



Prevalence and correlates of depression among rural and urban Rwandan mothers and their daughters 26 years after the 1994 genocide against the Tutsi

Celestin Mutuyimana^a, Cindi Cassady^b, Vincent Sezibera^a and Epaphrodite Nsabimana^{a,c}

^aCentre for Mental Health, University of Rwanda, Butare, Rwanda; ^bClinical Psychology, Caraes Ndera Neuropsychiatric Hospital, Kigali, Rwanda; ^cResearch department, Hope and Homes for Children, Salisbury, UK

ABSTRACT

Background: In the past 26 years since the genocide against the Tutsi, mental illness continues to be the greatest challenges facing the Rwandan population. In the context of the 1994 genocide against Tutsi, there are three different survival status within Rwandan women. Those who were targeted by the genocide referred to as 'survivors', those who were in the country during the genocide but were not targeted referred to as 'non-targeted', and those who were outside the country referred to as '1959 returnees'. All these groups experienced the traumatic events differently. The literature shows that traumatic stress exposure is associated with depression.

Objectives: To demonstrate differences in trauma exposure in a sample of mothers and daughters according to their genocide survival status. To examine differences in depression prevalence between these three groups of mothers and daughters as a function of their genocide survival status and place of residence. To examine the relationship between major depression, survival status, place of residence, and trauma exposure in sample of mothers and daughters, including the relationship between mothers' depression and daughters' depression.

Methods: A sample of 309 dyads of mothers and daughters was recruited. Data were collected using the Mini International Neuropsychiatric Interview, Life Events Questionnaire and the Social Demographics Questionnaire. Data were analysed using descriptive statistics, chi-square test, logistic regression, and one-way ANOVA.

Results: There is a significant difference in trauma exposure in three survival categories of mothers and daughters. A 23% of mothers and 18.4% of daughters met criteria for major depression, with urban participants twice as likely to meet criteria as participants from rural areas. Depression was associated with trauma exposure and place of residence in mothers' and daughters' samples. Maternal depression was associated with depression in daughters.

Conclusions: Family support counselling services and research to identify factors of intergenerational depression are needed.

Prevalencia y correlación de depresión en madres de las regiones rurales y urbanas de Ruanda y sus hijas, 26 años después del genocidio de 1994 contra los tutsi

Antecedentes: En los últimos 26 años, desde el genocidio contra los tutsi, la enfermedad mental continúa siendo uno de los grandes retos que enfrenta la población de Ruanda. En el contexto del genocidio de 1994 contra los tutsi, existen tres categorías de sobrevivencia diferentes entre las mujeres de Ruanda. Aquellas que fueron objetivo del genocidio se denominaron 'supervivientes'; las que estuvieron en el país durante el genocidio, pero no fueron objetivo de este, se les denominó como 'no objetivo'; y las que estuvieron fuera del país fueron denominados como los 'repatriados de 1959'. Todos estos grupos experimentaron los eventos traumáticos de manera diferente. La literatura muestra que la exposición al estrés traumático está asociada con la depresión.

Objetivos: Demostrar las diferencias en la exposición a trauma en una muestra de madres e hijas según su estado de supervivencia al genocidio. Examinar las diferencias en la prevalencia de la depresión entre estos tres grupos de madres e hijas en función de su estado de supervivencia al genocidio y el lugar de residencia. Examinar la relación entre la depresión mayor, el estado de supervivencia, el lugar de residencia, y la exposición al trauma en una muestra de madres e hijas, incluyendo la relación entre la depresión de las madres y la depresión de las hijas.

Métodos: Se reclutó una muestra de 309 díadas de madres e hijas. Los datos fueron recopilados utilizando los cuestionarios MINI Entrevista Neuropsiquiátrica Internacional, el Cuestionario de Sucesos Vitales y el Cuestionario Demográfico Social. Los datos fueron analizados utilizando la estadística descriptiva, la prueba de chi cuadrado, la prueba de regresión logística y la prueba de ANOVA unifactorial.

ARTICLE HISTORY

Received 28 April 2021
Revised 26 October 2021
Accepted 4 November 2021

KEYWORDS

Depression; trauma exposure; prevalence; mothers; daughters; survivors; nontargeted; 1959 returnees

PALABRAS CLAVES

Depresión; exposición al trauma; prevalencia; madres; hijas; supervivientes; población no objetivo; repatriados de 1959

关键词

抑郁; 创伤暴露; 流行率; 母亲; 女儿; 幸存者; 非目标; 1959年回归者

HIGHLIGHTS

- 23% of mothers and 18.4% of daughters met the criteria for depression.
- Depression is more prevalent in urban participants than rural.
- The development of depression is related to trauma exposure and place of residence.
- Mothers' depression is associated with daughters' depression.

Resultados: Hay una diferencia significativa en la exposición al trauma en las tres categorías de madres e hijas sobrevivientes. El 23% de las madres y el 18,4% de las hijas cumplieron los criterios de depresión mayor, teniendo las participantes de zonas urbanas el doble de probabilidades de cumplir con tales criterios en comparación con las participantes de las áreas rurales. La depresión estuvo asociada a la exposición al trauma y al lugar de residencia en las muestras de madres e hijas. La depresión materna se asoció a la depresión en las hijas.

Conclusiones: Se necesitan servicios de asesoramiento y apoyo familiar, así como investigación para identificar los factores relacionados a la depresión intergeneracional.

1994 年图西族种族灭绝 26 年后卢旺达农村和城市母女的抑郁流行率和相关性

背景: 在图西族种族灭绝过去 26 年中, 精神疾病仍然是卢旺达人口面临的巨大挑战。在 1994 年图西族种族灭绝事件中, 卢旺达妇女有三种不同的生存状况。屠杀目标被称为‘幸存者’, 在种族灭绝期间在国内但不是屠杀目标的被称为‘非目标’, 在国外的被称为‘1959 年回归者’。这些人群都以不同的方式经历了创伤性事件。文献表明, 创伤性应激暴露与抑郁有关。

目的: 根据母女的种族灭绝生存状况, 论证母女样本中创伤暴露的差异。考查这三组母女之间抑郁流行率的差异, 作为其种族灭绝生存状况和居住地的函数。研究母女样本中重性抑郁, 生存状况, 居住地和创伤暴露之间的关系, 包括母亲抑郁和女儿抑郁之间的关系。

方法: 招募了一个 309 对母女的样本。使用迷你国际神经精神病学访谈, 生活事件问卷和社会人口学调查问卷收集数据。使用描述性统计, 卡方检验, 逻辑回归和单向方差分析对数据进行分析。

结果: 母女三个生存类别的创伤暴露程度存在显著差异。23% 的母亲和 18.4% 的女儿符合重性抑郁标准, 城市参与者符合标准的可能性是农村参与者的两倍。抑郁与母女样本中的创伤暴露和居住地有关。母亲抑郁与女儿抑郁有关。

结论: 需要家庭支持咨询服务和研究以确定代际抑郁因素。

1. Background

From 1990 to April 1994, the civil war and the genocide against Tutsi took place in Rwanda. During that time, Rwandans were exposed to a variety of traumatic experiences, including scenes of unmitigated violence, masses of corpses, and the breakdown of any semblance of civility (Pham, Weinstein, & Longman, 2004). Genocide against the Tutsi, and violent retaliatory attacks until 1998 terrified the inhabitants of Rwanda (Rieder & Elbert, 2013). Studies found that more than 75% of the population has been exposed to traumatic events such as being forced to flee their homes, witnessing killings, having their lives threatened to death, experiencing the death of a close family member, witnessing rape or sexual mutilation of a close family members or friends, hiding among dead bodies, and having property destroyed or lost (Neugebauer et al., 2009; Pham et al., 2004). Women were reported to be the most vulnerable group in the violence that took place in Rwanda especially during the genocide against Tutsi. It is estimated that between 250,000 and 500,000 women were raped with extreme torture (Amnesty International, 2004). Studies have shown that major depression occurs within populations depending on the degree of exposure to traumatic events (Gros, Price, Magruder, & Frueh, 2012). This suggests that Rwandan women are a predisposed group to major depression, although specific prevalence studies are still limited.

The literature has shown that the prevalence of depressive symptoms is twice as high in women as in men (Choo, Diederich, Song, & Ho, 2014; Cyranowski,

Frank, Young, & Shear, 2000; Ford & Erlinger, 2004; van Montfoort & Glasser, 2020). The prevalence of depression is increasing, especially among women in rural areas compared to urban areas, who face circumstances and conditions that may negatively affect their health (Assari, 2017; De Oliveira, Cianelli, Gattamorta, Kowalski, & Peragallo, 2017). These circumstances include poor health, poverty, lack of social support, physical inactivity, and heavy alcohol consumption (Auchincloss & Hadden, 2002; Cao et al., 2015; Wen, Browning, & Cagney, 2003). Studies in Rwanda have shown that the aftermath of the genocide has increased risk factors for depression among Rwandan women, especially in rural areas. After the genocide, women became widows, headed households, and suffered the effects of economic deprivation, such as lack of food, housing, unemployment, and lack of money to educate their children (Rieder & Elbert, 2013).

The living conditions of women, especially those living in rural areas, remain critical (National Institute of Statistics of Rwanda [NISR], 2018). Poverty and destitution have been found to be three times more prevalent in rural areas than in urban areas (NISR, 2018; Nkundizana, 2011). According to the World Bank's collection of development indicators, 82.69% of Rwanda's total population lived in precarious rural conditions in 2019. Despite government efforts to increase the employment rate of women, research has shown that while more than half of Rwandan workers are women, men are more likely to be in wage employment. In fact, a large percentage of women work

without pay. Men are more likely than women to work in the formal and informal sectors, where earnings are relatively high (African Development Bank, 2014).

The literature shows that in a context where the majority of a family is affected by organized violence, children may additionally be exposed to an increase in physical and emotional violence within their families, which may expose them to depressive disorder (Catani, Jacob, Schauer, Kohila, & Neuner, 2008; Palosaari, Punamäki, Qouta, & Diab, 2013). Women are at higher risk for depression if they experienced childhood neglect, physical and emotional abuse (LeMasters et al., 2021). Consequently, children of depressed mothers not only have a higher risk of developing depression, but may also be exposed to increased and lasting stressful experiences (Hammen, Hazel, Brennan, & Najman, 2012; Weissman et al., 2006). A study of survivors and perpetrators of genocide in Rwanda found a high prevalence of child abuse and neglect due to parental mental impairment and poor parenting skills (Rieder & Elbert, 2013). Therefore, children from these families are at higher risk of depression, but studies on intergenerational depression are still limited.

Depression depends on the degree of trauma experienced (Gros et al., 2012). With regard to the genocide of the Tutsi in 1994 in Rwanda, there are differences within Rwandan women. There are those who were affected by the genocide referred to as 'survivors', those who were in the country during the genocide but were not targeted are referred to as 'non-targeted', and those who were outside the country are referred to as '1959 returnees'. According to their historical background, all these categories have experienced trauma exposure and other depression risk factors differently. The daughters of these mothers are likely to have different trauma exposure and may suffer from depressive symptoms differently. In addition, recent study of mental disorders in Rwanda showed that the prevalence of major depression was high among genocide survivors (35%) than the general population (12%) (Rwanda Biomedical Centre, 2018). These results show that depression prevalence in Rwanda can be hypothesized to be associated with survival category (Rwanda Biomedical Centre, 2018).

To our knowledge, however, little is known about the association between depression and trauma exposure in groups of mothers and their daughters based on their survival category. There is limited evidence of differences in the prevalence of depression in rural and urban areas and within specific age groups and populations, such as mothers and their daughters based on their survival category. Moreover, the relationship between mothers' depression and daughters' depression remains to be investigated.

The aims of this study were to demonstrate differences in trauma exposure in a sample of mothers and daughters according to their genocide survival status

(genocide survivor, non-targeted and 1959 returnee groups). To examine differences in depression prevalence between these three groups of mothers and daughters as a function of their genocide survival status and place of residence (rural vs urban). To examine the relationship between major depression survival status, place of residence, and trauma exposure in sample of mothers and their daughters, including the relationship between mothers' depression on their daughters' depression.

From these aims, we formulated the following hypothesis:

- (1) Genocide survivor mothers had significantly higher trauma exposure than non-targeted mothers and 1959 returnees. Similarly, daughters of genocide survivors had significantly higher trauma exposure than daughters of non-targeted and 1959 returnees.
- (2) Depression is significantly more prevalent among genocide survivor mothers and their daughters than 1959 returnees and non-targeted mothers and their daughters. Moreover, in both samples of mothers and daughters, depression is more prevalent among rural than urban residents.
- (3) The likelihood of developing depression was associated with trauma exposure, survival status, and place of residence (rural vs. urban) in both samples of mothers and their daughters.
- (4) Mothers' depression is significantly associated with daughters' depression.

We hope that this study will contribute to research on mental illness in post-genocide Rwanda that aims to uncover the lingering effects of community-based trauma decades later and initiate mechanisms to break the cycle.

2. Methods

2.1. Participants recruitment

Participants were selected according to their genocide survival category. 309 Dyads of mothers and their daughters from genocide survivors, non-targeted and 1959 returnees were selected in rural provinces and in the city of Kigali. Data were collected by a team of 6 local clinical psychologists with clinical backgrounds and experience in data collection. Prior to data collection, they received 2 days of training that enabled them to make a clinical diagnosis of depression using MINI and ethical considerations in data collection.

To reach participants, data collectors were assisted by local authorities who referred them to households with participants who met the study criteria. Participants were approached and the interview was conducted with those who agreed to participate. The interview was conducted

in Kinyarwanda, the local language, in a secure room prepared for a face-to-face clinical interview. The interview was conducted in the participant's home or in a nearby office of the local leader. Interview duration ranged from 15–20 min. The sample consisted of 309 dyads of mothers and their adult daughters, including 103 dyads of genocide survivors, 111 of non-targeted, and 95 dyads of 1959 returnees.

Mothers participants had to be Rwandan citizens and permanent residents of the country, a mother with an adult daughter who was able to complete a clinical interview. The daughter met the study criteria if she lived with her mother on a full-time basis or lived until she married.

Participants with communication difficulties, or who had experienced a mental health crisis at the time of the study, or who had recently experienced a traumatic event, or who refused voluntary participation were excluded.

2.2. Measures

2.2.1. The Mini International Neuropsychiatric Interview (MINI) questionnaire

The instrument was developed by psychiatrists and clinicians in the United States and Europe.

It is a brief, structured diagnostic interview for the major psychiatric disorders in DSM-III-R, DSM-IV, and DSM-5 and ICD-10. Its validity and reliability have been investigated in several different studies and is currently translated into more than 70 languages (Sheehan et al., 1998). MINI covers the 17 most common mental disorders, including major depression. To keep the interview short, it is structured and the participant only has to answer 'yes' or 'no' to a posed statement. The MINI is divided into modules labelled with letters corresponding to diagnostic categories. Major Depression is the first category and is designated by the letter 'A' and is the only category used in this study.

In each category there is a subcategory (e.g. A1, A2, A3) and each subcategory has the number of statements a participant must answer. The depression category has 6 subcategories. All questions must be graded. Grading is done to the right of each question by circling yes or no. At the end of the interview, the clinician rates the overall rating criteria for each category and circles 'yes' for results that meet the criteria for the presence of the disorder being rated or 'no' if the criteria are not met (Sheehan et al., 1998).

2.2.2. The Life Events Checklist (LEC-5)

The Life Events Checklist (LEC-5) was used to explore traumatic events experienced by the participants. LEC-5 is a self-report measure designed to screen for potentially traumatic events in a respondent's lifetime. The LEC-5 assesses exposure to 16 events known to

potentially result in PTSD or distress and includes one additional item assessing any other extraordinarily stressful event not captured in the first 16 items. LEC rate the severity of trauma exposure based on how a person was exposed. (5) happened to me, (4) I witnessed, (3) I learned about it, (2) is part of my job, (1) not sure, (0) does not apply (Weathers et al., 2013).

2.2.3. Socio-demographic questionnaire

We developed a short demographic questionnaire that included the following variables: Age, gender, education, marital status, employment category, religion, survival status, and place of residence. These data were provided by the participants prior to the interview.

2.3. Translation procedure

All the instruments have been translated backwards and forwards to give equivalent Kinyarwanda versions of the original English version. The first author CM, whose native language is Kinyarwanda, who speaks English and is familiar with English psychology terms, translated the instruments from English to Kinyarwanda, emphasizing conceptual rather than literal translation. A bilingual (Kinyarwanda-English) expert panel that included the original translator (CM), a psychologist, and an expert with experience in instrument development and translation identified and resolved the inappropriate expressions/concepts in the translation. The full Kinyarwanda version of the questionnaires was then translated back into English by an independent translator whose first language is English and who has no knowledge of the questionnaires. Discrepancies were discussed by the bilingual expert panel to obtain the final Kinyarwanda version.

2.4. Ethical considerations

Ethical approval No. 72/CHMS/ IRB/2020 was obtained from the University of Rwanda' Institutional Review Board, College of Medicine and Health Sciences Written. Informed consent was obtained from the respondents before the interview.

2.5. Data analysis

Before the analysis was performed, relevant assumptions of the statistical analysis were checked. First, it was verified that there were no missing values or outliers. The exploratory data showed that there were no missing values or outliers. Examination of the independence of the independent variables revealed that there was no multicollinearity and all independent variables were not highly correlated (Tables 6 and 7).

Table 1. Demographics data of participants.

Characteristics		Mothers demographics data		Daughters demographics data	
		Frequency	Percentage	Frequency	Percentage
Age group	19–40	7	2.3	269	87.1
	41–65	193	62.4	40	12.9
	66+	109	35.3	-	-
	Minimum	37		Minimum	17
	Maximum	95		Maximum	61
	Mean	61.3		33	
Sex	Female	309	100	309	100
Marital status	Single	8	2.6	71	23
	Married	186	60.2	207	67
	Separated	8	2.6	22	7.1
	Widow	107	34.6	9	2.9
Occupation	Employed	36	11.7	107	34.6
	Self-employed	117	37.9	101	32.7
	Unemployed	156	50.4	101	32.7
Education	No formal studies	96	31.1	30	9.7
	Primary	126	40.8	84	27.2
	Secondary	78	25.2	102	33
	University	9	2.9	93	30.1
Religion	Christian	298	96.4	297	96.1
	Muslims	6	1.9	7	2.3
	No religion	4	1.3	5	1.6
	Other	1	.3	-	-

Age group according to Erikson development stage (Orenstein & Lewis, 2020).

Table 2. Comparisons of traumatic exposure between genocide survivors, non-targeted and 1959 returnees.

Types of participants	Groups	<i>n</i>	Mean	<i>SD</i>	Tukey's HSD comparisons		
					Survivors	Non-targeted	1959 returnees
Mothers	Survivors	103	34.80	14.49			
	Non-targeted	111	26.64	13.18	<.001		
	1959 returnees	95	31.33	13.98	.635	.002	
Daughters	Survivors	103	28.10	14.25			
	Non-targeted	111	23.72	12.46	<.05		
	1959 returnees	95	29.40	12.46	.763	.006	
Mothers & daughters	Survivors	206	31.45	14.72			
	Non-targeted	222	25.18	12.86	<.001		
	1959 returnees	190	31.22	13.79	.985	<.001	

The mean is significant at $p < .05$.

To obtain the socio-demographic characteristics of the participants, a descriptive statistical analysis was performed (Table 1). To test the difference in trauma exposure between the three survival categories of mothers and daughters, the one-way test ANOVA was used. Since the results indicated significant differences, a Tukey HSD post-hoc test was conducted to find these specific differences (Table 2).

A chi-square test was performed to examine prevalence differences of depression in the sample of mothers and daughters by survival category and place of residence (Table 3).

To test correlates of major depression, a four-level hierarchical logistic regression was performed for the sample of mothers and a six-level logistic regression for the sample of daughters. Depression score of the mothers and daughters, were the dependent variables. The common independent variables in both samples were survival status, residence, and trauma exposure, while mothers' depression and trauma exposure in the daughters' sample were additional independent variables. Each independent variable was entered into the model individually. Age, education level, marital

status and occupation were entered together as covariates at the last level (Tables 4 and 5).

3. Results

3.1. Demographics data of the participants

The sample consisted of 309 dyads of mothers and their adult daughters, including 103 dyads of Tutsi genocide survivors, 111 dyads of non-targeted mothers, and 95 dyads of 1959 returnees.

The mean age of mothers was 61.38 years ($M = 61.38$, $SD = 9.83$), and that of daughters was 33 years ($M = 33$, $SD = 7.9$). The majority of the mothers (60.2%) were married at the time of the interview, while 34.6% were widowed.

The majority of daughters 67% ($n = 207$) were married, while only 2.9% ($n = 9$) were widows. Of the 309 mothers, 11.7% ($n = 36$) were employed, 37.9% ($n = 117$) were self-employed, and 50.4% ($n = 156$) were unemployed. Of the 309 daughters, 34.6% ($n = 107$) were employed, 32.7% ($n = 101$) reported being self-employed, and 32.7% ($n = 101$)

Table 3. Depression prevalence difference among mother and daughters according to survivor status and residence.

	Survival status										Residence				
	Genocide survivor		Non-targeted		1959 Returnees		Total		Rural		Urban		Total	P value	
	N	%	N	%	N	%	N	%	N	%	N	%			
Prevalence differences among daughters	74	71.8	96	87	82	86	252	82	184	85	68	73	252	82	<.001
With depression	29	28.2	15	14	13	14	57	18	32	15	25	27	57	18	<.001
Total	103	100	111	100	95	100	309	100	216	100	93	100	309	100	
Prevalence differences among mothers	69	67	97	87	72	76	238	77	197	82	41	59	238	77	<.001
With depression	34	33	14	13	23	24	71	23	43	18	28	41	71	23	<.001
Total	103	100	111	100	95	100	309	100	240	100	69	100	309	100	<.001
Mothers and daughter's general prevalence	143	29.2	193	39	154	32	490	79	381	78	109	22	490	100	<.001
With depression	63	49.2	29	23	36	28	128	21	75	59	53	34	128	100	<.001
Total	206	33.3	222	36	190	31	618	100	456	74	162	26	618	100	<.001

were unemployed. Of the 309 mothers, 31.1% ($n = 96$) had not attended any formal education, 40.8% ($n = 126$) reported having completed primary school, 25.2% ($n = 78$) had attended secondary school, and only 2.9% ($n = 9$) had completed university. Of the 309 daughters, 27.2% ($n = 84$) had completed primary school, 30% ($n = 93$) had completed secondary school, and 33% ($n = 102$) had completed university. Most of the participants belonged to a Christian religion (see Table 1). The total number of urban participants was 162, those who lived in rural areas 456.

3.2. Traumatic exposure differences in mothers and daughters

Table 2 shows the results of the comparison of trauma exposure by survival status (genocide survivors, non-targeted and 1959 returnees). For the sample of mothers, there was a significant difference $p < .001$ for the three groups [$F(2, 306) = 10.76, p < .001$].

Post-hoc comparisons using the Tukey HSD test revealed that the mean score of genocide survivors ($M = 34.80, SD = 14.49$) was significantly different from that of non-targeted ($M = 26.64, SD = 13.18$) and not significantly different from that of 1959 returnees ($M = 33.04, SD = 12.01$). The mean of the 1959 returnees was significantly different from the mean of the non-targeted group. For the sample of daughters, there was a significant difference $p < .001$ in three groups [$F(2, 306) = 5.45, p < .05$]. Post hoc comparisons using the Tukey HSD test revealed that the mean score of genocide survivors ($M = 28.11, SD = 14.25$) was significantly different from that of non-targeted ($M = 23.72, SD = 12.42$) and not significantly different from that of 1959 returnees ($M = 29.40, SD = 12.46$). Taken together, these results suggest that in both samples, genocide survivors and 1959 returnees were more exposed to trauma than the non-targeted group.

3.3. Prevalence of depression according to survival status and residence among mothers and daughters

In the sample of mothers, the prevalence of depression was 33% in the genocide survivor group, 12.6% in the non-targeted and 24.2% in the 1959 returnees.

The association between these variables was significant, $X^2(2, N = 309) = 12.67, p < .05$. The prevalence of depression was 17.9% among rural participants and 40.6% among urban participants. The association between these variables was significant, $X^2(1, N = 309) = 15.55, p < .001$.

Among the sample of daughters, the prevalence of depression was 28.2% in the genocide survivor group, 13.5% in the non-targeted group, and 13.7% in the 1959 returnees. The association between these variables was significant, $X^2(2, N = 309) = 9.62, p < .05$.

Table 4. Correlates of depression in a sample of mothers.

Variables	OR	95% C.I.	R ²
Step 1			
Survivor category			0.06
Genocide survivors	1	-	
Non-targeted	0.49	[0.22, 1.09]	
1959 returnees	0.64	[0.31, 1.31]	
Step 2			
Residence			0.11
Rural**	1	-	
Urban	3.16**	[1.51, 6.61]	
Step 3			
Traumatic exposure			0.28
Very high exposure**	1	-	
High exposure	0.34**	[0.16, 0.73]	
Moderate exposure	0.22**	[1.51, 6.61]	
Low exposure	0.05**	[0.01, 0.21]	
Step 4			
Age category			0.33
Age group of 41–65	1	-	
Age group of 66+	1.21	[0.59, 2.47]	
Age group of 19–40	0.99	[0.02, 0.24]	
Education level			
Primary	1	-	
Secondary	0.60	[0.24, 1.48]	
No study	0.51	[0.23, 1.10]	
University	0.98	[0.07, 12.46]	
Occupation status			
Employed	1	-	
Self employed	0.82	[0.22, 3.09]	
Unemployed	0.75	[0.18, 3.01]	
Marital status			
Married	1	-	
Single	1.97	[0.18, 21.27]	
Separated	3.14	[0.15, 65.50]	
Widow	3.06	[0.27, 33.34]	

** *p* value ≤ .001, * *p* value ≤ .005. Very high exposure: ≥ 41 Trauma events, High exposure: 31–40, Trauma events, Moderate: 20–30 trauma events, Low exposure: 0–19 trauma events. Age group according to Erikson development stage (Orenstein & Lewis, 2020).

The prevalence of depression was 14.8% in the rural participant group and 26.9% in the urban participant group. The association between these variables was

Table 5. Correlates of major depression in a sample of daughters.

Variables	OR	95% C.I.	R ²
Step 1			
Survivor status			0.04
Genocide survivors	1	-	
Non-targeted	0.82	[0.33, 2.03]	
1959 returnees	0.325	[0.12, 0.84]	
Step 2			
Residence			0.07
Rural*	1	-	
Urban	2.29*	[1.01, 5.26]	
Step 3			
Trauma exposure			0.19
Very high exposure**	1	-	
High trauma exposure	0.54	[0.21, 1.37]	
Moderate trauma exposure	0.38	[0.13, 1.03]	
Low trauma exposure	0.15**	[0.42, 0.57]	
Step 4			
Mothers' depression			0.38
No depression**	1	-	
With depression	8.74**	[4.02, 18.7]	
Step 5			
Age category			0.43
Age 19–40*	1	-	
Age 41–65	3.04*	[1.08, 8.55]	
Education category			
Primary	1	-	
Secondary	1.13	[0.45, 3.82]	
No study	0.56	[0.10, 2.97]	
University	1.06	[0.29, 3.81]	
Occupational category			
Employed	1	-	
Self employed	1.27	[0.46, 3.48]	
Unemployed	0.48	[0.14, 1.64]	
Marital status category			
Married	1	-	
Single	1.43	[0.39, 5.29]	
Separated	4.07	[0.80, 20.63]	
Widow	3.48	[0.37, 32.71]	

** *p* value ≤ .001, * *p* value ≤ .005. Very high exposure: ≥ 36 Trauma events, High exposure: 26–35 Trauma events, Moderate: 16–25 trauma events, Low exposure: 0–15 trauma events. Age group according to Erikson development stage (Orenstein & Lewis, 2020).

significant, $X^2(1, N = 309) = 6.29, p < .001$. Overall, the general prevalence of depression is 20.7%. Among

Table 6. Spearman correlations between correlates' variables in mothers' sample.

	Age	Education	Marital status	Residence	Survival status	Occupation	Trauma exposure
Education	.149**	-					
Marital status	.369**	-0.076	-				
Residence	0.110	0.045	.112*	-			
Survivor status	0.050	0.047	-0.039	-0.045	-		
Occupation	0.097	-0.068	.150**	-0.031	0.009	-	
Traumatic exposure	-0.055	-.161**	.151**	-0.091	-0.043	.265**	-
Depression	0.058	-.164**	.156**	-.224**	-0.090	0.091	.387**

** *p* < .001, * *p* < .05.

Table 7. Spearman correlations between correlates' variables in daughters' sample.

	Age	Education	Marital status	Location daughters	Residence	Occupation	Traumatic exposure	Depression daughter	Depression mother
Education	0.080	-							
Marital status	.375**	.179**	-						
residence	-0.056	-.374**	-0.107	-					
Survivor status	0.104	0.055	0.047	-0.024	-				
Occupation	-.254**	-.540**	-.266**	.346**	-0.093	-			
Trauma exposure	.170**	-.137*	-0.032	.138*	0.028	.156**	-		
Depression daughter	.154**	-0.011	.186**	-.143*	-.160**	-0.089	.252**	-	
Depression mother	.188**	0.071	.160**	-.178**	-0.106	-.136*	.232**	.494**	-

** *p* < .001, * *p* < .05.

depressed mothers and daughters, 49.2% are genocide survivors, 22.7% are non-targeted and 28.1% are 1959 returnees. The overall prevalence of depression by place of residence is shown in Table.

3.3.1. Correlates of depression among mothers and daughters

Table 4 shows that in the sample of mothers the likelihood of developing depression was associated with trauma exposure and place of residence. Urban participants were three times more likely to be depressed than rural. The logistic regression model was statistically significant, $\chi^2(9, N = 309) = 9, p < .001$. The model explained 20%-31% (Cox and Snell R^2 , Nagelkerke R^2) of the major depression and correctly classified 80.3% of cases. The model has a good fit as Hosmer and Lemeshow test was insignificant $p = .339$.

shows that in a sample of daughters the likelihood of developing major depression was associated with trauma exposure, having a depressed mother and place of residence. Urban residents were two times more likely to develop major depression than rural. The model explained 26%-43% (Cox and Snell R^2 , Nagelkerke R^2) of the major depression and correctly classified 86.4% of cases. The model has a good fit as Hosmer and Lemeshow test was insignificant $p = .294$.

4. Discussion

The aim of this study was to demonstrate differences in trauma exposure, depression prevalence, the relationship between major depression, survival status, traumatic exposure and place of residence, and the relationship between mothers' depression and their daughters' depression in a sample of Rwandan mothers and their daughters according to genocide survival status (genocide survivors, non-targeted and 1959 returnees).

The first hypothesis was that genocide survivor mothers had significantly higher trauma exposure than non-targeted mothers and 1959 returnees. Similarly, daughters of genocide survivors had significantly higher trauma exposure than daughters of non-targeted and 1959 returnees. To test this hypothesis, a one-way analysis ANOVA was performed with subsequent post hoc comparisons using Tukey HSD.

The results showed that in both samples, the mothers and daughters who survived the genocide were exposed to significantly more traumatic events than the non-targeted. However, no significant difference was found between the genocide survivors and 1959 returnees as suspected. These findings are consistent with previous research showing that more than 75% of the Rwandan population was exposed to traumatic events such as being forced to flee their homes, witnessing killings, being threatened with death, witnessing the death of a close family member, witnessing rape or sexual mutilation of a close family member or friend, hiding among dead bodies, and having property destroyed

or lost (Neugebauer et al., 2009; Pham et al., 2004). The notable addition to the previous results is the differences in trauma exposure between these three groups and between generations. These differences in trauma exposure explain the difference in the intensity of mental disorders related to trauma exposure in these three groups (Mutuyimana et al., 2019).

Moreover, these results show that 1959 returnees, although not in the country during the genocide, were as exposed to traumatic events as the genocide survivors in the sample of mothers and daughters. There is much research on mental disorders among genocide survivors due to their exposure to traumatic events (Musabaganwa et al., 2020), but these findings have created a need for the same research in 1959 returnees.

The second hypothesis was that depression is significantly more prevalent among genocide survivor mothers and their daughters than 1959 returnees and non-targeted mothers and their daughters. It stated also that in both samples of mothers and daughters, depression is more prevalent among rural than urban residents. To test the hypothesis, a chi-square test for independence was performed. The results show that depression is prevalent in all three groups of mothers and daughters.

However, in both samples of mothers and daughters, the high prevalence is found among the participants who survived the genocide. 1959 returnees were the second group in which depression was more prevalent, while the last group was non-targeted in both samples. Contrary to our hypothesis, depression was more prevalent among urban than rural participants in both samples.

These findings are consistent with previous studies showing the highest prevalence among Rwandan genocide survivors (Munyandamutsa, Mahoro Nkubamugisha, Gex-Fabry, & Eytan, 2012; Mutuyimana et al., 2019; Rwanda Biomedical Centre, 2018), but additionally show depression prevalence rates in other remaining groups and in different generations of women.

Prevalence rates by participant residence were also highlighted, showing a higher burden of depression in urban areas than in rural areas.

The third hypothesis stated that the likelihood of developing depression was associated with trauma exposure, survival status, and place of residence (rural vs. urban) in both samples of mothers and their daughters. The fourth hypothesis stated that mothers' depression was significantly associated with daughters' depression. Hierarchical logistic regressions were performed to test the hypothesis. Results showed that in a sample of mothers, the likelihood of developing depression was associated with trauma exposure and place of residence. Urban residents were twice as likely to develop depression than rural residents. In the sample of daughters, the likelihood of

developing depression was associated with trauma exposure, place of residence, and depression in their mothers. Urban participants were three times more likely to develop depression than rural participants.

Contrary to our hypothesis, no association was found between survival status and the likelihood of developing depression in both the mothers' and daughters' samples.

A large number of studies have linked various forms of trauma, such as experiences of violence and experiences of natural and man-made disasters, to a variety of psychopathologies, including depression in adults and adolescents (Suliman et al., 2009; Teicher & Samson, 2013). Trauma impairs neural structure and function, making a person vulnerable to later cognitive deficits and psychiatric disorders, including major depression and bipolar disorder (Mills, Teesson, Ross, & Peters, 2006; Schneider, Baumrind, & Kimerling, 2007). The results of this study are consistent with previous studies that have shown an association between trauma experiences and depression. Additionally, noteworthy, it is the first study to show this evidence of long-term consequence of trauma exposure in the Rwandan women's community. These findings are also consistent with studies showing that survivors of collective man-made traumatic events continue to exhibit long-term trauma sequelae that extend beyond PTSD symptoms and require community interventions (Maercker & Horn, 2013; Somasundaram, 2007).

Many epidemiological studies comparing depression in participants from rural vs. urban areas show that the prevalence of depression is significantly higher in residents of rural areas compared to urban areas (Juliana et al., 2021; Probst et al., 2006; Sundquist, Frank, & Sundquist, 2004; van Montfoort & Glasser, 2020). The results of this study, which went beyond epidemiological observation, showed that despite the difficult living conditions in rural areas of Rwanda (NISR, 2018), but the likelihood of developing depression is associated with urban residence than rural among mothers of different generations.

Previous research shows that maternal depressive symptoms can be devastating and have a profound impact on the care the baby receives and the relationships the baby forms (Sawyer, Zunszain, Dazzan, & Pariante, 2019). For this reason, offspring of depressed parents are more likely to develop a depressive disorder than children of non-depressed parents (Landstedt & Almquist, 2019; Weissman et al., 2006). In this study, the results show that the likelihood of developing depression in daughters is associated with maternal depression. This is a call for further research examining intergenerational depression factors in offspring of Rwandans.

Nevertheless, this study has a number of limitations that should be considered in future studies. This is

a comparative cross-sectional study and it was not possible to find causal relationships in the analysis. Although a large sample was used in the study, the sampling procedures were non-probability sampling, which may lead to subject bias. We therefore recommend that probability samples be used for future studies. The study examined only the mother-daughter dyad, rather than also assessing the impact of mental health on the father-daughter or father-son dyad. The likelihood of developing depression was examined globally, but it will be further interesting to examine between groups.

5. Conclusion and implications

The results of the current study suggest that genocide survivors and 1959 returnee mothers and their daughters were more exposed to trauma than the non-targeted group. The highest prevalence rate of depression was found among genocide survivor mothers and their daughters than in other groups, but regression analysis confirmed that the likelihood of developing depression symptoms was not related to the survival status but to traumatic experience and place of residence. Although it was expected that more participants from rural areas would be depressed than participants from urban areas due to living conditions, the results show that participants living in urban areas are more likely to have major depression than participants living in rural areas. In addition, the results of this study show that maternal depression was associated with depression in daughters.

Overall, this study suggests a number of implications to consider. First, this study shows that depression is common among women in general, but the determinants of depression among Rwandan women, especially urban women, remain to be explored. This study shows a relationship between mothers' depression and daughters' depression.

Therefore, further research efforts are needed to describe the psychosocial and biological predictors that may contribute to intergenerational depression. This study showed that Rwandan women were exposed to trauma to varying degrees depending on their survival status, but each survival category had high levels of trauma exposure as well as a high prevalence of depression. Many studies of the post-genocide period have focused only on the sample of genocide survivors, but this finding indicates that further studies are needed to examine the effects of trauma in samples other than genocide survivors.

Second, given the extent of depression in two generations, there is a need to create a practical and appropriate community-based mechanism to support depressed patients and treat long-term trauma sequelae in addition to PTSD. Finally, this study is an alarm signal for clinicians and policy makers to improve the mechanisms of

prevention and treatment of depression, especially in women, to interrupt the transmission of the disease.

Acknowledgments

The authors would like to thank the participants of this study and the data collectors including Jonas Bikorimana, Christelle Ishimwe, Munganyinka Claudine, Etienne Kayumba, Albert Nahishakiye and Emile Bambara. Thanks to Remy Twagirimana for his contribution in managing the online software system.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Data availability

The data that support the findings of this study are available to the following reference: <https://doi.org/10.5281/zenodo.4723384>.

Ethics approval and consent to participate

The study was approved by the College of Medicine of the University of Rwanda and Health Sciences Ethics Committee. Participants signed an informed consent form before being interviewed.

Funding

This research is not funded. The funds used for this research came from the authors' budget.

ORCID

Celestin Mutuyimana  <http://orcid.org/0000-0002-6595-2796>

References

- African Development Bank. (2014). *Analysis of gender and youth employment in Rwanda*. Retrieved from <https://www.afdb.org/en/documents/document/analysis-of-gender-and-youth-employment-in-rwanda-47634>
- Amnesty International. (2004). *Rwanda: "Marked for death"*. Rape survivors living with HIV/AIDS. [Online library]. Retrieved from <http://www.refworld.org/docid/4129fd524.html>
- Assari, S. (2017). Social determinants of depression: The intersections of race, gender, and socioeconomic status. *Brain Sciences*, 7(12), 156. doi:10.3390/brainsci7120156
- Auchincloss, A. H., & Hadden, W. (2002). The health effects of rural-urban residence and concentrated poverty. *The Journal of Rural Health: Official Journal of the American Rural Health Association and the National Rural Health Care Association*, 18(2), 319–336. doi:10.1111/j.1748-0361.2002.tb00894.x
- Cao, B., Jiang, H., Xiang, H., Lin, B., Qin, Q., Zhang, F., . . . Nie, S. (2015). Prevalence and influencing factors of depressive symptoms among women of reproductive age in the rural areas of Hubei, China. *Public Health*, 129(5), 465–474. doi:10.1016/j.puhe.2015.01.020
- Catani, C., Jacob, N., Schauer, E., Kohila, M., & Neuner, F. (2008). Family violence, war, and natural disasters: A study of the effect of extreme stress on children's mental health in Sri Lanka. *BMC Psychiatry*, 8, 33. doi:10.1186/1471-244X-8-33
- Choo, C., Diederich, J., Song, I., & Ho, R. (2014). Cluster analysis reveals risk factors for repeated suicide attempts in a multi-ethnic Asian population. *Asian Journal of Psychiatry*, 8, 38–42. doi:10.1016/j.ajp.2013.10.001
- Cyranowski, J. M., Frank, E., Young, E., & Shear, M. K. (2000). Adolescent onset of the gender difference in lifetime rates of major depression: A theoretical model. *Archives of General Psychiatry*, 57(1), 21–27. doi:10.1001/archpsyc.57.1.21
- De Oliveira, G., Cianelli, R., Gattamorta, K., Kowalski, N., & Peragallo, N. (2017). Social determinants of depression among Hispanic women. *Journal of the American Psychiatric Nurses Association*, 23(1), 28–36. doi:10.1177/1078390316669230
- Ford, D. E., & Erlinger, T. P. (2004). Depression and C-reactive protein in US adults: Data from the third national health and nutrition examination survey. *Archives of Internal Medicine*, 164(9), 1010–1014. doi:10.1001/archinte.164.9.1010
- Gros, D. F., Price, M., Magruder, K. M., & Frueh, B. C. (2012). Symptom overlap in posttraumatic stress disorder and major depression. *Psychiatry Research*, 196(2–3), 267–270. doi:10.1016/j.psychres.2011.10.022
- Hammen, C., Hazel, N. A., Brennan, P. A., & Najman, J. (2012). Intergenerational transmission and continuity of stress and depression: Depressed women and their offspring in 20 years of follow-up. *Psychological Medicine*, 42(5), 931–942. doi:10.1017/S0033291711001978
- Juliana, C. O., Peter, O. M., Chukwuedozie, K. A., Charles, T. O., Emeka, E. I., & Chijioke, K. A. (2021). Rural-urban appraisal of the prevalence and factors of depression status in South Africa. *Journal of Affective Disorders Reports*, (4). doi:10.1016/j.jadr.2021.100082
- Landstedt, E., & Almquist, Y. B. (2019). Intergenerational patterns of mental health problems: The role of childhood peer status position. *BMC Psychiatry*, 19(1), 286. doi:10.1186/s12888-019-2278-1
- LeMasters, K., Bates, L. M., Chung, E. O., Gallis, J. A., Hagaman, A., Scherer, E., . . . Maselko, J. (2021). Adverse childhood experiences and depression among women in rural Pakistan. *BMC Public Health*, 21(1), 400. doi:10.1186/s12889-021-10409-4
- Maercker, A., & Horn, A. B. (2013). A socio-interpersonal perspective on PTSD: The case for environments and interpersonal processes. *Clinical Psychology & Psychotherapy*, 20(6), 465–481. doi:10.1002/cpp.1805
- Mills, K. L., Teesson, M., Ross, J., & Peters, L. (2006). Trauma, PTSD, and substance use disorders: Findings from the Australian national survey of mental health and well being. *The American Journal of Psychiatry*, 163(4), 652–658. doi:10.1176/appi.ajp.163.4.652
- Munyandamutsa, N., Mahoro Nkubamugisha, P., Gex-Fabry, M., & Eytan, A. (2012). Mental and physical health in Rwanda 14 years after the genocide. *Social Psychiatry and Psychiatric Epidemiology*, 47(11), 1753–1761. doi:10.1007/s00127-0120494-9
- Musanabaganwa, C., Jansen, S., Fatumo, S., Rutembesa, E., Mutabaruka, J., Gishoma, D., . . . Mutesa, L. (2020). Burden of post-traumatic stress disorder in postgenocide Rwandan population following exposure to 1994 genocide against the Tutsi: A Meta-analysis. *Journal of Affective Disorders*, 275, 7–13. doi:10.1016/j.jad.2020.06.017

- Mutuyimana, C., Sezibera, V., Nsabimana, E., Mugabo, L., Cassady, C., Musanabaganwa, C., & Kayiteshonga, Y. (2019). PTSD prevalence among resident mothers and their offspring in Rwanda 25 years after the 1994 genocide against the Tutsi. *BMC Psychology*, 7(1), 84. doi:10.1186/s40359-019-0362-4
- National Institute of Statistics of Rwanda (NISR). (2018). *The Rwanda Multidimensional Poverty Index Report*. Retrieved from https://www.mppn.org/wpcontent/uploads/2018/12/EICV5_Thematic-Report_Multidimensional-PovertyIndex_MPI.pdf
- Neugebauer, R., Fisher, P. W., Turner, J. B., Yamabe, S., Sarsfield, J. A., & Stehling-Ariza, T. (2009). Post-traumatic stress reactions among Rwandan children and adolescents in the early aftermath of genocide. *International Journal of Epidemiology*, 38(4), 1033–1045. doi:10.1093/ije/dyn375
- Nkundizana, B. M. (2011). The female face of poverty in Rwanda. *Educational Research*, 2(12), 1708–1718. Retrieved from <http://www.interestjournals.org/ER>
- Orenstein, G. A., & Lewis, L. (2020). *Eriksons stages of psychosocial development*. StatPearls. StatPearls Publishing. Retrieved from <https://www.ncbi.nlm.nih.gov/books/NBK556096/>
- Palosaari, E., Punamäki, R. L., Qouta, S., & Diab, M. (2013). Intergenerational effects of war trauma among Palestinian families mediated via psychological maltreatment. *Child Abuse & Neglect*, 37(11), 955–968. doi:10.1016/j.chiabu.2013.04.006
- Pham, P. N., Weinstein, H. M., & Longman, T. (2004). Trauma and PTSD symptoms in Rwanda: Implications for attitudes toward justice and reconciliation. *JAMA*, 292(5), 602–612. doi:10.1001/jama.292.5.602
- Probst, J. C., Laditka, S. B., Moore, C. G., Harun, N., Powell, M. P., & Baxley, E. G. (2006). Rural urban differences in depression prevalence: Implications for family medicine. *Family Medicine*, 38(9), 653–660. doi:10.1001/jama.292.5.602
- Rieder, H., & Elbert, T. (2013). Rwanda - lasting imprints of a genocide: Trauma, mental health and psychosocial conditions in survivors, former prisoners and their children. *Conflict and Health*, 7(1), 6. doi:10.1186/1752-1505-7-6
- Rwanda Biomedical Centre. (2018). *Rwanda mental health survey* (unpublished report).
- Sawyer, K., Zunszain, P., Dazzan, P., & Pariante, C. (2019). Intergenerational transmission of depression: Clinical observations and molecular mechanisms. *Molecular Psychiatry*, 24(8), 1157–1177. doi:10.1038/s41380-018-0265-4
- Schneider, R., Baumrind, N., & Kimerling, R. (2007). Exposure to child abuse and risk for mental health problems in women. *Violence and Victims*, 22(5), 620–631. doi:10.1891/088667007782312140
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., ... Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *The Journal of Clinical Psychiatry*, 59(Suppl 20), 22–57. doi:10.1001/jama.292.5.602
- Somasundaram, D. (2007). Collective trauma in northern Sri Lanka: A qualitative psychosocial ecological study. *International Journal of Mental Health Systems*, 1(1), 5. doi:10.1186/1752-4458-1-5
- Suliman, S., Mkabile, S. G., Fincham, D. S., Ahmed, R., Stein, D. J., & Seedat, S. (2009). Cumulative effect of multiple trauma on symptoms of posttraumatic stress disorder, anxiety, and depression in adolescents. *Comprehensive Psychiatry*, 50, 121–127. doi:10.1016/j.comppsy.2008.06.006
- Sundquist, K., Frank, G., & Sundquist, J. (2004). Urbanisation and incidence of psychosis and depression: Follow-up study of 4.4 million women and men in Sweden. *British Journal of Psychiatry*, 184(4), 293–298. doi:10.1192/bjp.184.4.293
- Teicher, M. H., & Samson, J. A. (2013). Childhood maltreatment and psychopathology: A case for ecophenotypic variants as clinically and neurobiologically distinct subtypes. *The American Journal of Psychiatry*, 170, 1114–1133. doi:10.1176/appi.ajp.2013.12070957
- van Montfoort, A., & Glasser, M. (2020). Rural women's mental health: Status and need for services. *Journal of Depression and Anxiety*, 9, 361. doi:10.35248/2167-1044.20.9.361
- Weathers, F. W., Blake, D. D., Schnurr, P. P., Kaloupek, D. G., Marx, B. P., & Keane, T. M. (2013). *The Life Events Checklist for DSM-5 (LEC-5) – Standard*. [Measurement instrument]. Retrieved from https://www.ptsd.va.gov/professional/assessment/temeasures/life_events_checklist.ap
- Weissman, M. M., Wickramaratne, P., Nomura, Y., Warner, V., Pilowsky, D., & Verdelli, H. (2006). Offspring of depressed parents: 20 years later. *The American Journal of Psychiatry*, 163(6), 1001–1008. doi:10.1176/ajp.2006.163.6.1001
- Wen, M., Browning, C. R., & Cagney, K. A. (2003). Poverty, affluence, and income inequality: Neighborhood economic structure and its implications for health. *Social Science & Medicine* (1982), 57(5), 843–860. doi:10.1016/s0277-9536(02)00457-4