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Mental and physical health in Rwanda 14 years after the genocide

**Naasson Munyandamutsa · Paul Mahoro Nkubamugisha ·
Marianne Gex-Fabry · Ariel Eytan**

Abstract

Purpose To examine the socio-demographic determinants of post-traumatic stress disorder (PTSD) and its association with major depressive episode and self-perceived physical and mental health in a large random sample of the Rwandan population 14 years after the 1994 genocide.

Methods Using the Mini International Neuropsychiatric Interview and Medical Outcomes Study 36-Item Short-Form (SF-36) translated in Kinyarwanda, we interviewed 1,000 adult residents from the five provinces of Rwanda. Socio-demographic data and specific somatic symptoms were also recorded. Data analysis included 962 questionnaires.

Results Participants were predominantly female (58.9%), aged between 16 and 34 years (53.2%), with a low level of education (79.7% below secondary school). Prevalence of PTSD was estimated to be 26.1%. In multivariable analysis, factors associated with PTSD were being aged between 25 and 34 years, living in extreme poverty, having endured the murder of a close relative in 1994, being widowed or remarried, having lost both parents and living in the South Province. Participants who fulfilled diagnostic criteria for PTSD were significantly more often affected with major depression (68.4 vs. 6.6%, $P < 0.001$) and substance dependence (7.6 vs. 3.5%, $P = 0.013$) than respondents without PTSD. They scored significantly lower on all SF-36 subscales. Somatic symptoms such as hiccups, fainting and loss of speech or hearing delineated a specific pattern of post-traumatic stress syndrome.

Conclusions PTSD remains a significant public health problem in Rwanda 14 years after the genocide. Facilitating access to appropriate care for all those who need it should be a national priority.

Keywords Post-traumatic stress disorder · PTSD · Rwanda · War · Trauma · Perceived health

Introduction

In the spring of 1994, Rwandans endured a cataclysmic civil war and genocide. In 100 days, almost one million people perished, one in seven of the country population. Murders and mutilations occurred mainly through machete attacks. Approximately two million fled to neighboring countries, mainly Congo and Burundi. The genocide followed years of ethnic tensions and conflict between the Tutsi minority and the Hutu majority communities. Beyond the immediate impact of these horrific events, most of the country's infrastructures and institutions were destroyed. In spite of the efforts by the government of Rwanda to promote reconciliation and alleviate trauma, testimonies and reports indicate that the magnitude of trauma is still important among the population more than a decade after the genocide [1]. Each year, on 7 April, Rwandans commemorate the tragedy. On this occasion, post-traumatic suffering becomes reactualized for many people, who express their pain and mourning through wailing, fainting or other forms of somatic manifestations [2].

Despite evidence of ongoing collective suffering, mental health consequences of trauma were seldom investigated

N. Munyandamutsa · P. Mahoro Nkubamugisha
Psychosocial Consultation Centre, Kigali, Rwanda

M. Gex-Fabry · A. Eytan (✉)
Department of Psychiatry, University Hospitals of Geneva,
2, Chemin du Petit-Bel-Air, 1225 Geneva, Switzerland
e-mail: Ariel.Eytan@hcuge.ch

systematically in Rwanda and few epidemiological studies have been published. The largest population survey was conducted in 2002 and involved 2,074 adult respondents in 4 communes [3]. Using a multistage, stratified cluster random sampling methodology and the post-traumatic stress disorder (PTSD) Checklist-Civilian Version, the authors observed a global PTSD prevalence of 24.8%. Post-traumatic symptoms were associated with traumatic exposure, proximity to conflict and some socio-demographic factors. Geographical differences were also observed. However, PTSD symptoms were the only health dimension measured, and no information was presented regarding somatic manifestations of distress. Prevalence of depression in Rwanda was investigated in a 1999 study [4], which considered a sample of 368 adults from 5 districts all situated in one rural commune, interviewed using the depression subscale of the Hopkins Symptom Checklist-25. A locally developed questionnaire was used to assess functional impairment. The global prevalence of depression was 15.5%, and depressive symptoms were strongly associated with functional impairment in most major roles for men and women. In a study conducted at the end of the 1990s in Rwandan and Burundese refugee camps, the prevalence of serious mental health problems was estimated to be 50% [5].

Some studies addressed the mental health of specific groups, such as children, orphans and widows. Between May and December 1995, ∼13 months after the genocide, 3,030 children aged between 8 and 19 years were interviewed in a two-stage process [6]. Results showed that a majority of Rwandan children had experienced a multitude of stressors. As expected, post-traumatic reactions were associated with loss, violence exposure and feeling that their life was in danger. In the same sample, the overall rate of "probable PTSD" was comprised between 54 and 62%, with a strong dose–response relationship with exposure. Indeed, for the most exposed individuals, the PTSD rate was 100% [7]. In September 2007, 400 widows and orphans of the genocide were interviewed using several questionnaires for assessing prolonged grief disorder (PGD) [8]. PGD, present in 8% of the interviewees, was predicted by the severity of PTSD symptoms, among other factors.

Using a qualitative methodology, Bolton [9] investigated the local, culturally specific categories of mental disorders related to the genocide. Interviewees divided symptoms into a "mental trauma" syndrome that included the PTSD symptoms and some depression and local symptoms, and a "grief syndrome" that included other depression and local symptoms. Local symptoms included depression-like features, such as "feeling like you have a cloud inside" and "burying one's cheek in his/her palm". Culturally specific forms of post-genocide resilience have

also been mentioned in a recent ethnographic study with survivors of genocide-rape in Rwanda. These specific forms of resilience were conceptualized as intra-psychic creative processes of drawing strength from within the self in order to withstand suffering [10].

The present study aims to report the 14-year post-genocide prevalence of PTSD and to explore its socio-demographic determinants in a large random sample of the Rwandan population. It also investigates comorbidity with major depressive episodes (MDEs) and substance-related disorders, as well as perceived physical and mental health.

Methods

Setting and survey design

Rwanda is a country of ∼11 million inhabitants for a total area of 26,338 km^2. The male/female sex ratio for adults aged between 15 and 64 years is 0.99. (https://www.cia.gov/library/publications/the-world-factbook/geos/rw.html). Since 2006, the country is divided into five administrative provinces: Northern, Eastern, Southern, Western and Kigali Province (location of the capital). Provinces are further divided into 30 districts and 416 sectors. The objective of the 2008 survey was to sample individuals aged 16 or more from all provinces. At that time, they represented 56.3% of the population.

Sample size estimation was performed prior to the study, based on the following assumptions: expected prevalence 50%, precision 4%, design effect 1.5, non-response rate 10% and 95% confidence level [11]. Calculated sample size of 990 was rounded up to 1,000 participants. In each of the five provinces, two districts were selected: one urban district (the administrative center of the province) and one rural district (simple random sampling), except for the exclusively urban Kigali province. In each of the ten districts, two sectors were selected (simple random sampling) from a list provided by the National Institute of Statistics of Rwanda (http://statistics.gov.rw/). The number of households per sector was determined as proportional to the population in each sector (26–71 households per sector). Households were then randomly selected using the spinning bottle sampling method [12]. Interviews were conducted with a single member of each household who was present at the time of the survey and fulfilled inclusion criteria: age ≥16 years, Rwandan nationality, fluent with the national language (Kinyarwanda), no mental impairment or other disorder that would prevent participation. Usually, several household members were eligible and the participant was randomly selected by drawing a number from a pool of cards.

The study was conducted over a 3-month period in 2008. Surveyors were recruited among psychologists, social workers and physicians with a special interest for mental health issues. All of them were specifically trained for the survey during a 2-day, 10-h workshop.

The project was supported by the Rwandan Ministry of Health and approved by the National Ethics Committee of the Republic of Rwanda. Participants received oral and written information and gave informed consent for participation. Data were gathered under the auspices of the national program for mental health. An anonymous database was transferred to the Department of Psychiatry of the Geneva University Hospitals, Switzerland, for statistical analysis.

Instruments

PTSD was assessed with the appropriate section of the Mini International Neuropsychiatric Interview (MINI), which considers symptoms during the last month. MDE in the past 2 weeks and alcohol and substance dependence over the last 12 months were assessed with the same instrument. The MINI is a standardized, structured diagnostic interview designed conjointly in the United States and Europe to assess psychiatric diagnoses, according to DSM-IV and ICD-10 criteria. It was tested against the Structured Clinical Interview for DSM-III-R diagnoses (SCID) and the Composite International Diagnostic Interview for ICD-10 (CIDI) and found to be reliable and valid [13]. It is short and can be administered by non-mental health professionals. The MINI is routinely used in a wide variety of cultures and settings. For research purposes, it was used in several African countries, such as Nigeria [14], Uganda [15] and Rwanda [16]. In a South African study, the MINI was chosen as the gold standard to validate a brief screening measure that could be given to HIV-infected individuals [17]. The PTSD section of the MINI starts with two screening questions investigating the exposure to one or more potentially traumatic events and re-experience of these events in a distressing way: "Have you ever experienced or witnessed or had to deal with an extremely traumatic event that included actual or threatened death or serious injury to you or someone else?" and "During the past month, have you re-experienced the event in a distressing way (i.e., dreams, intense recollections, flashbacks or physical reactions)?" In case it was difficult for the interviewee to understand the first question, a reworded version, validated in several languages including four African ones [18, 19], could be read to the participant: "*Have you ever experienced or had to face a horrible, shocking event during which you thought you were going to die? Have you ever seen something like this happen to someone else?* (followed by examples of traumatic events)". If answers are positive to the first two questions, the instrument explores three clusters of PTSD symptoms (avoidance, hyper-arousal, impaired functioning).

Self-perceived physical and mental health status was assessed using the Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36), which considers a 4-week time frame for most questions [20]. The SF-36 was translated into several languages and its cultural validity assessed in different countries, including Eastern countries such as Taiwan [21], mainland China [22] and Thailand [23], and European countries such as France [24] and Italy [25]. While the instrument is judged to be globally adequate, reliable and valid in these settings, it is considered that the most difficult items to translate are some examples of physical activities uncommon outside the US. It is, thus, recommended to find equivalents for such activities. For example, bowling, playing golf (for moderate physical activities) or climbing several flights of stairs (for more strenuous activities) may sound culturally awkward [26]. Rwanda is known as "the land of a thousand hills" referring to the country's physical geography, and half Rwanda's agricultural land slopes are at an angle of 25° from horizontal or more. Therefore, it became evident that, in the present study, problematic physical activities should be assessed using hill climbing equivalents (e.g., climbing a number of hills). SF-36 components were computed according to a three-step procedure [27]. Items were first recoded and aggregated into eight scales using a 0–100 scoring algorithm. Scales were then standardized on the basis of 1998 US population norms (z-transformation). The two summary scores (PCS, physical component summary score; MCS, mental component summary score) were calculated from these eight z-transformed scales, using factor score coefficients derived from the US sample. Finally, all scores were multiplied by 10 and added to 50 (norm-based scores), so that values 10 points below or above 50 represent differences of one standard deviation from the US average. The scoring algorithm was carefully checked against the online calculator freely available from the SF-36 developers (http://www.sf-36.org/nbscalc/index.shtml).

Both the MINI and SF-36 were locally translated into Kinyarwanda, the official language in Rwanda. A translation and back translation methodology was used [28]. Because of a high percentage of illiteracy, especially in rural areas, the questionnaires were always read aloud.

We also collected demographic information, including age, sex, education, occupation, marital status, province of residence, orphan status and possible loss of a close relative during the 1994 events. An ad hoc questionnaire was added, which comprised a list of somatic symptoms

postulated to be frequently associated with PTSD according to our local clinical experience (e.g., hiccups and fainting).

Statistics

PTSD prevalence was first compared between groups with the Fisher's exact test. Factors possibly associated with PTSD were then investigated with a multivariable logistic regression model that included the following independent variables: sex, age group (5 categories), education, occupation, marital status, orphan status, murder of a close relative in 1994 and geographical region. Adjusted odds ratios (OR) and 95% confidence intervals (95% CI) were estimated. Analysis of variance models adjusted for sex and age group (10-year intervals) were used to compare SF-36 dimensions between groups of respondents with and without PTSD. The Fisher's exact test was used to compare groups with respect to comorbid diagnoses and the presence of specific symptoms. Statistics were computed using SPSS version 17 (SPSS Inc., Chicago, IL, USA). All tests were two-tailed with significance level at 0.05.
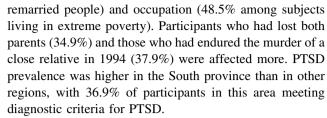
Results

Socio-demographic characteristics of survey participants

A sample of 962 subjects was analyzed and 38 questionnaires were excluded because of incomplete data. Socio-demographic characteristics are shown in Table 1. Respondents were predominantly female (58.9%) and younger than 35 years (53.2%), with a primary or lower educational level (79.7%) and a farm occupation (64.7%). Most participants were married (51.2%), while 21.0% were widowed or remarried. Only 25.1% of participants had both their parents alive, despite their relatively young age. Forty percent of participants had been exposed to the murder of a close relative in 1994 (brother or sister 26.8%; father 16.4%; mother 13.3%; child 6.2%; spouse 6.1%). The five provinces were evenly represented.

Post-traumatic stress disorder

The overall prevalence of PTSD, as diagnosed with the MINI, was 26.1%. It was 20.5 and 30.0% in male and female participants, respectively. As shown in Table 1, prevalence significantly differed according to age (higher among individuals aged 25 or more at the time of the survey), marital status (>40% among widowed and remarried people) and occupation (48.5% among subjects living in extreme poverty). Participants who had lost both parents (34.9%) and those who had endured the murder of a close relative in 1994 (37.9%) were affected more. PTSD prevalence was higher in the South province than in other regions, with 36.9% of participants in this area meeting diagnostic criteria for PTSD.

In multivariable analysis, factors significantly associated with PTSD were living in extreme poverty (OR = 2.26, 95% CI 1.02–5.03), being widowed (OR = 2.00, 95% CI 1.01–3.96) or remarried (OR = 2.26, 95% CI 1.10–4.66), having lost both parents (OR = 1.92, 95% CI 1.18–3.12), having endured the murder of a close relative in 1994 (OR = 1.92, 95% CI 1.35–2.73) and living in the South province (OR = 2.29, 95% CI 1.39–3.77). Subjects aged between 25 and 34 years at the time of the survey, i.e., 11–20 during the 1994 genocide, were affected more (OR = 2.06, 95% CI 1.18–3.60). The sex difference did not reach statistical significance after taking into account all other factors ($P = 0.084$). These results are shown in Table 1.

Psychiatric comorbidities

Overall prevalence rates were 22.7% for MDE, 7.6% for current alcohol dependence and 4.6% for other substance dependence. Of 44 participants with substance dependence, 35 were dependent on tobacco (79.5%), 3 were cannabis users and 6 cited other substances. Comorbid MDE and PTSD were observed in 17.8% of respondents.

Associations between PTSD and comorbid diagnoses are shown in Table 2. Compared with participants who did not fulfill the diagnostic criteria for PTSD, those who did were significantly more often affected with MDE (68.4 vs. 6.6%, $P < 0.001$) and substance dependence (7.6 vs. 3.5%, $P = 0.013$), while no significant difference was observed for alcohol dependence (9.6 vs. 6.9%, $P = 0.17$).

Perceived health and somatic symptoms

Self-perceived physical and mental health status according to the SF-36 are shown in Table 2. Respondents with PTSD had significantly lower scores on all dimensions of physical and mental health. Both the PCS (mean difference 4.5 points, $P < 0.001$) and the MCS (mean difference 9.6, $P < 0.001$) differed between subjects with and without PTSD after the adjustment for sex and age. Mean adjusted PCS (MCS) scores were 46.4 (44.4) in the absence of PTSD and EDM, 44.6 (37.5) in respondents with PTSD only, 41.2 (34.0) in the ones with EDM only, and 40.1 (32.4) when both PTSD and EDM were diagnosed. PTSD alone was associated with a significantly decreased MCS ($P < 0.001$), but no significant difference for PCS ($P =$

Table 1 Characteristics of respondents to the 2008 Rwanda survey and association with PTSD ($n = 962$)

Characteristics	Frequency	%	PTSD prevalence			Multivariable model[b]	
			Frequency	%	P[a]	OR	95% CI
Gender							
Male	395	41.1	81	20.5	0.001	1	
Female	567	58.9	170	30.0		1.37	0.96–1.96
Age							
16–24	194	20.2	27	13.9	<0.001	1	
25–34	317	33.0	92	29.0		2.06	1.18–3.60
35–44	173	18.0	48	27.7		1.33	0.69–2.59
45–54	153	15.9	50	32.7		1.46	0.73–2.89
≥55	125	13.0	34	27.2		0.82	0.38–1.81
Education							
None	177	18.4	46	26.0	0.38	1	
Primary school	590	61.3	165	28.0		1.45	0.94–2.25
Secondary school	153	15.9	31	20.3		1.04	0.56–1.93
Vocational school	26	2.7	6	23.1		0.80	0.27–2.32
University	16	1.7	3	18.8		1.16	0.28–4.85
Occupation							
Farmer	622	64.7	175	28.1	0.003	1	
Paid worker	97	10.1	18	18.6		0.85	0.45–1.61
Self-employed worker	88	9.1	20	22.7		1.32	0.71–2.46
Student	52	5.4	7	13.5		0.82	0.30–2.22
No occupation, dependent on family	70	7.3	15	21.4		0.91	0.47–1.75
No occupation, extreme poverty	33	3.4	16	48.5		2.26	1.02–5.03
Marital status							
Single	211	21.9	40	19.0	<0.001	1	
Married	493	51.2	107	21.7		0.92	0.55–1.55
Widowed	133	13.8	55	41.4		2.00	1.01–3.96
Remarried	69	7.2	29	42.0		2.26	1.10–4.66
Other	56	5.8	20	35.7		1.53	0.72–3.27
Orphan status ($n = 954$)							
Both parents alive	239	25.1	38	15.9	<0.001	1	
Lost one parent	323	33.9	76	23.5		1.19	0.74–1.92
Lost both parents	392	41.1	137	34.9		1.92	1.18–3.12
Murder of a close relative in 1994							
No	577	60.0	105	18.2	<0.001	1	
Yes	385	40.0	146	37.9		1.92	1.35–2.73
Regions							
Kigali	182	18.9	39	21.4	<0.001	1	
North	159	16.5	27	17.0		1.24	0.68–2.25
East	211	21.9	62	29.4		1.60	0.96–2.66
South	206	21.4	76	36.9		2.29	1.39–3.77
West	204	21.2	47	23.0		1.45	0.84–2.50

[a] Fisher's exact test for comparing prevalence across groups

[b] Multivariable logistic regression model ($n = 954$)

0.11). Comorbid EDM was associated with significantly decreased PCS ($P < 0.001$) and MCS ($P = 0.002$) in participants with PTSD.

As shown in Table 3, various somatic symptoms and complaints were significantly more frequent in the presence of PTSD. Most frequently endorsed symptoms were

Table 2 Associations between PTSD, comorbid psychiatric diagnoses (MINI) and subjective health scores (SF-36)

Comorbid diagnosis (MINI)	With PTSD		Without PTSD		OR	95% CI	P^b
	Frequency	%	Frequency	%			
MDE (n = 959)							
Present	171	68.4	47	6.6	30.5	20.5–45.4	<0.001
Absent	79	31.6	662	93.4			
Alcohol dependence (n = 962)							
Present	24	9.6	49	6.9	1.43	0.86–2.38	0.17
Absent	227	90.4	662	93.1			
Other substance dependence (n = 962)							
Present	19	7.6	25	3.5	2.25	1.22–4.16	0.013
Absent	232	92.4	686	96.5			

SF-36 dimensions (n = 912)[a]	With PTSD		Without PTSD		Mean difference	95% CI	P^c
	Mean	95% CI	Mean	95% CI			
Physical functioning	41.6	40.5–42.7	45.6	44.9–46.3	3.9	2.7–5.2	<0.001
Role physical	36.2	34.6–37.9	42.1	41.0–43.1	5.8	4.1–7.6	<0.001
Bodily pain	38.1	36.5–39.8	46.9	45.9–47.9	8.8	7.0–10.6	<0.001
General health	33.9	32.5–35.4	42.0	41.1–42.9	8.1	6.5–9.7	<0.001
Vitality	43.0	41.8–44.2	48.4	47.6–49.2	5.4	4.1–6.7	<0.001
Social functioning	43.0	41.8–44.3	49.1	48.3–49.9	6.1	4.7–7.5	<0.001
Role emotional	32.6	30.7–34.4	41.7	40.5–42.9	9.1	7.0–11.2	<0.001
Mental health	29.6	28.1–31.2	40.6	39.6–41.6	10.9	9.2–12.7	<0.001
Physical component summary (PCS)	41.5	40.4–42.7	46.0	45.3–46.7	4.5	3.2–5.8	<0.001
Mental component summary (MCS)	34.1	32.6–35.5	43.6	42.7–44.5	9.6	8.0–11.2	<0.001

[a] Norm-based scores using normative data from the 1998 US general population (mean = 50, SD = 10)

[b] Fisher's exact test

[c] Analysis of variance model adjusted for sex and age group (10-year intervals)

Table 3 Prevalence of specific somatic symptoms in respondents with and without PTSD

Symptoms	With PTSD (n = 251)		Without PTSD (n = 711)		P^a
	Frequency	%	Frequency	%	
Headache	182	72.5	357	50.2	<0.001
Back pain	186	74.1	374	52.6	<0.001
Abdominal pain[b]	111	44.2	259	36.5	0.035
Genital pain	76	30.3	126	17.7	<0.001
Sexual difficulties	61	24.3	88	12.4	<0.001
Fainting	23	9.2	10	1.4	<0.001
Hiccups	114	45.4	201	28.3	<0.001
Loss of speech	34	13.5	21	3.0	<0.001
Hearing loss	100	39.8	151	21.2	<0.001

[a] Fisher's exact test for comparing respondents with and without PTSD

[b] n = 1 missing value

back pain (74.1%), headache (72.5%), hiccups (45.4%), abdominal pain (44.2%) and hearing loss (39.8%).

Discussion

To our knowledge, the present large random survey is only the second epidemiological study conducted in Rwanda that addresses post-traumatic stress symptoms in adults. The first one was performed in 2002 and focused on attitudes toward justice and reconciliation [3]. Comorbidity and self-perceived mental and physical health had not yet been systematically investigated in the Rwandan population.

Our 2008 survey indicates that approximately one in five men (20.5%) and one in three women (30.0%) met

diagnostic criteria for PTSD 14 years after the genocide. These estimates are in close agreement with data from the 2002 survey by Pham et al. [3], who reported rates of 19.6% among men and 29.7% among women. However, these similar figures should be interpreted with caution. Simple persistence of PTSD over time is a possible explanation, but stable prevalence most probably results from variable temporal patterns of clinical courses, with fluctuating symptoms, delayed incidence and recovery in different subjects [29]. In low-income, post-conflict settings, PTSD is the most frequently reported mental disorder, affecting as much as 37% of populations exposed to armed conflicts [30]. A literature review and meta-analysis addressing the prevalence of PTSD and depression in the refugee and post-conflict mental health field included 161 articles, of which only a third addressed long-term outcome (6 years or more after the conflict). Among those, most were conducted in resettled or displaced populations rather than in post-war settings [31]. Studies that examined the very long-term outcome of collective war trauma (10–15 years or more) are even scarcer. They nevertheless consistently show that PTSD may be long-lasting in civilian adult survivors of war. Research conducted with World War II [32] and Holocaust survivors [33] indicated that suffering continues decades after the crisis has ended [34]. Delayed onset or reactivation of prior symptoms was also reported [35]. A 6-year longitudinal study of a large civilian sample in Kosovo indicated that 9.3% of participants developed PTSD during follow-up, and that traumatic events experienced after the war (e.g., lack of food or water, lack of shelter, ill health without access to medical care) were significant risk factors for delayed PTSD occurrence [36].

Several studies documented risk factors for the development of PTSD, such as female gender and older age, as well as protective factors, such as social and family support, and religious beliefs [37]. In the present study, PTSD diagnosis was significantly associated with being an adolescent and having lost a close relative during the 1994 genocide. A large survey of Rwandan children and adolescents aged 8–19 in 1995 revealed that over 90% had witnessed killings and felt their lives threatened, while 35% had lost immediate family members and 50–60% met criteria for probable PTSD about 1 year after the events [7]. Adverse living conditions at the time of the survey, such as extreme poverty and being an orphan or a widow, were additional factors associated with PTSD. Estimates of PTSD prevalence among widows (41.4%) and orphans (34.9%) were in close agreement with a study, conducted in Butare, Rwanda in 2007, which reported prevalence rates of 40.7% among widows and 32.2% in orphans who had lost both parents [38]. In the absence of longitudinal studies, whether marginalization, insecurity and lack of

social support should be considered as consequences or additional risk factors for persistent PTSD remains an open issue. Finally, higher prevalence of PTSD in the South province was in agreement with historical facts. The genocide aimed at eliminating the Tutsi population, which was much larger in the south of the country. Moreover, the South province now hosts a large number of persons accused of having taken part in the genocide. Ongoing violence, e.g., acts of revenge against perpetrators, might have contributed to PTSD persistence in this region.

Prevalence of depression was 22.7% in the present study, with 17.8% of all respondents meeting diagnostic criteria for both MDE and PTSD, whereas Bolton et al. [4] observed a 15.5% prevalence of depression in a rural southern part of Rwanda 5 years after the events. They emphasized that depressive symptoms were strongly associated with functional impairment in performing most daily life tasks. In the present study, functional impairment measured with the SF-36 was also strongly associated with the presence of PTSD. The significant associations of PTSD with depression and substance dependence (mainly tobacco) were also in accordance with the studies in the general population showing that 80% of individuals with PTSD have at least one other psychiatric diagnosis, the most frequent ones being depression, generalized anxiety disorder and substance abuse [39]. In diverse cultural settings, differentiating between depression and PTSD can be complicated not only because of true comorbidity, but also because of symptom overlap between both disorders. This is especially true for anhedonia, insomnia and difficulties concentrating [18]. Associations between health risk behaviors such as smoking or abusing drugs and mental disorders are well documented. According to a recent review, PTSD is not only associated with increased rates of smoking, but quit rates are also lower among PTSD smokers than among non-PTSD smokers [40].

Both PTSD [41] and depressive disorders [42] are associated with higher rates of general medical complaints and somatic symptoms, especially in non-Western cultures [43]. In the present study, we confirmed that PTSD was associated with lower subjective physical health according to the SF-36 and increased frequency of pain symptoms. Both PCS and MCS were the lowest in the presence of comorbid EDM. In addition, participants with PTSD more frequently endorsed several somatic symptoms that are not part of the usual clinical presentation of PTSD, for example, hiccups and loss of speech. These manifestations are not part of local descriptors of psychic trauma elicited in the ethnographic study by Bolton [9]. To our knowledge, they have not been specifically reported in the post-conflict mental health literature before, although they are familiar to Rwandan physicians who frequently encounter them during the annual commemoration of the genocide. As their

nature and prevalence are part of the cross-cultural variability of post-traumatic reactions [44], some authors call somatic symptoms "the missing items" of current classifications [45].

The present study has several limitations. First, generalization of results deserves some caution. Even though participants were recruited in the five provinces of Rwanda and in both urban and rural districts of each province, representativeness of the sample is difficult to ascertain. No information was available about people who refused to participate, so that a possible refusal bias cannot be excluded. In addition, in the absence of available census data posterior to the 2006 major administrative reform, no weighting scheme was used to correct for under- or over-sampling in some categories (e.g., women, who represented 58.9% of the observed sample), so that prevalence estimates cannot be generalized beyond the study sample. Furthermore, data analysis might have led to underestimated standard errors and increased probability of type I errors, because it did not take into account the complex survey design and possibly associated cluster effects. Second, our approach toward PTSD and MDE was categorical rather than dimensional, so that sub-threshold cases were not taken into account. For example, in the PTSD section of the MINI, the detailed symptom list is skipped in the absence of an extremely traumatic event and distressing re-experience of the event in the last month. Third, culturally specific factors were only taken into account through the presence or absence of somatic symptoms. Although most of them were associated with the presence of PTSD, participants were not interviewed for the elicitation of local syndromes of distress as described by Bolton [9]. Fourth, figures in the present study slightly differ from the ones in a first report, publically released in Rwanda on October 2, 2009 [46], which mentioned PTSD prevalence rates of 23.6% in men and 32.0% in women. The difference can be attributed to broader inclusion criteria in the first report and to PTSD diagnosis being assumed in some participants who showed uncontrolled emotional reactions to the evocation of trauma, precluding completion of the full MINI interview. This suggests that some incomplete records probably belonged to severely traumatized participants, so that rates of clinically significant psychopathology might have been, to a modest extent, underestimated in the present study. Fifth, we did not investigate exposure to specific traumatic events, neither during the 1994 genocide nor in the 14-year time interval preceding the survey, because of ethical reasons and possible recall bias. This information would have been valuable to document a possible dose–response relationship between prevalence of PTSD and cumulative traumatic exposure, as described by Pham et al. [3], who also reported differences according to ethnicity.

Conclusion

This study confirms that PTSD is still highly prevalent in the Rwandan population 14 years after the genocide. It is strongly associated with depression and lower perceived physical health, with some somatic manifestations of psychic trauma that might be specific to the local culture and context. It also points at categories of people who are at particular risk for persistent PTSD, such as widows, orphans and persons living in extreme poverty. While survey results contributed to the recognition of mental health as a major public health issue in Rwanda and led to a series of recommendations at the national level [47], they also underline the necessity of additional efforts toward facilitating mental health care accessibility for the most vulnerable subpopulations.

As a consequence of the genocide, among other factors, Rwanda has to face a shortage of health staff and poor access to care [48]. Many households in Rwanda do not seek health care when needed, while others are pushed into financial hardship as a result of seeking care, these effects being particularly accentuated for the poor and uninsured. During the last decade, the government implemented a mutual health insurance system. In 2004, 27% of the population had some form of health insurance coverage. Figures rose to 74% in 2007 [49]. This achievement is encouraging in the perspective of improving community mental health in Rwanda.

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