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Using Mental Health Indicators to Identify Postdisaster Gender-Based Violence among Women Displaced by Hurricane Katrina

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Abstract

Objective: Assessment of gender-based violence (GBV) among internally displaced persons (IDPs) is at best difficult. In complex humanitarian disasters, GBV inquiry can sometimes be dangerous and may lead to underestimation of the true prevalence. We developed a method of identifying women who have greater odds of having been exposed to postdisaster GBV (PDGBV) using mental health indicators.
Methods: We systematically random sampled IDPs living in travel trailer parks in Louisiana and Mississippi and interviewed respondents using a health needs assessment survey during an 8-week period in April and May 2006. Women (n = 194) were screened for GBV and symptoms of depression.
Results: Women were on average 43.3 years old (range 18–85). Of the nine symptoms assessed with the Patient Health Questionnaire-9 (PHQ-9), four were associated with PDGBV. Among women with sleep dysregulation, the odds of PDGBV were 2.5 times higher in comparison with women without sleep dysregulation (95% CI 1.2-5.1). Appetite dysregulation increased the odds by 3.8 (95% CI 1.4-10.3), low self-esteem increased the odds by 2.3 (95% CI 1.2-4.6), and suicidal ideation increased the odds by 2.7 (95% CI 1.1-6.7). The internal consistency reliability of this symptom cluster was higher among women with PDGBV. Women screening positive on all four symptoms were 2.7 times more likely to have experienced PDGBV (95% CI 1.03-7.1).
Conclusions: Several but not all symptoms of depression indicated exposure to PDGBV. Sleeping dysregulation, appetite dysregulation, low self-esteem, and suicidal ideation should be considered secondary indicators useful for identifying the prevalence of PDGBV exposure among female IDPs. This model may be useful for identifying women with exposure to PDGBV in settings where direct questioning may not be safe and reliable.

Introduction

The World Health Organization's (WHO) 2007 report on ethical and safety recommendations regarding the study of sexual violence in emergencies notes that participation in violence inquiries can be dangerous and sometimes life-threatening to both participants and data collectors.[1] Internally displaced persons (IDPs) comprise a population in which risk for gender-based violence (GBV) is elevated but where direct screening may not always be the safest mode to facilitate detection and prevalence estimation.[2–4] A method to identify women with increased odds for postdisaster exposure to GBV (PDGBV) that does not employ direct verbal screening has yet to be developed in disaster-affected populations.

It is well acknowledged that women who experience GBV often do not readily admit to having been abused when directly screened, and estimates of the rate of underreporting range as high as 70%.[5] Underreporting across medical settings has been attributed to such factors as sensitivity to interrogation, protection of the perpetrator, and physician-patient communication.[6–13] Furthermore, given the severity of the physical and mental health consequences of abuse and in order to attenuate the influence of the indicated factors on reporting, alternative tools for identifying exposure to abuse have been developed. The use of computerized screening in

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waiting rooms and the use of self-completed questionnaires have been evaluated recently and have shown efficacy as methods that are preferred by patients and that increase the likelihood of self-reported abuse.[8,14,15] However, computerized screening may not be readily available in resource-poor environments, and self-completed questionnaires are not appropriate for highly illiterate populations, making the use of both such technologies nearly impossible in the context of disaster-affected populations, such as those displaced by hurricane Katrina. It is thus warranted to explore alternative methods of GBV detection that can safely and accurately identify and determine the prevalence of women who have recently experienced GBV under such circumstances to facilitate timely introduction to healthcare services.

Female IDPs, GBV, and mental health

Female IDPs show extraordinarily high rates of lifetime GBV.[2–4] and major depressive disorder (MDD).[2,16,17] Among women displaced by hurricane Katrina, a 3-fold increase in the prevalence of intimate partner violence (IPV) and a 54-fold increase in the prevalence of sexual violence was documented in comparison with local rates before the disaster.[17] Further, MDD, when diagnosed with a 1-year recall, occurs at 6.6% in the adult male and female normal population[18] and has been documented at 31%–50% among male and female IDPs.[16,17,19]

There is sufficient evidence that the experience of GBV entails psychiatric sequelae, such as depressive symptoms, posttraumatic stress disorder (PTSD), and suicidality, among females in both high-risk and general populations.[20–26] In one sample of women with IPV and war-related experience in Bosnia-Herzogovina, it was found that the intensity of depression correlated with the frequency of physical ($r = 0.43$) and sexual ($r = 0.37$) abuse and that PTSD was more prevalent in women with histories of abuse in comparison to those with war-related trauma.[23] We posit that the psychiatric sequelae associated with the experience of GBV in women may be useful, alternative indicators of GBV in resource-poor environments where direct screening is not possible or is unsafe.

We had a unique opportunity to develop a model of PDGBV likelihood and prevalence in a probability sample of female IDPs displaced by hurricanes Katrina and Rita, residing in FEMA travel trailer parks in the Gulf Coast region of the United States, sampled 248 days after hurricane Katrina.[17] In this population, examination of psychiatric symptoms associated with GBV can be used to identify women with increased odds of PDGBV experience, ultimately leading to better determinations of the prevalence of PDGBV among IDPs where standard screening modalities, such as direct verbal screening, are not possible. This alternative method of PDGBV prevalence estimation will have implications for policy and programming related to the safety and health of displaced and disaster-affected women. In addition, it has the potential to provide clinicians and practitioners in resource-poor environments with an alternative tool to identify women who have experienced PDGBV. This type of clinical identification has implications for referrals to social workers as well as relocation and security strategies employed by government organizations to help address violence.

Materials and Methods

Study design

To determine an appropriate sample size for this study, we assumed a prevalence of major depression of 0.30 and determined that the sample size required to estimate the prevalence of depression within 0.05 of the unknown estimate and a confidence interval (CI) of 90%, assuming a true value of 30%, was 229 households.[17] We determined that 115 female respondents, as called for in the original design strategy, would allow us to detect a PDGBV prevalence of 15% within 0.06 of the true value, with 90% confidence. However, the final sample was much larger than we expected in the design phase, and a total of 195 female respondents were successfully surveyed. With this sample size, a 15% prevalence of PDGBV within 0.05 of the true value could be estimated with 95% confidence.

Setting

Louisiana has an estimated population of 4.5 million, and Mississippi has an estimated population of 2.9 million. As of May 2006, at the time of the study, there were more than 2.5 million IDPs from hurricanes Katrina and Rita nationwide, 62% of whom are in Louisiana and Mississippi, with Louisiana hosting nearly 42% of the internally displaced population (1,074,570 of 2,559,368) and Mississippi, 20% (503,405 of 2,559,368). At the time of the study in Mississippi, approximately 99,000 people were living in travel trailers and mobile homes, whereas in Louisiana, an estimated 48,400 people were temporarily housed in travel trailers and mobile homes.[27]

Selection of participants

We surveyed all FEMA group and commercial travel trailer parks listed in the February 15, 2006, FEMA PFO Housing Group Daily Tracking Report with 10 or more trailers, 47 in Louisiana and 50 in Mississippi. This list was considered by FEMA to be a comprehensive list of FEMA-supported trailer parks. Individual trailers taken to previous homesteads were not included in this list. FEMA trailer parks were in 21 of 64 parishes of Louisiana and in 9 of 82 counties in Mississippi. Sixty-three trailer parks were excluded according to size, 8 were excluded because they were industrial or exclusive sites, and we were denied access at 2 sites that fit our criteria. A total 85 trailer parks were sampled, and on average we interviewed 4–5 respondents per park. Random sampling was done proportional to the size of trailer parks; units were selected by surveyors who randomly (coin toss) determined a starting household at each trailer park, and each *n*th household was interviewed until the entire trailer park had been surveyed, taking into account the average number of refusals. Two separate attempts were made for trailers without anyone home at the initial attempt (on average, 8 per trailer park). The surveyor would continue with the sampling frame by going to the next *n*th house and returning at a later time. The survey was voluntary; reasons for eligibility or refusals were recorded by each surveyor. Respondents who were <age 18 were excluded.

Methods of measurement

The quantitative questionnaire was written in English and administered verbally. Three regional, human rights, and medical experts reviewed the questionnaire for content validity. The survey was pilot tested among six IDPs in the Washington, DC, area, and the resulting suggestions about clarity and cultural appropriateness were incorporated. The quantitative survey contained 134 closed-ended questions and health needs assessment items (inventory of needed items, e.g., food, blankets) described elsewhere,[17] but for the purposes of this study, we were primarily interested in items apart from the needs assessment items, such as respondent demographics, domestic and sexual violence, and mental health.

Factors that may confound the association between PDGBV and mental health in IDP communities, such as age of the respondent, time in current trailer park, ethnicity, marital status, and fuel shortage (which is both an explicit indicator of resource availability in a resource-poor environment, such as in an IDP context,[3,16,17,28,29] and a risk factor for sexual assault in IDP settings[3,28]), were examined in relation to PDGBV exposure and controlled for in multivariable analyses. State and trailer park locations were administratively documented.

MDD was assessed using the Patient Health Questionnaire–9 (PHQ-9), a well-validated, highly sensitive instrument for identifying current and past depression that additionally corresponds to the diagnosis of MDD as described in the DSM-IV.[30–32] Respondents were asked if they had experienced a given symptom nearly every day for any 2-week period since the hurricane. We examined each symptom individually, and we diagnosed MDD using the PHQ-9.[31,32]

Given the conceptual model described, the outcome of interest was exposure to PDGBV. The GBV questions were derived from standardized violence screening items that have been used in previously published data[2,33] adapted from internationally recognized definitions.[34] We defined PDGBV if the respondent, since displacement, had experienced sexual violence, such as molestation, being forced to undress or stripped of clothing, forced intercourse or other sexual acts, sexual experiences that were not desired, being pressured or paid with money or material goods in exchange for sex, forced sex by a spouse, or had been subject to violence, such as beatings, by a spouse between displacement and the point of survey (a mean of 248 days since hurricane Katrina).

Data collection and processing

The International Medical Corps (IMC) field team recruited six data collectors. Interviewer training consisted of a day of one-on-one instruction and role playing, followed by several days of field observation and continuous supervision by IMC.[35] Local health officials in both states and FEMA granted official permission for the study.

Interviews were conducted during an 8-week period in April and May 2006. A household was defined as "persons sleeping and eating under the same roof or in the same structure." A data collector interviewed a male or female household member (at least 18 years of age or emancipated minor) who could most accurately provide information about the experiences of the entire household. However, all GBV and mental health items were self-reported experiences, and respondents were not reporting on other members' experiences for these items. Interviews averaged 25 minutes and were conducted in the most private setting possible. Questionnaires were reviewed daily for completeness and for correctness of data recording after the interview by the interviewers and IMC team leaders.

The Western Institutional Review Board used to review and approve this study complies with the Declaration of Helsinki and is guided by Title 45 of the U.S. Code of Federal Regulations.[36] All data were anonymous, and verbal informed consent was obtained from all participants, who did not receive any material compensation.

Primary data analysis

Stata 10 statistical software (Stata Corporation, College Station, TX) was used to manage and analyze the data. All analyses were adjusted for response weight as well as clustering by trailer park, and all statistical significance levels were established at $p < 0.05$. The response weight took into account the number of eligible participants approached by trailer park, and the weighting scheme used in the analyses was calculated as the inverse of the total number of participants who were eligible and who consented to and completed a survey per trailer park divided by the total number of potential respondents approached. We tested for nonlinear relationships of the dependent variable to covariates using the Box-Tidwell test of nonlinearity and modeled covariates with nonlinear relationships accordingly (e.g., using a quadratic term).

To address whether individual symptoms of depression were associated with PDGBV experience, logistic regression was used to adjust odds ratios for confounders of the associations between GBV and depressive symptoms. Goodness of fit was assessed with the -2 log likelihood improvement as well as McKelvey and Zavoina's R^2 in order to determine how well our model fit our assumptions of using indirect indicators of violence as a means of determining exposure. The power of the model was assessed by evaluating the sensitivity and specificity of the model and by examining receiver operating characteristic (ROC) curves.

Finally, we considered the possibility that symptoms individually associated with PDGBV might cluster within women with PDGBV exposure. In this case, we first tested the internal consistency reliability of the associated symptoms, stratified by exposure status, with the Kuder Richardson-20 statistic.[37] Second, we considered whether an individual's number of associated symptoms (severity) in the cluster could indicate PDGBV exposure, again using logistic regression to test for an association.

Results

Characteristics of study subjects

Contact was made with 578 potential respondents, of which 366 consented to an interview and completed the survey (response rate = 63%) (Table 1). Women were on average 43.3 years old (range 18–85). Among 194 women sampled, 91 (46.9%) experienced GBV at some point during their lifetime, and 34 women experienced PDGBV (17.5%). On average, women who experienced PDGBV had been in the

Table 1. Respondent Characteristics by Postdisaster GBV Experience[a]

Respondent characteristics	Postdisaster GBV[b] Unexposed (n = 160)	Postdisaster GBV[b] Exposed (n = 34)	p value
Time in current trailer park (in days) (SD)	152.2 (64.2)	140.7 (74.0)	0.21
Divorced	31.3%	26.5%	0.79
Race (white)	46.8%	41.2%	0.47
Any fuel shortage (for food, water, or heat)	11.3%	20.6%	0.16
Age (SD)	44.6 (16.5)	39.6 (12.1)	0.09

[a]Analyses adjusted for response weight and effect of grouping by trailer park.
[b]GBV, gender-based violence; SD, standard deviation.

trailer park 11.5 days less (±12.5), were less often Caucasian (41.2% in PDGBV, 46.8% in non-PDGBV), and were less often divorced (26.5%) compared with those who did not experience PDGBV (31.3%). Women with PDGBV experience were more often married (35.3%) than those without PDGBV (18.8%); however, given that divorce was the most prevalent and descriptive category of marital status in our sample (30% divorced), we chose to represent marital status by divorce. Women who experienced PDGBV were on average 5 years younger than those without (±3), and further analysis revealed that the relationship between age and risk for exposure was not linear, such that likelihood of PDGBV increased with age from 18 to its peak risk at age 36 and declined with age from 37 to 85. This particular type of relationship was best fit by using a nonlinear (quadratic) term for age.

Main results

After adjusting for potential confounders, we identified four symptoms that reliably differentiated women with PDGBV exposure from women without PDGBV. The adjusted odds of exposure were 2.5 times more likely among women with sleeping problems in comparison to those without sleeping problems (95% CI 1.2-5.1, $df = 8$, $p < 0.05$) (Table 2). In addition, the odds of exposure were 3.8 times higher among women with appetite dysregulation (95% CI 1.4-10.3, $df = 8$, $p < 0.05$), 2.3 times higher among women with low self-esteem (95% CI 1.2-4.6, $df = 8$, $p < 0.05$), and 2.7 times higher among women with suicidal ideation (95% CI 1.1-6.7, $df = 8$, $p < 0.05$) in comparison to those without suicidal ideation. We also found that severity of depression, defined by total number of depressive symptoms on the PHQ-9, was associated with PDGBV exposure, such that the odds of PDGBV increased 1.2 with each depressive symptom (95% CI 1.02-1.5, $df = 8$, $p < 0.05$).

To determine if the associated symptoms occurred simultaneously and more frequently in women who experienced PDGBV, we examined the internal consistency reliability of a single composite measure comprising the four symptoms described: sleeping problems, appetite dysregulation, low

Table 2. Likelihood of Postdisaster GBV[a] Exposure by Evidence of PHQ-9-Assessed Depressive Symptoms

Main effect	aOR	95% CI	p value
PHQ-9 symptoms			
Down, depressed, hopeless	0.97	(0.45–2.10)	0.97
Anhedonia	1.34	(0.57–3.16)	0.52
Sleeping problems	2.46	(1.18–5.13)	0.02
Lethargy	4.22	(0.87–20.39)	0.08
Problem with appetite	3.75	(1.37–10.27)	0.01
Low self-esteem	2.34	(1.19–4.62)	0.01
Trouble concentrating	1.46	(0.64–3.32)	0.38
Motor control	1.78	(0.88–3.62)	0.12
Suicidal thoughts	2.73	(1.12–6.66)	0.03
MDD	2.10	(0.93–4.75)	0.08
Number of depressive symptoms	1.22	(1.02–1.45)	0.03
Cluster of symptoms[b]	2.70	(1.03–7.06)	0.04
Number of symptoms in cluster	1.63	(1.15–2.31)	0.006

[a]GBV, gender-based violence; aOR, adjusted odds ratio; CI, confidence interval, PHQ-9, Patient Health Questionnaire 9; MDD, major depressive disorder.
[b]Odds ratios are derived from a logistic regression and have been adjusted for amount of time spent in trailer park, age (quadratic), divorce status, race, fuel availability, as well as response rate and clustering by trailer park.
[b]Respondents who reported sleep dysregulation, appetite dysregulation, low-self esteem, and suicidal ideation.

TABLE 3. INTERNAL CONSISTENCY RELIABILITY OF DEPRESSIVE SYMPTOMS BY POSTDISASTER GBV[a] EXPOSURE

	Internal consistency reliability[b]	
Symptom schemes	*Unexposed (n = 160)*	*Exposed (n = 34)*
Cluster of symptoms[c]	0.66	0.72
All PHQ-9 symptoms	0.85	0.83

[a]GBV, gender-based violence; PHQ-9, Patient Health Questionnaire 9.
[b]Assessed with the Kuder-Richardson statistic.
[c]Respondents who reported sleep dysregulation, appetite dysregulation, low-self esteem, and suicidal ideation.

self-esteem, and suicidal ideation. Among women with PDGBV exposure, the internal consistency reliability of this symptom cluster was higher (0.72) than among women who were unexposed (0.66) (Table 3). To test if this finding was simply an artifact of concordance of a broad range of depressive symptoms among women who recently experienced PDGBV, we also tested the reliability of a single composite measure comprising all symptoms in the PHQ-9. Here, reliability was lower among women with PDGBV experience (0.83) in comparison to women who had not experienced PDGBV (0.85) (Table 3).

For women who screened positive on all four of the symptoms, the likelihood that they had experienced PDGBV was 2.7 times higher in comparison with women who did not screen positive on all four symptoms (95% CI 1.03-7.1, $df = 8$, $p < 0.05$) (Table 2). In a model testing the severity of symptom load among symptoms in the defined cluster, we found that each additional symptom increased the likelihood of PDGBV exposure by 1.6 (95% CI 1.2-2.3, $df = 8$, $p < 0.01$) (Table 2). Figure 1 illustrates how consideration of these four symptoms, as opposed to all symptoms on the PHQ-9, may help identify women with elevated odds of having experienced PDGBV. This model fit the data relatively well ($R^2 = 0.45$) compared with the model that includes potential confounders but excludes mental health symptoms ($R^2 = 0.37$), and the area under the ROC curve for this final model (0.72) (Fig. 2) suggested that the model does an adequate job identifying women with increased odds for PDGBV exposure.

Discussion

This study evaluating PHQ-9 assessed symptoms of depression as indicators of PDGBV experience has several important findings relevant to GBV screening and detection among women in disaster-affected populations. First, evidence of sleep dysregulation, appetite dysregulation, low self-esteem, or suicidal ideation differentiated women who had recent experience with PDGBV. Further, the severity of the symptom load could indicate the likelihood of PDGBV more efficiently than consideration of all PHQ-9 symptoms. The ROC curve for this model indicated adequate sensitivity and specificity of the model. Underreporting is well documented in direct questioning as well as in nonprivate settings, such as IDP or refugee camps. Given that GBV screening in postdisaster settings can place a woman in danger because of proximity of the perpetrator and consequent violence, cultural risk, or safety of both the interviewer and victim, we developed a method to help identify women with elevated odds of having experienced PDGBV to minimize potential dangers associated with direct screening. This method will be a useful tool to researchers as a method of PDGBV prevalence estimation, allowing targeted policy and programming when direct GBV screening of a population is not possible. Further, this method may be useful to clinicians in estimating PDGBV experience, planning programs to address these issues, and providing appropriate referrals.

The four particular depressive symptoms identified showed greater internal consistency reliability in PDGBV-exposed women than in unexposed women, suggesting that there may be a quickly identifiable profile of depressive symptoms in women with PDGBV exposure. In a general population, Loxton et al.[24] found that for each unit increase on the Center for Epidemiological Studies Depression Scale (CES-D)-assessed depressive symptomatology, the odds of ever having experienced domestic violence increased by 7%, and for each unit of the Mental Health Component Score of the Medical Outcome Short Form Health Survey (SF-36 MCS)-assessed psychological well-being, the odds of domestic violence decreased by 3%. We suggest a method that uses four specific symptoms of PHQ-9-assessed depression to identify PDGBV experience, a more efficient and specific method of identification.

It is possible that the cluster of symptoms we identified may be symptoms of an underlying psychiatric condition that we did not measure, such as PTSD. For example, Stein and Kennedy[20] found that 43% of women with recent IPV experience with IPV-related PTSD were also diagnosed with MDD, as opposed to 18.2% diagnosed with MDD only and 31.8% with IPV-related PTSD only. The specific symptoms we have identified may also arise in GBV-related PTSD, which is likely inflated in our study population by the over-

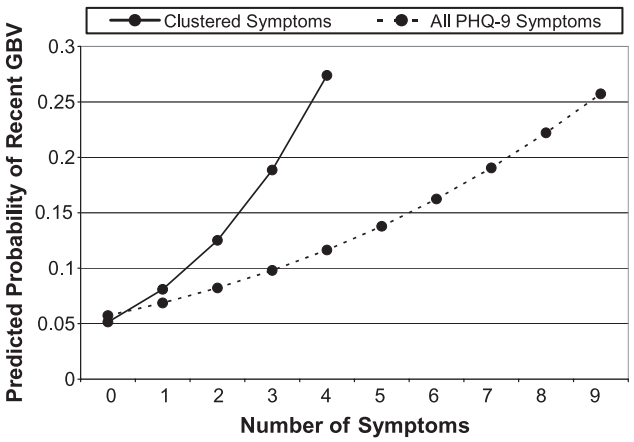

FIG. 1. Efficiency of GBV identification: clustered symptoms vs. all PHQ-9 assessed symptoms. Probabilities are derived from a logistic regression and have been adjusted for amount of time spent in trailer park, age (quadratic), divorce status, race, fuel availability, and response rate and clustering by trailer park. Clustered symptoms were sleep dysregulation, appetite dysregulation, low-self esteem, and suicidal ideation.

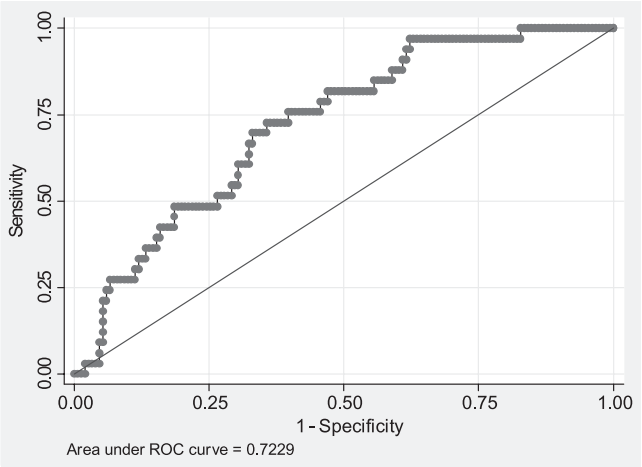

FIG. 2. ROC curve for PDGBV model including number of symptoms in cluster. Sensitivity and specificity estimates are derived from a logstic regression and have been adjusted for amount of time spent in trailer park, age (quadratic), divorce status, race, fuel availability, number of depressive symptoms in identified cluster, as well as response rate and clustering by trailer park.

all experience of disaster and displacement. In addition, *post hoc* analyses indicated that many of the mental health symptoms and conditions examined were significantly associated with predisaster GBV, which suggests that the significantly observed symptoms may emerge as a process of ongoing GBV. Three of the four symptoms identified in this study of PDGBV showed a trend level association with the experience of both predisaster and postdisaster GBV; however, only low self-esteem maintained a stable association with the experience of both lifetime and PDGBV. Further, we found that suicidal ideation and attempts since hurricane Katrina (attempts are measured separately from the PHQ-9 criteria, indicating ideation and attempt since Katrina with no symptom duration requirement) was associated with PDGBV (for ideation since the hurricane: 2.3, 95% CI: 0.9-5.8; for attempt since the hurricane: 1.8, 95% CI: 0.4-7.3). It is evident that the odds ratios, although suggestive of a trend level association, are unstable compared with the PHQ-9-assessed symptom of suicidal thoughts, which requires at least a 2-week duration for a positive screen. We are most interested in the efficiency of a method indicating PDGBV in a population of IDPs, however, given its importance to organizations and governments that need to develop programming and policy to address PDGBV. Thus, the mechanism underlying the association is not as important in this case as the association and method itself.

Beyond the associations between mental health symptoms and GBV that have been reported elsewhere in the literature, we suggest that mental health screening is a steppingstone to safely identifying PDGBV in this type of population. The weight of certain symptoms (such as the four identified depressive symptoms in this study) can assist practitioners and researchers in determining the likelihood of PDGBV exposure in this type of population where PDGBV screening is particularly difficult. In research, there are environments where violence screening may be discouraged or even prohibited by the state or paramilitary forces but where mental health screening is permitted. Our model aims to inform humanitarian aid researchers in determining the relative magnitude and scope of the problem as well as foci of the problem given limited allocation of resources and time. For clinical purposes, our model assists humanitarian aid healthcare workers in identifying likely PDGBV such that with the passage of time, as patient trust is built, a healthcare worker can re-inquire, knowing that the patient is showing symptoms indicative of PDGBV. Further, at the discretion of the healthcare practitioner in conjunction with local programs and referrals, specific attention can be paid to the patient, with acknowledgment that the noted symptoms are associated with PDGBV in these settings.

Limitations

The findings of this study represent approximately 32,841 internally displaced women residing in travel trailer parks in Louisiana and Mississippi. Thus, our results cannot be generalized to the entire hurricane-affected IDP female population. Further, the study does not represent women in the host populations of Louisiana and Mississippi.

Data used for the analyses in this study were collected to describe the health and basic needs of IDPs in travel trailer parks and not specifically to determine the relationship between PDGBV exposure and depressive symptoms. We believe, however, that the associations detected provide useful information to researchers in adequately estimating a prevalence of PDGBV and to practitioners who may require an alternative method of assessing the likelihood that a woman has experienced abuse. In addition, a *post hoc* power analysis of a model with seven predictor variables and R^2 value of 0.45, a significance level of 0.05 (alpha value), and sample size of 194 revealed that the power of this analysis exceeded 0.9, indicating that the analysis central to this study was well powered.

There is always a limitation that women may have underreported their experiences of PDGBV. In this case, the associations detected may be an artifact of reporting bias where those willing to report recent GBV are also more likely to screen positive for PHQ-9-assessed depressive symptoms. Further, although this study allowed us to test for associations with number of symptoms experienced, our screening methodology did not allow for measurement of the incidence of major depressive episodes in association with PDGBV exposure, which could be a potential factor driving the observed associations. In addition, a *post hoc* ROC curve analysis showed that sensitivity and specificity estimates were much higher for Caucasian women (area under curve = 0.82) in comparison with non-Caucasian women (0.64), suggesting that cultural biases within this IDP population may exist in how depressive symptoms and GBV are reported. In addition, underreporting of PDGBV may have led to an underestimate of the association(s) between the cluster of symptoms identified and PDGBV. We assume that the prevalence of GBV in this study is underestimated; however, we used rigorous survey methodology and provided respondents with the maximum privacy possible while administering the questionnaire. The face-to-face mode of verbal survey administration employed in this study is similar to the verbal mode of screening for mental health symptoms as it occurs between clinicians and patients in health clinics. Thus, we believe that the clinical applications of our findings are highly relevant in that regard.

Conclusions

We found that specific depressive symptoms indicated greater odds of exposure to PDGBV in female IDPs, and we provided a model that will be useful in estimating PDGBV prevalence among female IDPs as well as identifying individual women who are more likely to have been exposed to PDGBV in settings where direct questioning may be hazardous. Although we advocate direct screening when it does not endanger the interviewee or interviewer, an alternative screening method will help researchers and clinicians counteract the effects of underreporting in determining PDGBV experience among women in disaster-affected populations. We are not advocating that screening be the end point of GBV inquiry; rather we provide a method to roughly estimate the prevalence and identification of PDGBV that should result in referrals and appropriate evidence-based programming. In emergency circumstances, depressive symptoms, including appetite or sleep dysregulation, low self-esteem, and suicidal ideation, should signal likely PDGBV exposure and warrant further, more in-depth follow-up for improved healthcare as an alternative method for identifying victims of PDGBV.

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Disclosure Statement

No competing financial interests exist.

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