

# Association of Exposure to Violence and Potential Traumatic Events With Self-reported Physical and Mental Health Status in the Central African Republic

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**F**OR DECADES, THE CENTRAL AFRICAN Republic (CAR) has experienced poverty and political and economic instability. This has resulted in successive military coups, as well as the militarization and ethnicization of the political system.<sup>1,2</sup> Beginning in 2001, the latest wave of violence has been rooted in the power struggle between CAR's former president Ange-Félix Patassé and his former army chief and current president, François Bozizé. The instability has been compounded by the presence of neighboring warlords, rebels, and mercenaries, who freely use remote rural areas as bases for their operations.<sup>3,4</sup>

In December 2008, representatives of the government, rebel groups, and the international community gathered for an Inclusive Political Dialogue. They agreed on the appointment of a "government of national unity" that would facilitate political and economic reforms. The forum contributed to a reduction in the levels of violence. However, in the north, unrest continues and health care and educational services remain limited outside of the capital, Bangui.<sup>5,6</sup>

Little empirical research has been conducted to document the extent of the violence and its consequences in CAR. Mortality surveys associated with recent conflicts in the Congo, Sudan, or Iraq have been used to examine war-related violence and raise awareness about ongoing humanitarian crises.<sup>7-10</sup> Other studies have examined ex-

**Context** For decades, the Central African Republic (CAR) has experienced violence, economic stagnation, and institutional failure. The latest wave of violence erupted in 2001 and continues to this day in some areas. Yet there has been little attention to the conflict and even less research to document and quantify the conflict's human cost.

**Objective** To study levels of violence in CAR, including mortality levels, and the association between exposure to violence and traumatic events with self-reported physical and mental health status.

**Design, Setting, and Participants** Multistage stratified cluster random survey of 1879 adults 18 years or older in selected households conducted in 5 administrative units of CAR (3 in the south, which has been free from recent violence, and 2 in the north, in which violence continues) between October and December 2009.

**Main Outcome Measures** Mortality, morbidity, exposure to potential traumatic events, sense of insecurity, and meeting of symptom criteria for depression and anxiety using the Hopkins Symptom Checklist-25 with a cut-off score of 1.75.

**Results** The crude mortality rate (CMR) was 4.9 deaths (95% confidence interval [CI], 4.6-5.1) per 1000 population per month and self-reported CMR due to violence was 0.8 deaths (95% CI, 0.6-1.0) per 1000 population per month. Thirty-five percent reported their physical health status as being good or very good while 29% described it as bad or very bad. Respondents in northern prefectures reported higher rates of mortality, exposure to trauma, and insecurity and lower levels of physical health and access to health services compared with those in the south. The estimated prevalences of symptoms of depression and anxiety were 55.3% (95% CI, 51.6%-59.0%) and 52.5% (95% CI, 48.1%-56.8%), respectively. Exposure to violence and self-reported physical health were statistically associated with mental health outcomes ( $P < .001$ ). Anxiety symptom scores were higher for respondents in the northern prefectures than those in the south ( $t = 2.54$ ,  $P = .01$ ).

**Conclusion** A high proportion of adult respondents in CAR reported witnessing or having personally experienced traumatic events over the course of the conflicts, and more than half met symptom criteria for depression and anxiety.

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posure to human rights abuses and war crimes.<sup>11-15</sup> The purpose of this study was to provide a more comprehensive assessment of violence and its association with physical and mental health among a random sample of adult residents in 5 administrative units of CAR.

## METHODS

This study took place in the CAR prefectures of Lobaye, Ombella M'Poko,

Ouham, and Ouham Pendé and the capital city of Bangui (FIGURE 1). The 5 administrative units account for 52% of the total population of CAR. They were

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selected to reflect the country's conflict experience: the southern part of the country (Lobaye, Ombella M'Poko, Bangui) experienced conflict in 2002 and 2003 but had been stable and free from violence for several years. In the northern part of the country (represented in this study by Ouham and Ouham Pendé), violence continues to this day, with rebel groups effectively controlling part of the territory. The study was conducted both in government-controlled and rebel-controlled areas.

Study participants were selected through a multistage cluster sampling method (FIGURE 2). Within each administrative unit, 22 to 25 villages (neighborhoods in Bangui) were randomly selected from a list of all villages, proportionate to the population size. Population figures were based on the 2009 population projection of the 2003 census conducted by the Ministry of Economic, Planning, and International Cooperation. A total of 117 villages were selected, and 6 villages had to be replaced by randomly sampling additional villages.

Within the selected villages or neighborhoods, interviewers were directed to the center of the zone to select randomly a direction by spinning a pen. Once that direction was chosen, they selected every alternate household in that direction. Within each household, 1 adult (at least 18 years old) was interviewed, chosen by the name closest to the beginning of the alphabet. Interviewers were assigned to same-sex respondents. Age was the only eligibility criterion for study participation. A minimum sample size of 352 individuals in each administrative unit was determined using the proportional estimate formula for an assumed level of precision of 10% with 80% power at an  $\alpha$  of 5% and adjusted for an assumed design effect of 2.

Interviewers approached 2192 households and were able to complete an interview in 1879 (86% response rate). A total of 313 households were selected but did not participate in the study for the following reasons: all of the eligible participants were away and

**Figure 1.** Sampled Prefectures in the Central African Republic



could not be contacted after 3 attempts (85), the household was empty (90), all eligible individuals refused (73), no one was eligible in the household (48), or other reasons (17). Within the 1879 households, interviewers approached 1969 individuals, of whom 1879 were interviewed (1 per household; response rate, 95%). A total of 90 selected individuals were replaced because they were away and could not be located after 3 attempts (48), they refused to participate (28), or other reasons (14) (Figure 2).

#### Instruments and Data Collection

Data were collected between November and December 2009. A semistructured questionnaire was developed by the investigators and administered to the respondents by 20 interviewers (10 men and 10 women) organized into 5 teams of 4. Data were collected using a smartphone. Response options based on pilot interviews were provided to the interviewer for coding, but were not read to study participants unless indicated, and only for questions employing a scaling format (eg, Likert scale). An "other" category was available to record responses when necessary.

Questionnaires and consent documents were developed in French and independently translated and back-translated to and from Sango, the primary local language. Discrepancies were resolved through discussion among the translators, back translators, and lead researchers.

Interviewers were students or professionals with experience in data collection. The interviewers underwent 8 days of training on the study objectives, content, use of the smartphone, and interview technique. Tests to improve interrater reliability included a pilot study and simultaneous coding of mock interviews by all the interviewers until full coding agreement was obtained on all questions. However, the tests were conducted in a controlled setting (ie, training) with all the interviewers listening and coding interviews at the same time; interrater reliability is likely to have been lower during the actual implementation of the study.

During data collection, each interviewer was expected to conduct 4 interviews per day, each lasting approximately 1 hour. Oral rather than written informed consent was obtained because of the high illiteracy rate in CAR.

The committee for the protection of human subjects at the University of California, Berkeley, approved the study protocol. In CAR, the protocol was approved by the Ministry of Economic, Planning, and International Cooperation and local authorities at each survey site. Neither monetary nor material incentives were offered for participation. One-on-one interviews were conducted anonymously and privately.

**Measures and Statistical Analysis**

To assess economic status, we used both household monthly cash income and ownership of a list of 9 common assets by respondent household, including chairs, a table, and a bed. For each item, a yes/no answer was recorded. The

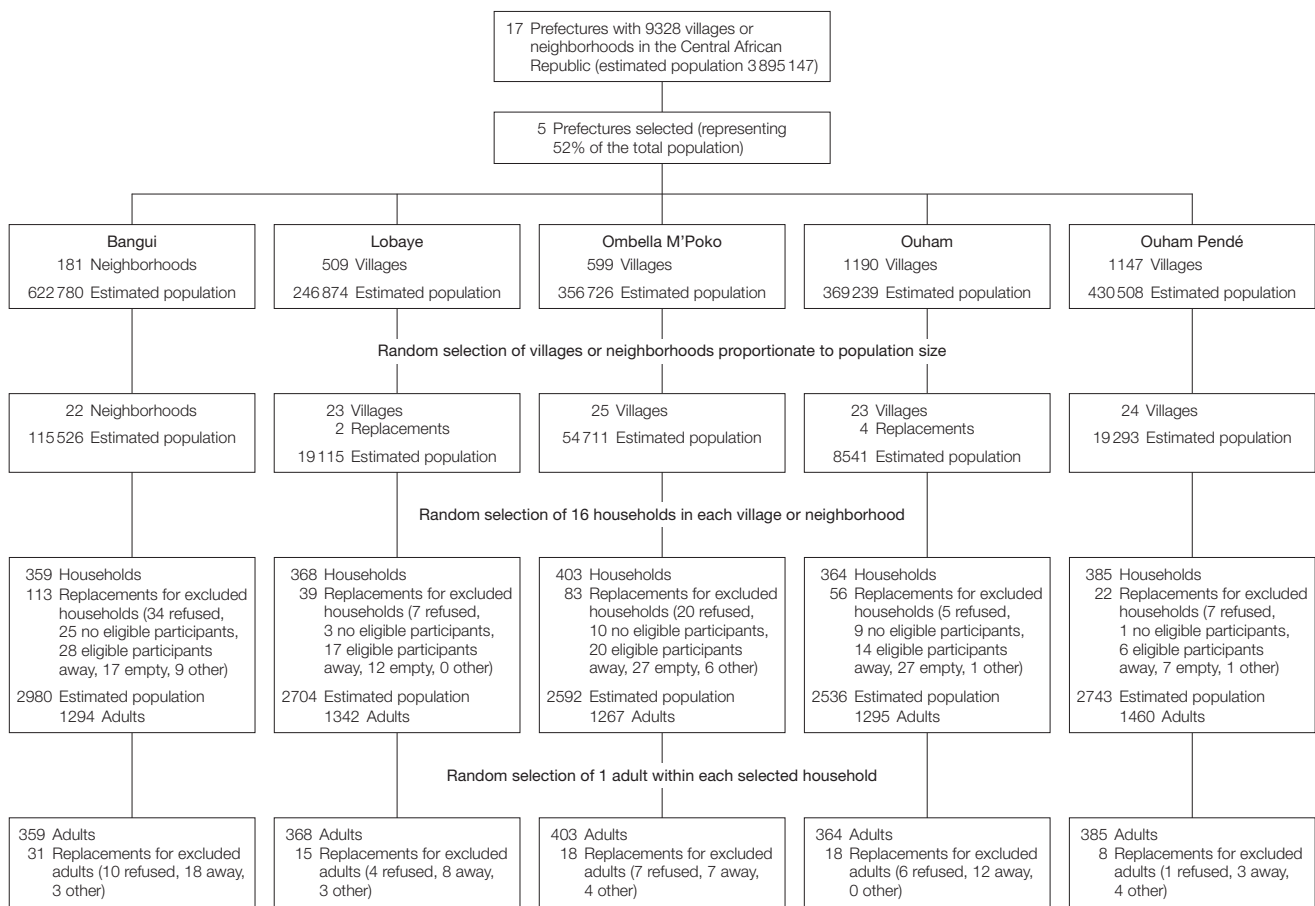
sum of types of items owned was used as a measure of respondent household economic status. The Cronbach  $\alpha$ , a measure of internal reliability, for the asset scale was 0.78.

Current household census methods with a 1-year recall were used to assess household size and the number of births and deaths.<sup>16</sup> This information was used to compute an all-cause crude mortality rate (CMR) expressed in deaths per 1000 population per month. We expressed the number of deaths per 1000 population per month rather than per 10 000 population per day because the latter is associated with crisis situations, whereas the situation in CAR can be described as chronic. Although not all causes of death were as-

sessed, respondents were asked to identify deaths within the 1-year recall period that resulted from a direct experience of violence caused by armed groups. The information was used to compute a “CMR due to violence.”

A list of 9 categories of potential traumatic events was established to assess individual exposure to violence due to the conflict and armed groups. The list was developed based on events typically reported in conflict and specifically in CAR. All of the events were due to the conflict and specifically associated with perpetration by armed groups. Individuals were asked whether they experienced 1 or more events over the course of the conflicts since 2001 (prevalence) and during the 1 year prior

**Figure 2.** Flow Diagram of Sampling Procedure



Among the originally selected villages, 6 villages had to be replaced by randomly sampling additional villages. After households and individuals were selected, 3 attempts at contact were made. When a selected household or individual was unable or refused to participate, the next available household using the sampling procedure, or another individual within the selected household, was selected as a replacement.

to the interview (incidence). The onset of violence in 2001 was a clear and known reference point for the population. A sense of insecurity scale comprising 6 items that asked how safe respondents felt in various settings was constructed; the Cronbach  $\alpha$  for the insecurity scale was 0.89.

Morbidity was assessed using self-reported physical health status (5-point Likert scale), ability to carry loads (4-point Likert scale), ability to conduct physical work (4-point Likert scale), and experience of sickness that prevented working for at least a week in the year prior to the interview (yes/no).

To assess symptoms of anxiety and depression, we employed the Hopkins Symptom Checklist-25 (HSCL-25),<sup>17</sup> which is composed of a 10-item subscale for anxiety and a 15-item subscale for depression, with each item scored on a Likert scale from 1 (not at

all) to 4 (extremely). The recall period was the past month at the time of the survey. Scores ranging from 1 to 4 were computed by adding the responses and dividing the total by the number of answered items. Prevalences of symptoms of depression and anxiety were assessed using a cut-off point of 1.75. The cut-off value had been found to be optimal in several cross-cultural research studies.<sup>18-21</sup> The estimated Cronbach  $\alpha$  was 0.88 for the anxiety subscale and 0.86 for the depression subscale.

All analyses presented in this study were performed by SPSS version 16 (SPSS Inc, Chicago, Illinois). The complex sample module was used to reflect the multistage sampling design. Three separate stepwise linear regressions were conducted to examine the association of exposure to violence with physical and mental health. For each linear model, the

*F* statistic was examined to determine the overall linear model statistical significance and *t* statistics (partial *F* statistics) to test the significance of each independent variable. All statistical tests were 2-sided with a significance level of  $P < .05$ .

## RESULTS

Demographics of the respondents are presented in TABLE 1. The mean (SD) household size was 7.4 (0.40). The mean (SD) age of respondents was 36.4 (0.55) years (range, 18-86 years), and 75% reported being in either a marital or a partnership relationship. The majority of the respondents were poorly educated with more than half the respondents reporting no formal education (25%) or incomplete primary schooling (29%). A majority of the respondents were Protestant (54%) or Catholic (34%).

**Table 1.** Sociodemographic Profile of Respondents, October Through December 2009

	Bangui (n = 359)	Lobaye (n = 403)	Ombella M'Poko (n = 403)	Ouham (n = 364)	Ouham Pendé (n = 385)	Total [95% CI] (N = 1879)
Female sex, No. (%)	179 (49.9)	184 (50.0)	201 (49.9)	180 (49.5)	192 (49.9)	936 (49.8) [49.4-50.2]
Age, mean (SD), y	36.7 (0.79)	36.3 (0.78)	36.0 (0.86)	35.9 (0.80)	36.7 (0.79)	36.4 (0.55) [35.8-37.0]
Household size, mean (SD), No.	8.3 (0.58)	7.3 (0.48)	6.4 (0.46)	7.0 (0.58)	7.1 (0.52)	7.4 (0.40) [7.1-7.7]
No. of assets, mean (SD)	5.0 (0.44)	3.0 (0.32)	3.5 (0.47)	1.3 (0.42)	1.8 (0.42)	3.2 (0.42) [2.8-3.5]
Monthly income <30 000 francs, No. (%)	132 (37.6)	244 (66.3)	231 (57.3)	301 (82.7)	341 (88.8)	1251 (63.7) [57.1-70.7]
Marital status, No. (%)						
Married or partnered	228 (63.5)	291 (79.1)	304 (75.4)	294 (80.8)	314 (81.6)	1431 (74.5) [71.5-77.3]
Single	73 (20.3)	36 (9.8)	43 (10.7)	20 (5.5)	24 (6.2)	196 (11.6) [9.6-14.1]
Widowed	29 (8.1)	25 (6.8)	27 (6.7)	36 (9.9)	32 (8.3)	149 (8.1) [6.7-9.6]
Divorced	29 (8.1)	16 (4.3)	29 (7.2)	14 (3.8)	15 (3.9)	103 (5.8) [4.7-7.1]
Education, No. (%)						
None	21 (5.9)	84 (22.8)	76 (18.9)	176 (48.4)	157 (40.8)	514 (25.4) [21.6-29.7]
Incomplete primary	69 (19.3)	132 (35.9)	126 (31.3)	110 (30.2)	137 (35.6)	574 (28.9) [26.4-31.5]
Completed primary	50 (14.0)	65 (17.7)	56 (13.9)	36 (9.9)	27 (7.0)	234 (12.2) [10.5-14.1]
Incomplete secondary	138 (38.7)	70 (19.0)	113 (28.0)	37 (10.2)	57 (14.8)	415 (24.1) [21.1-27.4]
Completed secondary or more	81 (22.1)	16 (4.6)	32 (7.9)	4 (1.4)	7 (1.8)	140 (9.4) [6.2-14.2]
Can read, No. (%)	282 (79.0)	161 (43.7)	207 (51.4)	84 (23.1)	127 (33.0)	861 (49.8) [44.5-55.1]
Religion, No. (%)						
Protestant	183 (51.3)	154 (41.8)	228 (56.6)	236 (64.8)	201 (52.3)	1002 (53.6) [49.1-58.1]
Catholic	130 (36.4)	136 (37.0)	119 (29.5)	111 (30.5)	131 (34.1)	627 (33.6) [29.4-38.2]
Other	46 (12.3)	78 (21.2)	56 (13.9)	17 (4.7)	53 (13.6)	250 (12.7) [10.7-15.2]
Ethnicity, No. (%)						
Gbaya	78 (21.8)	111 (30.2)	65 (16.1)	152 (41.8)	60 (15.6)	466 (24.2) [19.4-29.7]
Karre (Tali, Pana)	6 (1.7)	2 (0.5)	3 (0.7)	1 (0.3)	231 (60.2)	243 (13.5) [8.8-20.3]
Banda	71 (19.9)	13 (3.5)	30 (7.4)	56 (15.4)	5 (1.3)	175 (10.9) [7.9-14.9]
Manza (Mandja, Mandjia)	64 (17.9)	8 (2.2)	59 (14.6)	18 (4.9)	2 (0.5)	151 (9.4) [6.2-13.7]
Gbanou	9 (2.5)	8 (2.2)	110 (27.3)	7 (1.9)	2 (0.5)	136 (6.3) [3.9-10.1]
Other	131 (36.2)	226 (61.4)	136 (33.9)	130 (35.7)	85 (21.9)	708 (35.8) [29.9-42.3]

Abbreviation: CI, confidence interval.

More than 20 ethnic groups were represented in the sample, with the largest groups being the Gbaya (24%), Karre (14%, including Tali and Pana), and Banda (11%). Many respondents were very poor with 64% reporting income below \$2 a day (approximately 30 000 Central African Francs per mo). Out of a list of 9 common assets, respondent households reported owning a mean (SD) of 3.2 (0.42) assets. There were significant differences across

regions, with respondents in the north (Ouham and Ouham Pendé) reporting lower education levels and less asset ownership and income than respondents in the south (Ombella M'Poko, Bangui, Lobaye).

**Mortality**

Crude mortality rates are reported in TABLE 2. For the 1-year recall period, the CMR was 4.9 deaths (95% CI, 4.6-5.1) per 1000 population per month.

There were no significant differences in CMR among Bangui and the 2 southern prefectures, Lobaye and Ombella M'Poko. The northern prefectures of Ouham and Ouham Pendé, however, had significantly higher mortality rates at 6.7 (95% CI, 6.2-6.8) and 6.2 (95% CI, 5.6-6.5), respectively.

The self-reported CMR due to violence was 0.8 deaths (95% CI, 0.6-1.0) per 1000 population per month, with rates ranging from 0.3 to 0.4 in Bangui, Lobaye, and Ombella M'Poko. The CMR due to violence was significantly higher in Ouham and Ouham Pendé at 1.2 (95% CI, 0.8-1.4) and 1.9 (95% CI, 1.3-2.2), respectively. In Ouham and Ouham Pendé, the CMR due to violence represented 18% and 30% of the total CMR, respectively, compared with rates from 8% to 9% in Bangui, Lobaye, and Ombella M'Poko.

**Potential Traumatic Events and Security**

The exposure to potentially traumatic events is summarized in TABLE 3. High

**Table 2.** Crude Mortality Rates per 1000 Population per Month and Crude Mortality Rates Due to Violence per 1000 Population per Month (1-Year Recall Period)

	Deaths, No.	CMR (95% CI)	Violent Deaths, No.	Self-reported Violent CMR (95% CI)	Violent CMR as % of Total CMR
Bangui (n = 359)	141	3.94 (3.33-4.20)	13	0.36 (0.14-0.45)	9
Lobaye (n = 368)	126	3.91 (3.70-4.00)	9	0.30 (0.16-0.36)	8
Ombella M'Poko (n = 403)	129	4.20 (4.01-4.29)	12	0.40 (0.19-0.50)	9
Ouham (n = 364)	204	6.65 (6.20-6.84)	37	1.21 (0.79-1.37)	18
Ouham Pendé (n = 385)	206	6.22 (5.64-6.46)	63	1.89 (1.29-2.16)	30
<b>Total (N = 1879)</b>	<b>806</b>	<b>4.93 (4.65-5.13)</b>	<b>134</b>	<b>0.83 (0.63-0.98)</b>	<b>17</b>

Abbreviations: CI, confidence interval; CMR, crude mortality rate.

**Table 3.** Exposure to Conflict-Related Violence Prevalences Since 2001 and Incident Rates per 1-Year Period

Potential Traumatic Events Perpetrated by Armed Groups	No. (%)					Total, No. (%) [95% CI] (N = 1879)
	Bangui (n = 359)	Lobaye (n = 368)	Ombella M'Poko (n = 403)	Ouham (n = 364)	Ouham Pendé (n = 385)	
	<b>Prevalence (2001-2009)</b>					
Witnessed violence	284 (80.2)	142 (38.6)	262 (65.5)	316 (86.8)	355 (92.7)	1359 (76.4) [72.7-79.8]
Property stolen or destroyed	177 (50.0)	81 (22.0)	185 (46.2)	311 (85.4)	341 (89.0)	1095 (60.7) [55.1-66.1]
Displaced	270 (76.3)	162 (44.0)	303 (75.7)	357 (98.1)	375 (97.9)	1467 (80.8) [76.3-84.7]
Physical violence	53 (15.0)	16 (4.3)	56 (14.0)	104 (28.6)	173 (45.2)	402 (22.4) [18.7-26.7]
Threat of death	213 (60.2)	126 (34.2)	228 (57.0)	332 (91.2)	324 (84.6)	1223 (67.3) [62.8-71.6]
Household member killed	111 (31.4)	64 (17.4)	108 (27.0)	174 (47.8)	217 (56.7)	674 (37.3) [33.2-41.5]
Abducted	18 (5.1)	3 (0.8)	18 (4.5)	48 (13.2)	107 (27.9)	194 (10.8) [8.3-13.9]
Coercion to work or commit violence	27 (7.6)	11 (3.0)	30 (7.5)	94 (25.8)	120 (31.3)	282 (15.4) [12.4-19.1]
Sexual violence	11 (3.1)	2 (0.5)	12 (3.0)	7 (1.9)	30 (7.8)	62 (3.6) [2.6-4.8]
Sexual violence, women only	9 (5.1)	2 (1.1)	12 (6.0)	5 (2.8)	27 (14.1)	55 (6.3) [4.5-8.7]
	<b>Incidence (1 Year, November 2008 to November 2009)</b>					
Witnessed violence	72 (20.3)	14 (3.8)	15 (3.7)	88 (24.2)	126 (32.9)	315 (18.8) [15.3-22.8]
Property stolen or destroyed	10 (2.8)	4 (1.1)	4 (1.0)	57 (15.7)	70 (18.3)	145 (7.9) [5.7-10.9]
Displaced	24 (6.8)	16 (4.3)	18 (4.5)	62 (17.0)	84 (21.9)	204 (11.2) [8.8-14.2]
Physical violence	7 (2.0)	1 (0.3)	3 (0.7)	25 (6.9)	42 (11.0)	78 (4.4) [2.9-6.5]
Threat of death	27 (7.6)	3 (0.8)	7 (1.7)	63 (17.3)	67 (17.5)	167 (9.6) [7.3-12.5]
Household member killed	11 (3.1)	1 (0.3)	0	22 (6.0)	34 (8.9)	68 (4.0) [2.8-5.6]
Abducted	0	0	2 (0.5)	17 (4.7)	23 (6.0)	42 (2.2) [1.4-3.5]
Coercion to work or commit violence	3 (0.8)	2 (0.5)	4 (1.0)	37 (10.2)	33 (8.6)	79 (4.2) [2.8-6.3]
Sexual violence	1 (0.3)	0	0	4 (1.1)	7 (1.8)	12 (0.7) [0.3-1.3]
Sexual violence, women only	0	0	0	3 (0.7)	4 (2.1)	7 (0.7) [0.3-1.7]

Abbreviation: CI, confidence interval.



percentages of respondents reported witnessing or having personally experienced potential traumatic events over the course of the conflicts. Among them, 80.8% reported displacement (95% CI, 76.3%-84.7%), 76.4% reported witnessing violence (95% CI, 72.7%-79.8%), 67.3% reported having been threatened with death (95% CI, 62.8%-71.6%), and 60.7% reported having property stolen or destroyed (95% CI, 55.1%-66.1%). Abduction was reported by 10.8% of the respondents (95% CI, 8.3%-13.9%), and 15.4% (95% CI, 12.4%-19.1%) reported being coerced to work with armed groups, including committing violence. A total of 3.6% (95% CI, 2.6%-4.8%) of respondents reported experiencing sexual violence; among women respondents, the total was 6.3% (95% CI, 4.5%-8.7%). For most items, percentages of respondents reporting exposure to potential traumatic events were higher in the northern prefectures of Ouham and Ouham Pendé. For example, 89% of the respondents in Ouham Pendé and 85% of those in Ouham reported having had property stolen or destroyed by armed groups, compared with 50% among those in Bangui, 46% in Ouham Pendé, and 22%

in Lobaye. Differences across prefectures were significant ( $\chi^2_4 = 4.21$ ,  $P < .001$ ).

High percentages of respondents reported security as being bad or very bad as shown in TABLE 4. More than 1 in 4 respondents reported a bad or very bad level of security walking in their village at night (29.0%; 95% CI, 24.4%-34.6%), meeting strangers (27.4%; 95% CI, 23.2%-32.3%), or traveling to the nearest town or village (25.7%; 95% CI, 21.1%-31.3%). The mean sense of insecurity scores were significantly lower (ie, security was better) in the 2 southern prefectures, Lobaye (mean, 12.9) and Ombella M'Poko (mean, 14.1), compared with Bangui (mean, 16.1), Ouham (mean, 17.4), and Ouham Pendé (mean, 18.4) (overall  $F_{4,1866} = 81.4$ ,  $P < .001$ ).

### Morbidity

Thirty-five percent of the population reported their physical health status as being good or very good, while 29% described it as bad or very bad (Table 4). Sixty-nine percent reported being easily able to carry a 20-L jerry can over a distance of 20 m, and 70% reported being easily able to carry out their work for at least half a day. In the 1 year prior to the survey, 63% of those surveyed

indicated having suffered an illness that prevented them from carrying out their daily activities for at least a week. Respondents in the northern prefectures of Ouham and Ouham Pendé less frequently reported having a good or very good physical health status (25% and 22%, respectively), and a majority frequently reported sickness (74% and 76%, respectively). Physical health status was correlated with the ability to carry a jerry can ( $r = 0.41$ ,  $P < .001$ ), the ability to work ( $r = 0.67$ ,  $P < .001$ ), and sickness ( $\chi^2_3 = 187.1$ ,  $P < .001$ ).

Overall, half the respondents (50.1%; 95% CI, 44.1%-56.9%) reported their access to health services to be bad or very bad. The rates reporting inadequate access to health services were highest in the northern prefectures of Ouham (71.9%) and Ouham Pendé (67.6%), compared with Bangui (30.0%), Lobaye (44.6%), and Ombella M'Poko (45.4%) ( $\chi^2_{16} = 2.43$ ,  $P < .001$ ).

### Mental Health

The estimated mean scores and prevalences of symptoms of depression and anxiety are provided in TABLE 5. A total of 1868 individuals responded to all items (99.4% of the sample). The mean

**Table 4.** Self-Reported Sense of Insecurity, Physical Health Status, and Access to Health Services Among Respondents

	Bangui (n = 359)	Lobaye (n = 368)	Ombella M'Poko (n = 403)	Ouham (n = 364)	Ouham Pendé (n = 385)	Total [95% CI] (N = 1879)
Sense of insecurity, bad or very bad, No. (%)						
Daily life	29 (8.1)	12 (3.3)	18 (4.4)	84 (23.1)	144 (37.6)	287 (15.9) [12.1-20.9]
Going to field or work	37 (10.4)	9 (2.4)	20 (4.9)	91 (25.0)	142 (37.0)	299 (16.8) [13.1-21.8]
Sleeping at night	82 (23.1)	10 (2.7)	36 (9.0)	95 (26.1)	170 (44.4)	393 (23.1) [18.6-28.6]
Walking at night	130 (36.5)	22 (6.0)	46 (11.4)	105 (28.9)	177 (46.2)	480 (29.0) [24.4-34.6]
Going to nearest village	116 (32.6)	24 (6.5)	44 (11.0)	87 (23.9)	155 (40.4)	358 (25.7) [21.1-31.3]
Meeting strangers	89 (25.0)	47 (12.8)	70 (17.4)	138 (37.9)	147 (38.4)	491 (27.4) [23.2-32.3]
Sense of insecurity score, mean (SD)						
	16.1 (0.54)	12.9 (0.46)	14.1 (0.55)	17.4 (0.66)	18.4 (0.88)	16.1 (0.51) [15.6-16.6]
Physical health status, No. (%)						
Good or very good	155 (43.5)	146 (39.7)	186 (46.2)	90 (24.7)	83 (21.6)	660 (35.4) [31.3-39.9]
Average	131 (36.7)	125 (34.0)	118 (29.3)	150 (41.2)	131 (34.1)	655 (35.3) [32.7-38.1]
Bad or very bad	71 (19.9)	97 (26.4)	99 (24.5)	124 (34.1)	170 (44.2)	561 (29.3) [25.8-33.2]
Carry jerry can easily, No. (%)	238 (66.7)	267 (72.6)	291 (72.2)	247 (67.9)	266 (69.3)	1309 (69.1) [66.1-72.0]
Work half-day easily, No. (%)	271 (75.9)	257 (69.8)	306 (75.9)	237 (65.1)	234 (60.9)	1305 (70.0) [66.9-73.0]
Sick 1 wk per year, No. (%)	193 (54.1)	218 (59.2)	230 (57.1)	268 (73.6)	290 (75.5)	1199 (63.4) [60.1-66.5]
Self-reported access to health services, No. (%)						
Good or very good	113 (31.6)	68 (18.5)	82 (20.3)	28 (7.7)	43 (11.2)	334 (19.4) [16.0-23.4]
Average	137 (38.4)	136 (37.0)	138 (34.2)	74 (20.3)	82 (21.4)	567 (30.6) [27.4-33.9]
Bad or very bad	107 (30.0)	164 (44.6)	183 (45.4)	262 (71.9)	259 (67.6)	975 (50.1) [44.1-56.9]

Abbreviation: CI, confidence interval.

total score on the HSCL-25 was 1.91 (95% CI, 1.85-1.97), with 1.94 (95% CI, 1.87-2.00) for the depression section and 1.87 (95% CI, 1.81-1.94) for the anxiety section. The estimated prevalences for meeting the criteria of symptoms of depression and anxiety were 55.3% (95% CI, 51.6%-59.0%) and 52.5% (95% CI, 48.1%-56.8%), respectively. There were no significant differences in mean scores and the percentages of individuals meeting the criteria for symptoms of depression and anxiety among Bangui, Lobaye, and Ombella M'Poko and between Ouham and Ouham Pendé. However, the mean scores and percentages of individuals meeting the criteria for symptoms of both depression and anxiety were significantly higher in Ouham and

Ouham Pendé compared with the other prefectures (anxiety,  $F_{4,1844} = 45.4$ ,  $P < .001$ ; depression,  $F_{4,1858} = 80.6$ ,  $P < .001$ ).

**Physical Health Status, Depression, and Anxiety**

The independent variables with statistically significant associations with self-reported health status, depression score, and anxiety score in multivariate linear analyses are presented in TABLE 6. Worse self-reported physical health status (higher score) was associated with worse self-reported access to health services, increased insecurity, older age, lower educational achievement, and a higher number of assets. Men reported better physical health status than women.

Older age, increased insecurity, worse self-reported physical health status, lower number of assets, and increased exposure to selected potential traumatic events were all associated with increased scores on the depression scale. The same variables excluding age were significantly associated with anxiety score. Men had lower depression and anxiety scores compared with women. After adjusting for other variables significantly associated with the outcome, there was a statistical difference in mean anxiety score between the northern and southern prefectures ( $t = 2.54$ ,  $P = .01$ ).

**COMMENT**

This study was conducted among 5 administrative regions of CAR account-

**Table 5.** Symptoms of Depression and Anxiety Scores Measured by the Hopkins Symptom Checklist-25

	Bangui (n = 359)	Lobaye (n = 368)	Ombella M'Poko (n = 403)	Ouham (n = 364)	Ouham Pendé (n = 385)	Total [95% CI] (N = 1879)
Total score, mean (SD)	1.77 (0.20)	1.67 (0.16)	1.74 (0.18)	2.21 (0.20)	2.15 (0.22)	1.91 (0.16) [1.85-1.97]
Depression score, mean (SD) <sup>a</sup>	1.79 (0.20)	1.74 (0.16)	1.77 (0.19)	2.17 (0.18)	2.21 (0.20)	1.94 (0.15) [1.87-2.00]
Symptoms of depression, No. (%)	167 (47.2)	167 (45.4)	181 (45.4)	263 (72.3)	254 (66.3)	1032 (55.3) [51.6-59.0]
Anxiety score, mean (SD) <sup>a</sup>	1.74 (0.20)	1.57 (0.17)	1.69 (0.19)	2.27 (0.23)	2.05 (0.25)	1.87 (0.18) [1.81-1.94]
Symptoms of anxiety, No. (%)	150 (42.4)	124 (33.7)	166 (41.5)	290 (79.7)	243 (63.4)	973 (52.5) [48.1-56.8]

Abbreviation: CI, confidence interval.  
<sup>a</sup>Cut-off score was 1.75.

**Table 6.** Multivariate Linear Regression Analyses of Factors Associated With Self-reported Physical Health Status, Depression Scores, and Anxiety Scores

	Self-reported Health Status (n = 1870)			HSCL Depression Score (n = 1847)			HSCL Anxiety Score (n = 1864)		
	Unstandardized Coefficient B	t Value	P Value	Unstandardized Coefficient B	t Value	P Value	Unstandardized Coefficient B	t Value	P Value
Constant	1.46	12.15	<.001	1.10	17.39	<.001	1.04	13.86	<.001
North vs south <sup>a</sup>	0.04	0.66	.51	-0.01	-0.52	.60	0.08	2.54	.01
Sex, men vs women	-0.12	-2.80	.005	-0.20	-9.25	<.001	-0.27	-10.56	<.001
Age, 1-y increase	0.02	10.64	<.001	0.00	4.41	<.001	0.00	-0.76	.45
Education, 1-level increase	-0.05	-3.67	<.001	0.00	-0.37	.72	0.00	-0.32	.75
Total assets, 1-asset increase	-0.04	-3.46	.001	-0.03	-5.74	<.001	-0.03	-3.77	<.001
Sense of insecurity, 1-point increase	0.03	6.55	<.001	0.03	11.07	<.001	0.03	11.90	<.001
Access to health services, 1-point increase <sup>b</sup>	0.19	8.59	<.001	0.02	1.59	.11	0.02	1.66	.10
Property stolen, yes vs no	0.05	0.93	.36	0.06	2.34	.02	0.10	3.44	.001
Coercion, yes vs no	-0.06	-1.02	.31	0.10	2.97	.003	0.18	4.61	<.001
Threat, yes vs no	0.05	1.04	.30	0.10	4.07	<.001	0.17	5.63	<.001
Sexual violence, yes vs no	0.04	0.35	.73	0.33	6.01	<.001	0.36	5.51	<.001
Witnessed violence, yes vs no	-0.02	-0.41	.68	0.07	2.67	.008	0.07	2.09	.04
Physical violence, yes vs no	0.06	1.08	.28	0.06	1.93	.05	0.06	1.70	.09
Health status, 1-point increase <sup>b</sup>	NA	NA	NA	0.07	5.8	<.001	0.06	4.13	<.001

Abbreviations: CI, confidence interval; HSCL, Hopkins Symptoms Checklist; NA, not applicable.  
<sup>a</sup>North refers to Ouham and Ouham Pendé; South refers to Bangui, Lobaye, and Ombella M'Poko.  
<sup>b</sup>Access to health services and health status were self-reported.

ing for 52% of the total population. To the best of our knowledge, the findings provide the most comprehensive data on exposure to potential traumatic events and self-reported well-being and mental health status among the selected population.

The CMRs per 1000 population per month in the 5 administrative units ranged from 3.9 (Lobaye, Bangui), to more than 6.0 (Ouham, Ouham Pendé). Differences in methodologies (eg, sampling method, recall period) limited direct comparison with other conflict and postconflict areas. Nevertheless, the rates found in this study exceeded the estimated CMR for sub-Saharan Africa of 1.16 for the period 2005 through 2010 and the threshold of 1 death per 10 000 persons per day, or 3 deaths per 1000 per month, proposed by Toole and Waldman<sup>22</sup> to define the acute phase of a complex emergency. Higher CMRs have been reported elsewhere. In July 1994, CMR estimates ranged from 59 to 94 deaths per 1000 population per month among Rwandan refugees in eastern Democratic Republic of the Congo.<sup>23</sup> Higher rates are associated with acute crisis and with vulnerable populations such as refugees, neither of which define the situation in CAR. The CMR found in CAR is comparable with or higher than similar data from well-documented chronic conflicts in the region. In eastern Congo, CMRs ranging from 2.4 to 2.9 per 1000 population per month have been reported.<sup>10</sup> In Darfur, the CMR per 1000 population per month has been estimated to range from 1.26 to 11.16 from 2003 to 2008.<sup>23</sup>

Although this study did not attempt to look systematically at the causes of mortality, a distinction was made between all-cause mortality and mortality resulting from direct exposure to conflict-related violence. In the prefectures with the highest mortality rates, Ouham and Ouham Pendé, violence accounted for 18% to 30% of mortality. This possibly reflects findings from other studies suggesting that the main cause of mortality during chronic conflicts is not direct violence, but other

causes such as malnutrition and infectious diseases.<sup>10,23</sup>

High percentages of respondents reported exposure to potential traumatic events and a lack of security. The level of exposure is comparable with trends observed in other countries, with a majority of respondents exposed to displacement, destruction or loss of assets, and the witnessing of violent events.<sup>11-15</sup> Direct violence, including physical abuse, was less frequent but nevertheless important, and as many as 6% of the women, 14% in Ouham Pendé, reported sexual abuse by armed groups. Sexual violence figures were comparable with rates found in eastern Congo.<sup>24,25</sup>

The study found an association between socioeconomic factors and self-reported physical and mental health. The association of poor access to health services and low asset ownership with poor self-reported physical health status and symptoms of anxiety supports existing literature on the likely association of poverty and access to services with physical and mental health.<sup>26-28</sup> Sex was associated with self-reported health status and mental health, with women showing higher depression and anxiety scores and worse health status scores than men. This is consistent with the literature and may be attributed to women being more susceptible to internalizing than men or to sex-related roles in society.<sup>29-31</sup> The study further found an association of insecurity with physical and mental health and of exposure to potential traumatic events with symptoms of anxiety and depression, which is consistent with published literature on depression.<sup>13,32-34</sup>

Several limitations are inherent to the cross-sectional method and context of the study. Estimates of CMR may be affected by inaccurate recall or underestimated because of survival bias (ie, entire households may have been killed, unaccounted for, or disappeared). The data collected for this study did not allow computing an under-5-year mortality rate (U5MR); the U5MR would have allowed additional comparison

with other studies. Few villages, households, and individuals had to be replaced. How the replaced individuals differ from those interviewed is unknown. In addition, although the sample is representative of the region under study, this research is not nationally representative, because only part of CAR territory was included in the survey. Furthermore, the sampling design used population data from 2003. Population displacement and natural movements have resulted in differences in the distribution of the population that could affect the sampling. However, the proportionate distribution of the population has been relatively stable.

It is also possible that responses were influenced by social desirability and concerns over safety in areas affected by conflicts. The training, use of a consent form, anonymous interviews, confidentiality, supervision, and quality control processes were all designed to reduce biases. The use of various scales to measure symptoms of depression and anxiety has been debated, highlighting the need to adapt measures to the culture and to develop indigenously informed measures of distress.<sup>35</sup> The HSCL-25 has been used and validated in various cultural contexts in sub-Saharan Africa, but not specifically in CAR.<sup>20,36</sup> Finally, for the ease of data entry and analysis, responses to open-ended questions were categorized. Pre-coded answers were available to the interviewers but never read to the participants. However, they also had the opportunity to record in full the answers provided by the respondents. The use of categories may mask nuances in definitions and understanding of some concepts. This is one of the limitations of quantitative research over the depth that qualitative work offers.

## CONCLUSIONS

High percentages of respondents reported witnessing or having personally experienced traumatic events over the course of the conflicts. More than half of the respondents met the criteria for symptoms of both depression and



anxiety. Mortality rates, lower levels of physical health and access to health services, and symptom scores for anxiety were higher among study respondents in the 2 northern prefectures experiencing ongoing violence compared with those in the south. Mortality rates in all the areas in the study were 3 to 5 times higher than that for sub-Saharan Africa and were higher than rates in some comparable conflict and postconflict areas.

Such findings may be used to advocate the initiation of aid programs and security sector reforms to ensure that civilians are protected. The associations of violence with physical and mental health need to be further explored to develop a better framework in which to offer health care services in conflict and postconflict situations. Unaddressed, these issues could further undermine CAR's development and slow its progress toward social reconstruction.

**Author Contributions:** Dr Vinck had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Study concept and design:** Vinck, Pham.

**Acquisition of data:** Vinck.

**Analysis and interpretation of data:** Vinck, Pham.

**Drafting of the manuscript:** Vinck, Pham.

**Critical revision of the manuscript for important intellectual content:** Vinck, Pham.

**Statistical analysis:** Vinck, Pham.

**Obtained funding:** Vinck, Pham.

**Study supervision:** Vinck, Pham.

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