: 对当地社区卫生工作者进行了培训, 以使用经过验证的措施通过个人访谈收集数据。在纳库鲁县的两个非正式住区中, 使用系统随机抽样招募了参与者。我们使用路径分析来检验301名女性样本中的假设模型。

结果: 该模型具有很好的拟合度 ($\chi^2 = 13.391$, $df = 8$, $p = .099$; $GFI = .99$; $CFI = .99$; $RMSEA = .05$), 并解释了PTSS方差的25%和28%的方差。抑郁症的差异。除来自朋友的支持外, 所有预测变量均在预期方向上具有统计学意义。具体而言, 经济压力, 童年虐待, 性暴力以及伴侣的身体和心理虐待与PTSS和抑郁症有着显著的正相关。家庭成员的支持和社区参与的感觉与症状之间存在显著的负面联系。

结论: 结果强调了在这种情况下应对亲密伴侣和其他形式的人际暴力的重要性, 并为针对这一边缘化人群制定干预措施产生了影响。

The worldwide burden of mental illness is well documented (World Health Organization [WHO], 2010, 2011), and the problem appears to be worsening in low- and middle-income countries (LMICs) (Whiteford, Ferrari, Degenhardt, Feigin, & Vos, 2015) where the treatment gap is typically the widest (Kohn, Saxena, Levav, & Saraceno, 2004; Mathers & Loncar, 2006; WHO, 2013). Women are disproportionately affected in that they carry a higher burden of certain common mental disorders compared to men (Steel et al., 2014; Whiteford et al., 2015). This disparity has been attributed to several factors including inequality in education and employment opportunities (Collier, Weiss, Pollack, & Lam, 2020; Olff, 2017; Seedat et al., 2009). In addition, women experience intimate partner and other forms of interpersonal violence at disproportionate rates, both of which are strongly associated with mental health problems including depression and posttraumatic stress disorder (Beydoun, Beydoun, Kaufman, Lo, & Zonderman, 2012; Dillion, Hussain, Loxton & Rahman, 2013; García-Moreno & Riecher-Rössler, 2013).

On average, 35% of women globally have experienced physical or sexual violence during their lifetimes, with even higher rates in many LMICs (García-Moreno & Riecher-Rössler, 2013). In Kenya, for example, a population-based study indicated 45% of women experienced at least one episode of violence (after the age of 15), with partners being the most frequent perpetrators (Kenya National Bureau of Statistics [KNBS], 2015). Intimate partner violence (IPV) in this context occurs against a background of high rates of exposure to violence during childhood, itself a predictor of mental health problems in adulthood (Benjet, Borges, & Medina-Mora, 2010; Lindert et al., 2014). Approximately two-thirds of women who took

part in a national house-hold survey in Kenya reported experiencing at least one episode of physical abuse before the age of 18, most commonly perpetrated by parents or other relatives (Chiang et al., 2018).

While invaluable for understanding overall prevalence rates of violence, these national surveys may not fully capture the experience of women living in Kenya's urban informal settlements, home to 56% of the country's population (UN Habitat, 2016), because the sampling involved only limited coverage of these areas (African Population & Health Research Center [APHRC], 2014). Informal settlements have a distinct set of problematic social conditions that potentially impact on both rates of violence and mental health. Crime rates are typically high, communities are overcrowded in makeshift housing, there is little basic infrastructure including access to healthcare, and residents experience chronic poverty with few opportunities for advancement (Mutisya & Yarime, 2011). The population is often transitory, resulting in communities with limited cohesion and few social networks (McIlwaine, 2013). Studies in informal settlements have found higher rates of violence against women (Corburn & Hildebrand, 2015; Swart, 2012; Winter, Obara, & McMahan, 2020), and worse physical health outcomes, including higher disease burden and mortality than studies of women in the general population (APHRC, 2002, 2014; Kyobutungi, Ziraba, Ezech, & Yé, 2008; Ziraba, Mills, Madise, Saliku, & Fotso, 2009; Zulu et al., 2011).

Despite evidence that women living in informal settlements are disproportionately vulnerable to numerous risk factors, there are few published studies on their mental health status, from Kenya or other sub-Saharan African

countries (Ezeh et al., 2017; Sverdlik, 2011). In one exception, Winter et al. (2020) found women in an informal settlement in Nairobi who experienced recent psychological and physical violence from their husbands were more than two times as likely to meet criteria for depression, suggesting IPV is central to understanding mental health problems in this context. In this study, we build on existing work by evaluating multiple risk and protective factors associated with depression and posttraumatic stress symptoms (PTSS) among a sample of women living in informal settlements in Nakuru County, Kenya. Drawing from a life course perspective, in addition to IPV, we assessed exposure to violence in childhood and lifetime exposure to sexual violence, along with current economic stress because these social determinants of mental health are reported to be high in this context (Winter et al., 2020). We also evaluated potential protective factors to better understand resilience among this population, which has largely been absent in previous studies. We focused on different social resources as protective factors because social capital has shown to be a reliable predictor of mental health (Ehsan & De Silva, 2015), particularly among populations exposed to adversity (Maselko, 2017).

Although prior research has identified social determinants of mental health among women in other LMICs, there are likely differences in vulnerability and resilience across settings (Collier et al., 2020). Context specific research that provides a more comprehensive picture of factors associated with women's mental health is important for localizing interventions and ultimately breaking the cycle of poverty and mental health problems in these settings (Collier et al., 2020; Lund et al., 2011, 2014). In this study, we used path analysis to test if hypothesized risk factors including economic stress, along with psychological and physical violence from one's current partner, childhood physical abuse, and a history of sexual violence were associated with elevated symptoms of PTSS and depression. We focused on symptoms rather than diagnosis because we used self-report rather than clinical interviews. Hypothesized protective factors, proposed to be associated with lower symptoms, were having at least one family member or friend to turn to when faced with problems and a sense of connection to the community.

1. Method

1.1. Ethical considerations

Approval was obtained from the Strathmore University Institutional Ethics Review Committee in Kenya prior to the start of data collection. Enumerators were 15 community health volunteers (14 females and one male) from the local area who took part in a 5-day training that incorporated WHO (2001) standards on domestic violence research.

Respondents were informed during the consent process that taking part in the study was voluntary, they could refuse to answer any questions they did not wish to answer and could stop the interview at any point. Enumerators reminded respondents of their right to decline response or withdraw prior to starting sections of the interview with sensitive questions (e.g. exposure to violence and trauma).

1.2. Study location and procedure

Data were collected in two informal settlements in Nakuru County, Kenya; Rhonda in Nakuru Town West Subcounty and Karagita in Naivasha Subcounty. According to the 2019 census, the informal settlement in Rhonda has a population of 53,688 in an area of approximately 3.1 square kilometres (sq. km). Karagita has an estimated population of 30,000 living in an area of approximately 1.1 sq.km. Both areas are characterized by poor housing conditions, with most families living in one-room, makeshift structures without indoor plumbing. The population tends to be transitory. The economy of Nakuru county is primarily reliant on small scale farming, with some tourism, retail, and manufacturing; there are high rates of unemployment, particularly among the population in informal settlements, were most of the population works in the informal sector.

Data were collected over a two-week period in July 2019. Enumerators went door-to-door in the two study sites to recruit eligible participants i.e. those who were at least 18 years of age, capable of giving informed consent, and currently married or living with a partner. Households were selected using systematic random sampling. Specifically, each enumerator was assigned a separate street, starting at a landmark (e.g. shop) identified in advance by the field supervisor. Landmarks were numbered and selected at random using a computer-generated list. Starting from a landmark, she or he walked on the left side of the street, skipping five houses and knocking on the sixth door. If the person at the house was not eligible or willing to participate, the enumerator went to the next house. Almost half of the interviews (48.5%) were conducted with participants contacted on the first attempted household, 23.6% were conducted on the second attempted household, 12% on the third, 7% on the fourth, and the remaining 5.9% on the fifth to tenth attempt. If a more than one eligible woman was present, the enumerator asked one to volunteer. A total of 632 households were approached to obtain the final sample of 301 participants. Forty-nine women declined participation, 78 households did not have a person who met study criteria, and there was no one home at 204 of the households.

Women who consented took part in interviews lasting approximately one hour. The interviews took place in the respondent's home, or another location

selected by her, where privacy could be ensured. Enumerators recorded responses electronically using tablets and each day data were uploaded to a central data file and screened for errors. To reduce burden on enumerators, each person conducted no more than two interviews per day. A plan was in place to refer participants who were in imminent danger or required mental health support.

1.3. Participants

The final sample included 301 women; 204 from the more populated area of Rhonda and 97 from Karagita. As shown in Table 1, most participants were under 35 years of age (69.1%). Women had 0 to 10 children (*Mdn* = 2) and 1 to 11 people living in the household (*Mdn* = 4). Just over half of the sample (51.1%) was employed outside of the home, primarily in casual work.

1.4. Translation and adaptation of measures

Measures assessing for exposure to childhood physical abuse, sexual violence, PTSS and depression had been previously translated into Kiswahili (Hung, Tol, Musci, Aketch, & Bachani, 2019). Remaining items on economic stress, exposure to intimate partner violence and social resources were back translated by a professional translation company. The full study protocol was reviewed in a two-day workshop by the research team of 15 individuals who are bilingual in English and Kiswahili and members of the local community. Items were adapted to localise expressions and ensure clarity in wording using a consensus approach (Abubakar & van de Vijver, 2017).

Table 1. Participant demographic information.

	N	%
Age		
18–25 years old	76	25.20
26–34 years old	132	43.90
35–41 years old	58	19.30
42–49 years old	24	8.00
50–65 years old	9	3.00
Above 65 years old	2	.70
Religion		
Christian	297	98.70
Muslim	3	1.00
Traditional	1	.30
Highest level of education completed		
Primary	134	44.50
Secondary	127	42.20
Higher	25	8.30
Do not know	15	5.00
Marital status		
Married	274	92.00
Partnered	24	8.00

1.5. Measures

1.5.1. Economic stress

Participants were asked with a single item to rate how difficult it was to pay for necessities in the past month (e.g. food, water, etc.) on a scale ranging from 0 (*not at all*) to 4 (*very hard*).

1.5.2. Sexual violence and childhood physical abuse

Exposure to sexual violence and childhood physical abuse were assessed with two items from the Brief Trauma Questionnaire (BTQ; Schnurr, Spiro, Vielhauer, Findler, & Hamblen, 2002): ‘Has anyone ever made or pressured you into having some type of unwanted sexual contact?’ and ‘Before age 18, were you ever physically punished or beaten by a parent, caretaker, or teacher so that: you were very frightened; or you thought you would be injured; or you received bruises, cuts, welts, lumps or other injuries?’ Respondents answered yes or no to each item. The two items were scored as dichotomous variables.

1.5.3. Intimate partner violence

Exposure to psychological and physical violence from one’s partner was assessed using selected items from the World Health Organization Violence Against Women Instrument (Garcia-Moreno et al., 2006). Four items assess psychological violence and seven items assess physical violence (including sexual violence) from one’s current husband/partner. Respondents are asked to indicate whether they have experienced a specific behaviour from their partner (yes or no) e.g. ‘Has your partner ever threatened to hurt you or someone you care about?’ and ‘Has he kicked you, dragged you or beaten you up?’ The two subscales were scored as dichotomous variables, indicating the presence or absence of any type of abuse.

1.5.4. Social resources

Support from family was assessed with a single item ‘How many family members do you have whom you could rely on for a serious problem?’ Because a majority of participants indicated they had five or more family members they can rely on, we dichotomised the response to compare those who do and do not have such a family member. Support from friends was assessed in the same way. Community connection was assessed with a single item from the Adapted Social Capital Assessment Tool (SASCAT; De Silva et al., 2006) ‘Do you feel you are really a part of this community?’ to which participants responded yes or no.

1.5.5. Mental health problems

Symptoms of posttraumatic stress disorder (PTSD) were assessed using the 20-item *PTSD Checklist for DSM-5* (PCL-5; Blevins, Weathers, Davis, Witte, &

Domino, 2015). Each item corresponds to a specific symptom in the diagnostic criteria for PTSD according to the DSM-5. Participants were read each item and asked to rate how much the symptom had bothered her in the past month on a scale ranging from 0 (*not at all*) to 4 (*extremely*). A total score is calculated for this measure; a cut-off score of 31 to 33 or higher indicates clinically significant symptoms (Blevins et al., 2015). In this sample the PCL-5 had Cronbach's alpha of .95.

Symptoms of depression were assessed with the 15-item depression scale from *Hopkins Symptom Checklist* (HSCL; Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974). Items, each of which corresponds to a specific symptom of depression, were read to participants. Participants rated how much the symptom had bothered them in the last two weeks on a scale ranging from 1 (*not at all*) to (*extremely*). A mean score is calculated from responses to items, a cut-off score of 1.75 is commonly used to indicate clinically significant symptoms (Mollica et al., 2004). Cronbach's alpha in the current sample was .93.

1.5.6. Demographic information

Participants were asked to indicate their age range, marital status, employment status, number of children, and number of people residing in the household.

1.6. Data analysis

Analyses proceeded in two steps. First, descriptive statistics and bivariate correlations between all study variables were generated using SPSS 25. The sample demographics were similar across both communities and no difference were found on variables of interests, so data from both locations were evaluated together. Cut-off scores for the PCL-5 and the HSCL are commonly used to determine caseness for PTSD and depression. We evaluated the proportion of the sample that fell above these limits for descriptive purposes; however, we ran the model using continuous scores to avoid loss of information.

Second, Lavaan (V 0.5–12) package in R 4.0 was used to test a path model, with hypothesized risk and protective factors as exogenous variables and both PTSS and depression scores as endogenous variables. One variable, social support from friends, was excluded because it was not sufficiently correlated with PTSS or depression.

2. Results

2.1. Descriptive statistics

2.1.1. Hypothesised risk factors

A high percentage of participants reported at least one form of abuse from their husbands; 68.8%

endorsed at least one form of psychological abuse and 61.8% endorsed at least one form of physical abuse. Just over half of participants (52.2%) reported both forms of abuse. The most common forms of psychological abuse involved being insulted (60.8%), being humiliated in front of other people (39.5%), being intimidated by husband yelling or throwing things (38.9%), and having husband threaten to hurt her or someone she cares about (31.2%). The most common acts of physical abuse were being slapped (37.5%), forced to have sexual intercourse (35.9%), hit with a fist or object (29.2%) and physically assaulted (27.5%). Regarding other forms of interpersonal violence, 62.5% had been exposed to physical abuse during childhood; 26.6% had lifetime exposure to sexual violence. Regarding economic stress 42% of the sample reported it was very difficult to pay for their basic needs over the past month ($M = 2.92$, $SD = 1.07$).

2.1.2. Hypothesised protective factors

Protective factors were social resources including having a supportive family member or friend to turn to with a problem and feeling a sense of connection to one's community. Most participants reported having at least one family member (85.7%) and one friend (72.4%) they can rely on if they face a serious problem. Most (78%) also felt a part of the community.

2.1.3. Mental health problems

Total scores on the PCL-5 ranged from 0 to 80 with a mean score of 36.00 ($SD = 20.70$). Scores on the HSCL ranged from 1 to 4, with an average score of 2.34 ($SD = 0.76$). A cut-off score of 31 to 33 or higher has been used to indicate clinically significant symptoms on the PCL-5 (Blevins et al., 2015); 57% and 54% of the sample, respectively, scored within this range. Among a variety of clinical and community populations, a score of 1.75 or higher indicates clinically significant symptoms on the HSCL (Mollica et al., 2004); 75% of the sample scored within this range. Bivariate correlations for study variables are shown in Table 2.

2.2. Path analysis

Support from friends was not significantly related to depression or PTSS so was not included in the main analysis. The model had an excellent fit ($\chi^2 = 13.391$, $df = 8$, $p = .099$; GFI = .99; CFI = .99; RMSEA = .05) and explained 25% of the variance in PTSS and 28% of the variance in depression. All predictor variables were statistically significant in the expected direction (see Table 3). Specifically, hypothesized risk factors including economic stress, childhood abuse, sexual violence, physical and psychological abuse from

Table 2. Correlations between variables.

Variable	1	2	3	4	5	6	7	8	9	10
(1) Economic stress	–	.06	.12*	.18**	.21**	–.01	–.14*	–.01	.26**	.34**
(2) Childhood abuse		–	.28**	.14*	.01	–.08	.03	.03	.20**	.28**
(3) Sexual violence			–	.23**	.26**	–.09	.01	.02	.20**	.18**
(4) Physical abuse from partner				–	.44**	–.07	–.08	.10	.28**	.34**
(5) Psych abuse from partner					–	–.17**	–.10	.02	.30**	.34**
(6) Community connection						–	.21**	.04	–.27**	–.20**
(7) Family support							–	.12*	–.24**	–.23**
(8) Friend support								–	–.02	.09
(9) PTSS									–	.77**
(10) Depression										–

* $p < .05$, ** $p < .01$. Psych = Psychological. PTSS = Posttraumatic stress symptoms. All variable except economic stress, PTSS, and depression were dichotomous; 0 = no, 1 = yes.

Table 3. Path coefficients.

	PTSS		Depression	
	Estimate (SE)	p	Estimate (SE)	p
Economic stress	3.318 (1.009)	.001	.169 (.036)	.001
Childhood abuse	5.391 (2.240)	.011	.172 (.080)	.031
Sexual violence	6.240 (2.512)	.013	.191 (.090)	.033
Physical abuse from partner	5.078 (2.448)	.038	.274 (.087)	.002
Psychological abuse from partner	6.485 (2.545)	.001	.250 (.091)	.006
Community connection	–9.296 (2.558)	.001	–.207 (.091)	.024
Family support	–9.606 (3.019)	.001	–.333 (.108)	.002

Unstandardized path coefficients are shown. PTSS = Posttraumatic stress symptoms. All predictor variables except economic stress were dichotomous; 0 = no, 1 = yes.

partner had positive significant positive associations with PTSS and depression. Hypothesized protective factors, community connection and family support, had significant negative associations.

3. Discussion

The aim of this study was to identify risk and protective factors associated with Mental health problems among a sample of women living in urban informal settlements in Nakuru County, Kenya. Findings indicated that economic stress, in addition to partner-perpetrated physical and psychological abuse, childhood abuse and a history of sexual violence had a positive significant association with PTSS and depression. Conversely, community connection and family support had negative associations, suggesting these social resources are protective. Results augment prior work by modelling effects of exposure to multiple forms of violence together with economic stress and protective factors on multiple mental health outcomes. Findings highlight the joint toxic impacts of economic marginalization and violence on the well-being of women in this context, as well as the protective roles of family relationships and sense of connection to the community.

Our findings are consistent with prior research showing that violence against women is more pervasive in informal settlements than in the general population in Kenya (Corburn & Hildebrand, 2015; Swart, 2012; Winter et al., 2020). Winter et al. (2020), for example, found 66.2% of women living in an informal settlement in Nairobi had experienced abuse from their husband in the past year, whereas Swart (2012) found 85% of women had a lifetime exposure to interpersonal violence. There are multiple potential explanations for these elevated rates. The problematic social conditions that increase stress in these communities may also exacerbate violence (Capaldi et al., 2012; McIlwaine, 2013). Belief systems that accept or even condone violence against women likely play a role (Memiah et al., 2018; Mugoya, Witte, & Ernst, 2015); according to data from the KNBS (2015) 41% of women and 36.2% of men in Kenya agreed that husbands are justified in beating their wives under certain circumstances. Males in Kenya are also exposed to high rates of violence during childhood; 73% of males aged 13 to 24 reported experiencing at least one episode of physical violence before the age of 18 with parents, teachers, and police being the most frequent perpetrators (Chiang et al., 2018). Being a victim of violence in childhood is a predictor of later violence perpetration (Capaldi et al., 2012).

Women living in informal settlements in Kenya are disproportionately burdened with adverse physical health outcomes (APHRC, 2002, 2014; Kyobutungi et al., 2008; Ziraba et al., 2009; Zulu et al., 2011). Our findings suggest mental health problems are also pervasive. Rates of mental health problems among the study population were high; 57% and 75% of the sample scored within the clinical range for posttraumatic stress and depressive symptoms respectively. These distress levels are comparable to or even higher than those found in research with conflict-affected populations (Charlson et al., 2019) and trauma-affected refugees (Steel et al.,

2009). Rates in this study are also higher than those found in other studies in Kenya. A recent study including university-educated adults in Kenya found approximately 20% met criteria for a probable diagnosis of posttraumatic stress disorder (Ben-Ezra et al., 2020). Musyimi, Mutiso, Haji, Nandoya, and Ndeti (2018) found a prevalence of rate of 25% for depression among adults randomly sampled from public health facilities.

There are several explanations for such high rates of distress in this study. Depression and anxiety disorders are higher among women worldwide (Steel et al., 2014; Whiteford et al., 2015) and among trauma-affected women, in particular (Olf, 2017). Participants have likely experienced chronic adversity throughout their lifespan. Exposure to violence and current economic stress are potentially only part of the toxic social conditions that over time have eroded their mental health and well-being (Forde et al., 2019). Because data were collected during the daytime, it is possible the sample experienced more mental health problems than women who were out of the home engaged in work or other activities. Additionally, it is possible that using self-report instruments and cut-off scores developed with other populations lead to elevated symptoms.

Results are consistent with a large body of literature examining the social determinates of mental health (see Lund et al., 2018 for a review), and suggest that economic stress is a significant contributing factor to depression and PTSS, in addition to the well-characterized risk factors associated with exposure to interpersonal violence (García-Moreno & Riecher-Rössler, 2013; Dillion et al., 2013). Whereas economic stress was a key predictor in this study, Winter et al. (2020) found a non-significant association between income and indicators of distress among women in an informal settlement in Nairobi. Economic stress rather than actual income may be particularly important in this context because one income may support any number of individuals.

Study findings are also consistent with prior work documenting a protective effect of social connection on adverse mental health conditions (Wang, Mann, Lloyd-Evans, Ma, & Johnson, 2018). Having a family member to rely on when faced with problems and feeling a sense of connection to the community were associated with significantly lower PTSS and depression. Contrary to expectations, having a friend to rely on was not significantly associated with lower symptoms. In terms of disclosure and help for serious problems, it may be family relationships are more relevant in this cultural context than friends. This could be related to the social stigma women face around interpersonal violence and mental health concerns (Maticka-Tyndale, Barnett, & Trocaire, 2020)). Our findings suggest that social resources were

generally high in this sample, in contrast to previous research that showed lack of social networks in Kenya's informal settlements (McIlwaine, 2013). Most of this research has taken place in large settlements in Nairobi; it is possible that social and community characteristics vary by location. Future research is needed to confirm this proposition.

3.1. Limitations and future research

There are several limitations to the study. Collecting data during daylight hours could have resulted in a sample that is not representative of the population. When more than one woman was present in the household, the interviewer asked for a volunteer, which could have biased the sample. Data could also be biased due to the nature of self-reporting. Although efforts were made to interview women in private locations, given the population density and poor construction of households, it is possible some participants refrained from disclosing information because of fears they would be overheard.

Additional limitations are related to the measures. Although symptom measures were previously validated with the population, because both PTSD and depression are psychiatric concepts originating in the global north, the measures may not fully capture the experiences of the population (Bass, Bolton, & Murray, 2007). Mendenhall et al. (2019) found the urban population in Kenya utilizes both local and international terminology to express distress. Stress and depression are commonly used along with Kiswahili terms meaning 'thinking too much,' and 'agony' to communicate the impact of suffering. Economic stress and community connection were assessed with single items which could have limited the accuracy of measurement.

To limit burden on participants, brief measures of social resources were used as indicators of support from family and friends and sense of connection to the community. Asking participants to estimate the number of people they can turn to for specific problems or assistance had previously been used to evaluate women's social networks (e.g. Rees et al., 2019). However, this method of assessment does not reflect the nature of the social relationship, which may be particularly important in this context are often blamed and stigmatized for IPV (Barnett, Maticka-Tyndale, & Triocaire Kenya 2016; Maticka-Tyndale et al., 2020).

We did not collect data from men; thus, we do not know the extent to which men living in these settlements may have been exposed to different types of violence. In addition to experiencing violence in childhood, population-based research in Kenya indicated 42 to 45% of adult men had experienced at least one episode of physical violence since the age of 15;

the most frequent perpetrators were non-family members. One in 10 men in this study reported experiencing physical violence from their female spouse (KNBS, 2015). Additionally, we only included currently partnered women in the sample, thus we cannot draw conclusions about women who may have left abusive partners.

Although most of our hypothesized variables were statistically significant, a considerable amount of variance remained unexplained in the model. Future research is required to understand the multiple contributing factors to elevated distress in settings of extreme economical marginalization. Inclusion of a more detailed analysis of economic resources, assessment of living and housing conditions, and physical health problems would likely be informative in this context. Additional work focused on understanding the nature of social resources and how they link with mental health outcomes in the local context would be informative for interventions focused on building resilience. Additionally, the impact of IPV and mental health problems on parenting and the is important to address in future studies.

4. Conclusion

Our study builds on an emerging body of research (Swart, 2012; Winter et al., 2020) showing women in informal settlements are particularly vulnerable to experiencing IPV and mental health problems. Results demonstrate a pressing need to develop and scale effective mental health interventions in this context. Interventions such as sociotherapy (Jansen et al., 2015) that foster supportive relationships and community connection may be helpful. Findings also highlight the need for violence prevention. A growing number of programs have shown promise in reducing violence against women and girls in LMICs (see Kerr-Wilson et al., 2020 for a review). A reduction in violence coupled with effective development interventions aimed at alleviating poverty may ultimately improve the mental health of women in this context.

Data availability statement

Data are not posted publicly because of organizational policy on protecting confidentiality of participants. The data that support the findings of this study are available from the corresponding author, [JEL], upon reasonable request.

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