

Effects of recurrent violence on post-traumatic stress disorder and severe distress in conflict-affected Timor-Leste: a 6-year longitudinal study



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Summary

Background Little is known about the effect of recurrent episodes of communal violence on mental health in countries recovering from mass conflict. We report results of a 6-year longitudinal study in post-conflict Timor-Leste assessing changes in mental health after a period of communal violence.

Methods We assessed 1022 adults (600 from a rural village, 422 from an urban district) exposed to mass conflict during the Indonesian occupation after independence in 2004, and again in 2010–11, following a period of internal conflict. We took a census of all adults living at the two sites. The survey included measures of post-traumatic stress disorder, severe distress, traumatic events, poverty, ongoing conflict, and injustice.

Findings 1247 (80%) of 1554 invited adults participated in the baseline survey. 1038 (89% of those eligible) were followed up. The analysis included 1022 people who had sufficient data at baseline and follow-up. The prevalence of post-traumatic stress disorder increased from 23 of 1022 (2.3%) in 2004, to 171 of 1022 (16.7%) in 2010. The prevalence of severe distress also increased, from 57 of 1022 (5.6%) in 2004, to 162 of 1022 (15.9%) in 2010. Both these outcomes were associated with disability at follow-up. Having post-traumatic stress at follow-up was associated with being a woman (odds ratio [OR] 1.63, 95% CI 1.14–2.32), experience of human rights trauma (OR 1.25, 95% CI 1.07–1.47), or exposure to murder (OR 1.71, 95% CI 1.38–2.10) during the Indonesian occupation (1975–99), human rights trauma during the period of internal violence in 2006–07 (OR 1.46, 95% CI 1.04–2.03), and ongoing family or community conflict (OR 1.80, 95% CI 1.15–2.80) or preoccupations with injustice for two or three historical periods (OR 4.06, 2.63–6.28). Severe distress at follow-up was associated with health stress (OR 1.47, 1.14–1.90), exposure to murder (OR 1.57, 1.27–1.95), and natural disaster (OR 1.65, 1.03–2.64) during the Indonesian occupation, conflict-related trauma during the internal violence (OR 1.33, 1.02–1.74), and ongoing poverty (OR 1.53, 1.36–1.72) or preoccupations with injustice for two or three historical periods (OR 2.09, 1.25–3.50).

Interpretation Recurrent violence resulted in a major increase in post-traumatic stress disorder and severe distress in a community previously exposed to mass conflict. Poverty, ongoing community tensions, and persisting feelings of injustice contributed to mental disorders. The findings underscore the importance of preventing recurrent violence, alleviating poverty, and addressing injustices in countries emerging from conflict.

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Introduction

After mass conflicts, countries are at increased risk of recurrent episodes of communal violence and upheavals that adversely affect social, economic, and political development.^{1–3} However, no studies have assessed the effect of repeated communal violence on mental health of citizens in these settings.

Generally, symptoms of post-traumatic stress remain high in the period soon after mass conflict (up to 3 years), with a gradual improvement in mental health in the years afterwards.^{4–7} Recurrent conflict might increase the prevalence of mental disorders for several reasons. Repeated exposure to trauma increases the risk of post-traumatic stress disorder and other common forms of mental distress in a well established dose-effect relationship.⁸ Furthermore, the nature of

the conflict—and what it means to the affected citizens, for example, a sense of persistent injustice—might be instrumental in determining mental health responses.^{9,10}

Timor-Leste exemplifies a country that has had recurrent conflicts that differ in their characteristics and implications for the society as a whole. The Indonesian occupation (1975–99) leading up to the humanitarian crisis of 1999 was associated with extreme trauma and human rights violations, including torture, murder, and mass displacement.¹¹ Yet our study of a rural village and an urban district in 2004 yielded low prevalence of post-traumatic stress disorder and severe distress compared with other post-conflict settings, which we tentatively attributed to the general sense of optimism that followed national independence in 2002.^{12,13}

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A period of internal violence occurred in 2006–07, involving warring factions from within the country.¹⁴ Tensions persisted even after the UN contained the violence, with members of opposing groups continuing to live side by side in the same villages. Observers noted that the internal conflict had a detrimental effect on the society as a whole, undermining the sense of optimism that had followed independence.¹⁴ The loss of community cohesion and continuing feelings of insecurity after the internal conflict might have created a general vulnerability to mental disorders in the community as a whole.

Persistent feelings of injustice related to human rights violations might be an important factor leading to mental disorders in post-conflict populations.¹⁵ We anticipate that successive periods of conflict in Timor-Leste in which human rights traumas were common would lead to a mounting sense of injustice among survivor populations, particularly because most of the perpetrators have not been brought to account.^{9,16}

Debate continues as to the relative importance of poverty and psychological trauma in shaping adverse mental health outcomes in people living in post-conflict settings.^{17,18} Poverty and trauma might exert different effects on mental health outcomes—eg, poverty is associated with symptoms of depression, whereas trauma is associated with post-traumatic stress disorder.¹⁹ Establishing how each of these determinants contributes to mental health is important for the development of strategies for prevention and intervention of mental health disorders.

We did this study to test several related hypotheses: first, that post-traumatic stress disorder and severe distress would be more common after the period of internal conflict in Timor-Leste compared with baseline. Second, that these mental disorders would be associated with wide-ranging psychosocial disabilities. Third, that post-traumatic stress disorder would be linked to potentially traumatic events related to violence and ongoing tensions, whereas ongoing poverty would be most relevant to severe distress (including symptoms of depression). And finally, that distressing preoccupations with injustice spanning several historical periods would be associated with mental health symptoms.^{11,15,20,21}

Methods

Study design and participants

We did this longitudinal cohort study in two locations in Timor-Leste. In a baseline study, we sought to measure the prevalence of common mental disorders 4 years after the cessation of conflict in Timor-Leste with the aim of following up the sample to assess how symptoms changed over time. 3 months before our baseline study, the Timorese Government did a pilot census in a defined district of the capital, Dili, and a rural village, Hera, 1 h away by car. These locations were chosen because together they included populations with varied socioeconomic characteristics typical of Timorese society

as a whole. Each location (*suco*) consists of contiguous hamlets (*aldeias*) that fall under the overall administration of one chief (*chefe*). Global positioning system coordinates and aerial maps used in the government pilot census enabled us to identify all households in the two locations, including those in forested or remote areas. Both locations were severely affected by conflict, violence, and displacement during the Indonesian occupation and the subsequent internal conflict. Details of the 2004 survey have been published.^{12,22} We used the same method in a 2010–11 follow-up survey with the addition of the measures described here. The study was approved by the ethics committee of the University of New South Wales, the Minister of Health of Timor-Leste, and the chiefs of each village.

Procedures

We did a census to enable data analysis of both the individual (in the present report) and the household (the intended subject of future reports). At baseline, we sought to interview all adults aged 18 years or older residing in every dwelling in the two locations. In the follow-up study (June, 2010–June, 2011), we aimed to interview all participants surveyed in the baseline survey. In both surveys, we visited households up to five times to maximise participation. At follow-up, we traced those who had moved by asking families, village chiefs, and other informants. We did a longitudinal analysis of participants who had sufficiently complete data at baseline and follow-up. The field team consisted of 18 Timorese workers with previous survey experience or public health degrees, supervised by an Australian project director (BL) and a Timorese in-country manager. The interviewers received 2 weeks of training followed by 2 months of field testing at geographical locations separate from the two villages participating in the main study. Interviewers were assessed serially in pairs until they achieved a consistent 100% inter-rater reliability for application of symptom measures. We have previously described the comprehensive capacity-building programme offered to the East Timorese fieldworkers, the effect on morale contributing to the high response and retention rate in the team.²³

We used the Harvard Trauma Questionnaire,²⁴ which assesses 16 symptoms of post-traumatic stress disorder, each scored on a four-point frequency scale: the summary score (1–4) is the mean score for the 16 symptoms. We also used the Kessler-10 questionnaire,²⁵ which consists of ten items each scored on a five-point frequency scale primarily measuring depression but also including anxiety and somatic symptoms. A score of 30 or more represents severe distress that in other settings corresponds with the presence of mental disorder in general.²⁵

We did a clinical recalibration study by comparing the Harvard Trauma Questionnaire and Kessler-10 with a gold standard clinical interview to derive culturally appropriate diagnostic thresholds for post-traumatic stress disorder and severe distress. We included 97 people who

participated in the follow-up study, stratifying the sample to include a range of symptom scores on both questionnaires. Because the Kessler-10 questionnaire predominantly includes symptoms of depression, we compared the measure with the module for major depressive episode of the Structured Diagnostic Interview for the Diagnostic and Statistical Manual IV.²⁶ Fieldworkers readministered the questionnaires and Australian trained psychologists (including BL) assisted by interpreters applied the modules for post-traumatic stress disorder and major depressive disorder of the Structure Clinical Interview for the Diagnostic and Statistical Manual IV.²⁶ Fieldworkers were masked to the results of psychologists' assessments and vice versa.

The Harvard Trauma Questionnaire score of 2·2 provided the highest overall level of convergence with the post-traumatic stress module from the Diagnostic and Statistical Manual: area under the curve 0·82 (95% CI 0·71–0·94), sensitivity 77·3%, specificity 87·5%, overall correct classification 83%. For the Kessler-10 questionnaire, the international cutoff score of 30 or more for extreme distress provided the highest level of convergence: area under the curve 0·79 (95% CI 0·67–0·91), sensitivity 92·3%, specificity 66%, correct classification 71%. The lower specificity for the Kessler-10 questionnaire is probably a result of the inclusion of anxiety and somatic complaints, in addition to depression, within the measure of symptoms.

We assessed the 16 potentially traumatic events listed in the Harvard Trauma Questionnaire at two points: at baseline (2004), which captures effects of the Indonesian occupation and subsequent humanitarian emergency (in 1999) and the period surrounding independence in 2002, and at follow-up (2010–11), including the effects of the internal conflict (2006–07). A previous factor analysis⁸ of the baseline data yielded five potentially traumatic event domains: human-rights trauma (including torture and arbitrary imprisonment), witnessing murder (of family or others), natural disaster (floods and earthquakes), severe deprivation of health care, and conflict-related trauma (fire, lack of shelter, and insufficient food and water). Subscale scores were derived by adding endorsed items (1=yes, 0=no) for each factor.

To assess how poverty and family or community conflict were related to mental health disorders, we made an inventory of contemporary daily living difficulties on the basis of extensive community consultations and refinement of items during piloting. Responses on a five-point visual analogue scale were dichotomised into serious or very serious problems (scoring 1) or not serious or less serious problems (scoring 0). Two composite scales (each scored 1–6) were derived for poverty (insufficient food [two items], lack of money for school fees and to meet traditional obligations to family, poor shelter, unemployment) and family or community conflict (with spouse, children, extended family, young people, and the wider community).

At follow-up, participants were asked to identify the worst injustice they had experienced for each of three defined historical periods: the Indonesian occupation and humanitarian emergency (1975–99), the internal conflict (2006–07), and in their present lives (2008–10). Participants who reported relevant events were asked to say whether they had ongoing distressing preoccupations of injustice (no events scored 0, distressing preoccupations for one historical period scored 1, distressing preoccupations for two or three historical periods scored 2). Scores of 2 and 3 were conflated because of small numbers of people who scored a 3.

For disability, two items in the World Mental Health Survey assessed days-out-of-role related to ill-health in the past month (categorised as 0, 1–4, and ≥ 5).²⁷ The Work and Social Adjustment Scale applied at follow-up is a self-report measure of functioning that assesses difficulties in doing housework, study or work, caring for family, and social activities.²⁸ All measures were translated into Tetum, the most widely spoken language in Timor-Leste. Minor inconsistencies were addressed during piloting and the final versions were translated and back-translated with a standard approach.²⁹

Interviews usually lasted an hour and were done in participants' homes. We checked forms for missing data immediately after the interview and gaps were rectified. Each electronic data entry was checked at least once for completeness and accuracy against the paper questionnaires.

Statistical analysis

We did five analyses. First, we generated descriptive data (frequencies, means) with SAS (version 9.2). Second, we calculated intraclass correlations to assess clustering of post-traumatic stress disorder and severe distress within households. Correlations were low ($<0\cdot05$), indicating

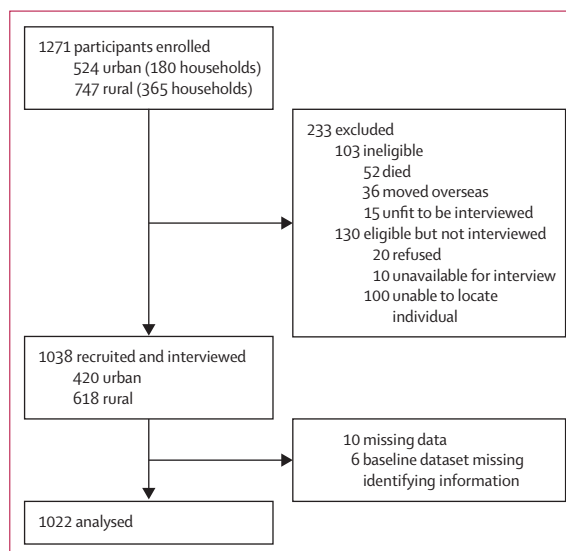


Figure 1: Study profile

negligible clustering. Third, we applied McNemar's test to assess differences in prevalence of post-traumatic stress disorder and severe distress at baseline and follow-up.³⁰ Fourth, we used χ^2 tests to test for associations between mental health and disability at follow-up. Fifth, we applied multiple hierarchical logistic regression models to assess predictors of post-traumatic stress disorder and severe distress at follow-up, each regression controlling for the corresponding baseline disorder (baseline post-traumatic stress disorder for prediction of follow-up post-traumatic stress disorder, baseline severe distress for prediction of follow-up severe distress). Six variables or sets of variables were entered into each regression in the following order: (1) baseline post-traumatic stress disorder or psychological distress, (2) sociodemographic variables, (3) five potentially traumatic events during the Indonesian occupation (measured at baseline), (4) five potentially traumatic

events during the internal conflict (measured at follow-up), (5) poverty and ongoing family or community conflict (measured at follow-up), and (6) distressing preoccupations with injustice. The hierarchical method ensured that the effects of earlier variables were taken into account in assessing the additional contributions of subsequent sets. Multivariate tests of association are presented as adjusted odds ratios (ORs) with 95% CIs, the level of significance set at $p < 0.05$. We used the SURVEYLOGISTIC procedure in SAS to adjust for design effects. Because the data were derived from a complete census of the target population, we did not apply post-stratification weighting.

Role of the funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, or writing of the report. The corresponding author had full access to all the data in the study and had final responsibility for the decision to submit for publication.

Results

At baseline, 1247 (80%) of 1554 adults in the two locations completed interviews. Of respondents who were still eligible at follow-up, 1038 (549 women) were interviewed (89%), including 420 of the 524 baseline urban and 618 of 747 baseline rural participants. Exclusion of records with extensive missing data yielded a final sample for analysis of 1022 people (figure).

More people lived in the rural location than in the urban location at both baseline and follow-up (table 1). Mean age increased from 33.9 years (SD 12.0) at baseline to 41.5 years (SD 13.5) at follow-up. A greater proportion of people were married and the level of education increased between baseline and follow-up (table 1). Exposure to each of the five potential traumatic event domains was greater during the Indonesian occupation than for the period of internal conflict (table 1). The prevalence of post-traumatic stress disorder and severe distress increased over the course of follow-up (table 1).

Post-traumatic stress disorder at follow-up was associated with several indicators of disability (table 2), including days out of role ($p=0.026$), ability to do housework ($p=0.011$), ability to work or study ($p<0.0001$), ability to care for family ($p<0.0001$), and engagement in social activities ($p<0.0001$). Severe distress was associated with difficulties in performing household duties ($p=0.004$), working or studying ($p=0.019$), and caring for family ($p=0.013$), but not with difficulties doing social activities ($p=0.080$) or days out of role ($p=0.059$; table 2).

In the final hierarchical logistic regression model, the significant predictors of post-traumatic stress disorder were: being a woman, human rights trauma and exposure to murder during the Indonesian occupation, conflict-related and human rights trauma during the period of internal conflict, ongoing family or community conflict from 2008 to 2010, and distressing preoccupations with injustice for one, two, or three historical periods (table 3).

	2004 (n=1022)	2010 (n=1022)	p value
Sex			
Female	549 (53.7%)	549 (53.7%)	..
Male	473 (46.3%)	473 (46.3%)	..
Location*			
Rural	595 (59.3%)	600 (58.7%)	..
Urban	408 (40.7%)	422 (41.3%)	..
Age group (years)†			
<25	255 (25.0%)	42 (4.1%)	..
25-34	342 (33.5%)	342 (33.5%)	..
35-54	363 (35.6%)	439 (43.0%)	..
≥55	60 (5.9%)	199 (19.5%)	..
Marital status			
Married	732 (71.6%)	801 (78.4%)	..
Other	290 (28.4%)	221 (21.6%)	..
Education‡			
None or some	580 (57.3%)	499 (48.8%)	..
Completed primary	173 (17.1%)	106 (10.4%)	..
Completed secondary	219 (21.6%)	288 (28.2%)	..
Completed tertiary	41 (4.1%)	129 (12.6%)	..
Mean PTEs (SD) 			
Health stress	1.34 (0.9)	0.50 (0.8)	<0.0001**
Human rights trauma	0.98 (1.4)	0.23 (0.6)	<0.0001**
Murder	0.60 (0.8)	0.08 (0.4)	<0.0001**
Natural disaster	0.98 (0.5)	0.92 (0.4)	<0.0001**
Conflict-related trauma	1.85 (0.8)	1.04 (0.7)	<0.0001**
Severe distress (K10 ≥30)			
No	965 (94.4%)	860 (84.2%)	..
Yes	57 (5.6%)	162 (15.9%)	..
PTSD (2-2 cutoff)			
No	999 (97.8%)	851 (83.3%)	..
Yes	23 (2.3%)	171 (16.7%)	..

PSTD=post-traumatic stress disorder. K10=Kessler-10 questionnaire score. PTE=potentially traumatic events. *19 missing in 2004. †Two missing in 2004. ‡McNemar's test. §Nine missing in 2004. ¶ χ^2 test. ||2010 PTEs excluding those reported in 2004. **Paired t tests.

Table 1: Sociodemographic characteristics and prevalence of post-traumatic stress disorder and severe distress at baseline (2004) and follow-up (2011)

	Severe distress		p value*	Post-traumatic stress disorder		p value*
	K10 <30 (n=860)	K10 ≥30 (n=162)		HTQ <2.2 (n=851)	HTQ ≥2.2 (n=171)	
Days out of role			0.059			0.026
0	464 (54.0%)	81 (50.0%)	..	464 (54.5%)	81 (47.4%)	..
1-4	173 (20.1%)	25 (15.4%)	..	169 (19.9%)	29 (17.0%)	..
≥5	223 (25.9%)	56 (34.6%)	..	218 (25.6%)	61 (35.7%)	..
Difficulty doing housework			0.004			0.011
None to little	445 (51.7%)	64 (39.5%)	..	439 (51.6%)	70 (40.9%)	..
Moderate to often	415 (48.3%)	98 (60.5%)	..	412 (48.4%)	101 (59.1%)	..
Difficulty working or studying			0.019			<0.0001
None to little	426 (49.5%)	64 (39.5%)	..	432 (50.8%)	58 (33.9%)	..
Moderate to often	434 (50.5%)	98 (60.5%)	..	419 (49.2%)	113 (66.1%)	..
Difficulty taking care of family			0.013			<0.0001
None to little	431 (50.1%)	64 (39.5%)	..	442 (51.9%)	53 (31.0%)	..
Moderate to often	429 (49.9%)	98 (60.5%)	..	409 (48.1%)	118 (69.0%)	..
Difficulty in social activities			0.080			<0.0001
None to little	525 (61.0%)	87 (53.7%)	..	533 (62.6%)	79 (46.2%)	..
Moderate to often	335 (39.0%)	75 (46.3%)	..	318 (37.4%)	92 (53.8%)	..

Data are n (%), unless stated otherwise. K10=Kessler-10 questionnaire score. HTQ=Harvard Trauma Questionnaire score. * χ^2 test.

Table 2: Disability associated with post-traumatic stress disorder and severe distress at follow-up

Severe distress at baseline was not significantly associated with severe distress at follow-up. Significant predictors of severe distress were health stress, exposure to murder, and natural disaster during the Indonesian occupation, conflict-related trauma during the internal conflict in Timor-Leste, ongoing poverty during 2008–10, and preoccupations with injustice for two or three historical periods (table 3).

Discussion

Our findings are novel in showing that a period of internal violence was associated with a major escalation in the prevalence of post-traumatic stress disorder and severe distress among a population previously exposed to prolonged conflict (panel). Specifically, we recorded a seven-times increase in post-traumatic stress disorder and an almost three-times increase in severe distress at follow-up compared with baseline.

Strengths of our study include the large sample size and high response and retention rates. In accordance with best practice, we recalibrated symptom measures against a gold standard clinical interview.³¹ A limitation of the study is that the sample is restricted to two locations. The study should be replicated in other parts of Timor-Leste and in post-conflict populations worldwide to assess whether the findings can be generalised. The census method of sampling includes several members of the same household. Nevertheless, clustering by dwelling proved to be negligible in relation to our key mental health indices. Moreover, we corrected for design effects in the regression analyses.

We restricted the number of symptom measures to keep participant interviews short. However, in other

settings, distress can act as a proxy indicator of mental disorder in general.^{25,32,33} Inaccuracy in recall—particularly for distant events—might affect responses to inquiries about previous potentially traumatic events. We limited the period of recall by assessing potentially traumatic events for the Indonesian occupation at baseline and for the internal conflict at follow-up. The multidimensional measure of disability was only applied at follow-up, precluding an assessment of change of disability over time. Although we applied the measure of injustice as a predictor of post-traumatic stress disorder and severe distress, we acknowledge that distressing preoccupations with injustice might be thought of as a psychological outcome in its own right.

Recurrent internal conflict is common in post-conflict countries and hampers socioeconomic development.¹ Our study is the first to show its specific adverse effect on the mental health of the population.³ The size of the effect on symptoms is not fully explained by a simple linear dose-effect relation between cumulative exposure to trauma and mental disorder, given that potentially traumatic events were rarer during the internal conflict than during the preceding Indonesian occupation. It therefore seems likely that the overall effects of the internal conflict on the morale, sense of communal cohesion, and security of the population created a general underlying vulnerability to psychological distress. This underlying vulnerability was probably affected by the specific risk factors we measured, increasing the prevalence of mental disorder at follow-up.

Preoccupation with injustice was associated with mental disorder, particularly when events from two or more

historical periods were involved. The quadrupling of risk for post-traumatic stress disorder associated with injustice for two or three periods was particularly noteworthy. Although a truth and reconciliation commission was formed in Timor-Leste in 2002, qualitative data cast doubt on whether the process adequately addressed feelings of injustice among many survivors.³⁴ Exposure to further human rights violations—in this instance enacted by compatriots during the internal conflict—probably exacerbated the sense of injustice, particularly since few perpetrators from either period of conflict have faced

prosecution. Our findings suggest that repeated exposure to human rights violations might result in the accumulation of distressing preoccupations with injustice that in turn contribute to the burden of mental disorder in post-conflict societies.⁸

Our findings help to resolve ongoing debates about the role of poverty or ongoing hardship and past trauma in generating mental disorder in post-conflict settings.^{17,19} In our study, poverty was associated with severe distress including symptoms of depression, whereas cumulative human rights trauma and ongoing family and community

	Total	Post-traumatic stress disorder		Severe distress	
		n (%)	OR (95% CI)*	n (%)	OR (95% CI)*
Total	1022	171 (16.7%)	..	162 (15.9%)	..
Baseline corresponding disorder	..	23 (2.3%)	1.90 (0.49–7.28)	57 (5.6%)	2.04 (0.97–4.30)
Demographics					
Sex					
Male	473	63 (13.3%)	1 (reference)	80 (16.9%)	1 (reference)
Female	549	108 (19.7%)	1.63 (1.14–2.32)	82 (14.9%)	0.86 (0.61–1.23)
Location					
Urban	422	63 (14.9%)	1 (reference)	52 (12.3%)	1 (reference)
Rural	600	108 (18.0%)	1.23 (0.82–1.83)	110 (18.3%)	1.37 (0.90–2.07)
Age group (years)					
<25	42	4 (9.5%)	1 (reference)	6 (14.3%)	1 (reference)
25–34	342	54 (15.8%)	1.79 (0.61–5.26)	35 (10.2%)	0.70 (0.26–1.90)
35–54	439	77 (17.5%)	2.08 (0.71–6.12)	76 (17.3%)	1.16 (0.45–2.99)
≥55	199	36 (18.1%)	2.09 (0.67–6.49)	45 (22.6%)	1.47 (0.54–3.99)
Educational level					
None to primary school	605	108 (17.9%)	1 (reference)	114 (18.8%)	1 (reference)
Secondary school or more	417	63 (15.1%)	1.03 (0.67–1.58)	48 (11.5%)	0.76 (0.47–1.23)
Potential traumatic event domains (1975–2004; mean, SD)					
Health stress	1.34 (0.88)	1.37 (0.87)	0.88 (0.71–1.08)	1.62 (0.72)	1.47 (1.14–1.90)
Human rights trauma	0.98 (1.35)	1.38 (1.42)	1.25 (1.07–1.47)	1.33 (1.44)	1.00 (0.86–1.17)
Murder	0.60 (0.84)	1.01 (1.00)	1.71 (1.38–2.10)	0.96 (0.98)	1.57 (1.27–1.95)
Natural disaster	0.98 (0.46)	1.05 (0.59)	1.11 (0.70–1.77)	1.12 (0.53)	1.65 (1.03–2.64)
Conflict-related trauma	1.85 (0.84)	1.95 (0.82)	0.98 (0.78–1.23)	2.01 (0.78)	0.87 (0.69–1.10)
Potential traumatic event (2005–10; mean, SD)					
Health stress	0.50 (0.79)	0.67 (0.89)	1.09 (0.88–1.36)	0.68 (0.90)	1.06 (0.84–1.33)
Human rights trauma	0.23 (0.63)	0.49 (0.91)	1.46 (1.04–2.03)	0.34 (0.86)	1.14 (0.84–1.55)
Murder	0.08 (0.36)	0.24 (0.65)	1.55 (0.98–2.43)	0.15 (0.51)	1.18 (0.77–1.81)
Natural disaster	0.92 (0.41)	0.95 (0.50)	0.68 (0.38–1.23)	0.98 (0.41)	0.91 (0.54–1.54)
Conflict-related trauma	1.04 (0.74)	1.35 (0.76)	1.83 (1.37–2.44)	1.25 (0.72)	1.33 (1.02–1.74)
Conditions at present (2008–10; mean, SD)					
Poverty	1.64 (1.48)	1.74 (1.35)	0.92 (0.81–1.04)	2.69 (1.73)	1.53 (1.36–1.72)
Ongoing family and community conflict	0.17 (0.38)	0.30 (0.46)	1.80 (1.15–2.80)	0.31 (0.47)	1.49 (0.97–2.31)
Distressing preoccupations with injustice					
None	547	54 (9.9%)	1 (reference)	57 (10.4%)	1 (reference)
Once	235	38 (16.2%)	1.84 (1.14–2.96)	40 (17.0%)	1.37 (0.82–2.29)
Twice or more	240	79 (32.9%)	4.06 (2.63–6.28)	65 (27.1%)	2.09 (1.25–3.50)
Model C-statistic	0.781	..	0.783

OR=odds ratio. *ORs adjusted hierarchically for variables in previous steps.

Table 3: Hierarchical multiple logistic regression of factors associated with post-traumatic stress disorder and severe distress at follow-up

tensions were linked to post-traumatic stress disorder. Nevertheless, associations between socioeconomic underdevelopment, recurrent conflict, and mental disorders are probably complex in countries like Timor-Leste. Observers in the country have noted that communal frustrations with the slow pace of economic development played an important part in generating the divisions leading to the internal conflict.¹⁴ The ensuing violence and destruction in turn exacerbated conditions of insecurity and poverty which, as shown here, contributed to an increase in mental health-related disability.^{1,3,35} A complex recursive relation seems to exist between poverty and internal violence: the two interact in a manner that increases vulnerability to mental disorder as countries emerge from major periods of mass conflict.

Our findings show the need for a multitiered approach to advancing recovery and reconstruction in post-conflict settings. Clinical services should be provided for people with severe and persisting psychological reactions. On a wider scale, an integrated plan of recovery is needed to

alleviate poverty, ensure political and social stability, reduce communal tensions, and offer survivors genuine redress for past and ongoing injustices.

Contributors

SR and DS had the idea for the study, applied for funding, designed the study, trained and supported field staff, collected, managed, and analysed data, and wrote the paper. ABZ designed the study, established in-country partnerships, analysed and interpreted results, commented on the draft report, responded to reviewers, and approved the final version. ZS designed the study, analysed and interpreted data and prepared the report. NT organised field staff and logistics. RB had the idea for the follow-up study, supervised field staff, and analysed data. AN designed the study, collected and interpreted data, and wrote the report. BL was research director for the project from 2011 to 2012, she designed the study design, collected and interpreted data, and wrote the report. TC searched the published work, designed the study, collected, analysed, and interpreted data, and translated documents from English to Tetum, and made writing suggestions. LLS managed the Timorese team, traced and recruited participants, and liaised with stakeholders.

Declaration of interests

We declare that we have no competing interests.

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Panel: Research in context

Systematic review

We searched for longitudinal studies published between 1990 and 2010 in Google Scholar, Medline, Embase, Scopus, PubMed, Science Direct, and the Global Health Database. We used the search terms “post-conflict”, “mass violence”, “war”, “human rights violations”, “trauma”, “refugees”, “PTSD”, “mental disorder”, “distress”, plus “survey”, “epidemiology”, “longitudinal”, “population-based”, “community-based”, “community”, “low-income country”. We also assessed studies included in meta-analyses relevant to post-conflict and refugee mental health, specifically focusing on longitudinal surveys that assessed mental health outcomes. We found no longitudinal studies that assessed the effect of a recurrent period of mass violence on mental health symptoms over time.

Interpretation

Our study is the first longitudinal survey of the effect of a period of recurrent violence on the mental health of a population previously exposed to mass conflict. The prevalence of mental disorders increased over the course of 6 years of follow-up. Predictors of post-traumatic stress disorder at follow-up included repeated exposure to human rights trauma, ongoing tensions or conflict in the community, and cumulative preoccupations with injustice. Conditions of poverty were associated with severe distress. Our findings suggest that a period of internal conflict can result in a major escalation in mental disorders in post-conflict countries. Mental health services should be enhanced in these settings to meet the increased needs. Prevention of communal violence, alleviation of poverty, and addressing past and ongoing injustices in post-conflict populations might help to both avert recurrent conflict and prevent an increase in mental disorders.

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