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
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Psychological Responses to Drought in Northeastern Brazil

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Abstract

This study of cumulative effects of drought in Northeast Brazil assessed the psychological responses (anxiety, emotional distress, and PTSD) of 102 individuals living in a city (Queimadas) in a drought-prone area compared to the responses of 102 persons living in a drought-free control city (Areia) of comparable size. As predicted, the findings revealed that residents in the drought area (Queimadas) had significantly higher levels of anxiety and emotional distress than residents in the no-drought area (Areia). In the drought area, women had significantly higher levels of anxiety and men had significantly higher levels of emotional distress than women and men, respectively, in the no-drought area. Likely because of their role vulnerability, women had significantly higher levels of anxiety and emotional distress than men. As predicted, Post-traumatic Stress Disorder (PTSD) was unrelated to the drought. Although descriptive, the results provide baseline data for comparisons as the drought deepens and offer insights and suggestions for further research into the psychological consequences of drought.

Keywords: Drought; psychological responses; gender; Brazil.

Respuestas Psicológicas de la Sequía en el Nordeste del Brasil

Compendio

Este estudio de los efectos acumulativos de la sequía en el nordeste Del Brasil, evaluó las respuestas psicológicas (ansiedad, distress emocional y trastorno por estrés pós traumático) de 102 individuos que vivían en la ciudad de Queimadas/Paraíba, en un área propensa a la sequía, y comparó con las respuestas de 102 personas que vivían en la ciudad de Areia/Paraíba, libre de la sequía, y de tamaño comparable con la primera. De acuerdo con lo esperado, los resultados revelaron que los residentes en el área de sequía (Queimadas) tenían niveles significativamente más altos de ansiedad e distress emocional, en comparación con los residentes Del área sin problemas de sequía (Areia.) En el área de sequía, las mujeres tenían niveles significativamente más altos de ansiedad y los hombres tenían niveles significativamente más altos de distress emocional, en comparación con mujeres y hombres, respectivamente, en el área sin problemas de sequía. Probablemente, debido a la vulnerabilidad de su papel social, las mujeres tenían niveles significativamente más altos de ansiedad y distress emocional si comparadas con los hombres. Como también ya se esperaba los casos de trastorno por estrés pós traumático, no se relacionaban con la sequía. Aunque descriptivos, los resultados proporcionan datos para comparaciones en el caso de agravamiento de la sequía, y ofrecen sugerencias para futuras investigaciones sobre las consecuencias psicológicas de la sequía.

Palabras claves: Sequía; respuestas psicológicas; género; el Brasil.

Drought has been a recurring phenomenon in Northeastern Brazil. Early reports date back to the 16th century (Universidade Federal do Rio Grande do Norte, 1985). Drought is a complex process with climatic events

interacting with economic, environmental, political and social factors. Compared to fast-onset natural disasters, the nature and effects of drought are more difficult to evaluate. Its effects are gradual, pervasive, indirect, and long term. As an example of its impact, in the drought-prone Northeastern region of Brazil, nearly 5.5 million people between 1950 and 1980 relocated (United Nations, 1997). Although this migration was not totally due to drought, it was a crucial factor for many in their decision to move, and continues to be a significant problem in Brazil. The present study was designed to assess the psychological responses of individuals who continue to live in this drought-prone area.

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² This article is based on the doctoral dissertation of the first author completed under the supervision of the second author. Dr. Mocellin had an important role to play in the inception of the study in 1995. The research was supported by a grant to the first author from the Canadian International Development Agency (CIDA). The assistance in the data collection by the psychology students from the Federal University of Paraíba is gratefully acknowledged: Talison Araujo, Maria N. Cabral, Wilker L. Campos, Francisco J. V. Duarte, and Joelma S. Lima.

Although the literature on psychological responses to disasters is extensive, the majority of the studies have been conducted primarily in developed countries on fast-onset disasters such as earthquakes, hurricanes and floods. Previous research on the psychological responses to drought is minimal, and in developing countries is virtually non-existent.

Theoretical Considerations

Research on psychological responses to the stress of natural and technological disasters, and war-related events has accelerated over the past two decades (Alexander & Wells, 1991; Bromet & Schulberg, 1986; Canino, Bravo, Rubio-Stipec, & Woodbury, 1990; Chardon, 1997; Gimenez & Vasconcelos, 1997; Hunter, 1993). Research has shown that stress-related psychological responses commonly associated with individual loss, traumatic injury, or physical assault; apply as well to natural or technological disasters that impact on entire communities. Disaster research has improved in recent years with entire populations or representative groups being evaluated with adequate control or comparison groups, with high response rates, with prospective designs over long observation periods, and with more adequate assessments through structured interviews and standardized rating instruments.

Studies of natural disasters indicate that early evaluation of psychological responses is a major priority (McFarlane, 1993). The need for intervention strategies aimed at preventing and treating stress-response syndromes is greatest in developing countries and among socioeconomically deprived individuals (Bravo, Rubio-Stipec, Canino, Woodbury, & Ribera, 1990; Canino et al., 1990). However, most studies on psychological responses after natural fast-onset disasters have been conducted in developed countries (Bromet & Schulberg, 1986; Cowan & Murphy, 1985; Madakasira & O'Brien, 1987; Shore, Tatum, & Vollmer, 1986b). Among the exception, have been studies of reactions to earthquakes in Ecuador (Lima et al., 1989) and to the volcanic eruption in Armero, Colombia (Lima, Pai, Santacruz & Lozano, 1991).

Similarly, most disaster and traumatic stress research has examined events that affected relatively small groups (McFarlane, 1993). In contrast, drought in developing countries typically impacts on hundreds of thousands of survivors. The extent to which the results of research conducted in developed countries can be generalized to these more devastating situations is an important theoretical and humanitarian issue.

Disaster research of the past also has been characterized by sweeping conclusions, ignoring in most cases reference to gender and other individual differences. Women's issues

in the context of disasters have only recently been addressed. There have been contradictory findings regarding gender and disaster. Some studies (Fritz & Marks, 1954; Strumpfer, 1970) supported the view that women are more affected by the disaster than men. However, other studies showed that both men and women are affected by disasters, however their reactions could occur in different styles. Among the survivors of the Mount St. Helens volcano eruption, three disorders were found to be significantly associated with disaster stress in the general population: generalized anxiety, major depression, and PTSD (Shore et al., 1986b). Women demonstrated elevated onset levels for all three disorders, while men only evidenced elevated levels of generalized anxiety disorder. Shore, Tatum and Vollmer (1986a) also reported that for persons with generalized anxiety or depression prior to the eruption, symptom recurrence rates post-disaster for one or more of these psychological disorders were significantly higher for women but not for men. In another study of survivors of the Mt. St. Helens eruption, female gender predicted more depression and somatization, while males predicted more symptoms of physical illness (Cowan & Murphy, 1985).

Solomon, Smith, Robins and Fischbach (1987) reported that males were more prone to alcohol abuse than women, and women were more prone to somatization than men. Furthermore, women's symptoms were not related to their personal exposure to the disaster but to the amount of social demand placed on them. The authors suggested that disasters might place more social demands on women than on men. This could explain some of the findings where women were more vulnerable than men to disaster effects.

Within developing countries, women's lives are already more stressful. There is a tradition that women should produce new workers by bearing children. In addition, at the end of each day, women must care for the present workers - their husbands, sons, and, since the twentieth century, their daughters. This pattern of labor distribution produces a severe power imbalance in the private domain (Lipman-Blumen, 1984), and the disaster event merely compounds women's stress loads. In the context of natural disasters in developing countries, the responsibility of coping with disasters falls disproportionately on women (Alexander, 1991; Rivers, 1982). Although women may be disproportionately represented among disaster stricken populations in developing countries (Wiest, Mocellin, & Motsisi, 1994), research regarding their psychological responses to disasters is relatively limited. The burden which women face, both as members of a community in crisis and as women within a family unit, should be acknowledged and studied.

Study Conceptualization

The research reported in this article differed from previous disaster research by studying the cumulative psychological responses to drought, a slow-onset natural disaster. Drought is defined as “essentially a temporary shortfall of water supply below demand caused by behaviour of natural atmospheric and hydrologic processes, and which has significant social and economic repercussions” (Chapman, 1994, p. 121). Although floods are the most frequent natural hazard worldwide, greater numbers of individuals are extensively affected and disrupted by droughts. It has been estimated that, during the 1970s, an average of approximately 25 million people were negatively affected by drought (Smith, 1992). In developed countries «no one dies of drought today» (Smith, 1992, p. 246). In some developing countries the disastrous effect of drought on an already unstable food supply often leads to death from famine, and certainly to serious psychological consequences.

Sample of Interest

Drought is common to large parts of the Northeastern region of Brazil (Hastenrath & Heller, 1977; Smith, 1992) where this research was conducted. The region is divided into nine states that cover more than 18% of the country’s land area and contain 43 million inhabitants, nearly 30% of Brazil’s population. Periodic and even chronic droughts are extensive in the drought-prone region, which is generally described as covering large portions of the states of Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, and Sergipe, and portions of the states of Piauí and Bahia.

This was the first study on psychological responses to drought in Brazil and one of the few on the effects of drought. How the psychological responses of persons coping with drought differ from these in well-studied fast-onset disasters such as bushfires, volcanic eruption and earthquakes was of interest. To address this question, the measures of anxiety, emotional distress and PTSD selected for this study were those that had been used in previous disaster research. Anxiety and emotional distress are overlapping constructs that were evaluated separately simply to enable comparisons with prior research. The measures of anxiety used in the present study have been used in research in developed countries, and emotional distress has been assessed in research in developing countries. This study also was designed to obtain a better understanding of how men and women were differentially affected by the drought. Since the introduction of the diagnostic category of PTSD (APA, 1980), the focus of studies on the psychological effects of disaster has been

on pathological outcomes, commonly associated with traumatic fast-onset disaster. Although PTSD was seen to be less relevant as a measure of psychological response to drought, a PTSD measure was used to assess its incidence in this slow-onset disaster context.

Method

Research Setting

The research was conducted in November 1995, in two communities within Paraíba state in Northeastern Brazil. The topography of this state is such that large portions of it are seriously drought-prone whereas others experience substantial rainfall. The drought area community for this study, Queimadas, is located in a geographical depression that deprives it of much of the moisture that other areas in the state receive. This leads to a history of recurring droughts. Although drought-prone, agriculture remains the primary industry, with cotton the main crop. Subsistence plantation and livestock are also found to a lesser degree. The annual level of precipitation in Queimadas is 600mm. Over time climatic conditions cycle between periods of minor lacks of moisture to severe droughts. During the period of data collection in 1995, when funding and travel opportunities permitted the research to be conducted, there was evidence of some drought, but conditions were not near the low point anticipated in the usual cycle of drought severity. There were 32,555 inhabitants in Queimadas according to the 1991 census.

The no-drought community, Areia, is located only 80km to the Northeast of Queimadas on the “Borborema” Plateau. In 1991, the census reported 28,130 inhabitants in Areia. Much of the moisture from the coast falls in this area that annually gets between 1400mm and 1600mm of rain from the coast, thereby influencing the vegetation and the community. The main agriculture production in Areia is sugar cane.

The Sampling Process

To obtain samples of approximately 100 respondents from each community, sectors of different economic levels were identified on city maps. Within these pre-determined sectors, streets were assigned to each interviewer (three women and three men) with instructions to sample every 10th household. The household was the primary basis for determining the sample. A household was defined as the residence for a nuclear or extended family. This sampling process resulted in 102 households being selected as research targets in each community. An additional 20 households in each city were identified a priori, to be used as replacements when households selected for the sample

had to be declared vacant or target persons refused to participate. Households were visited four times before being considered vacant and replaced.

Only married heads of households, equally divided between males and females were sampled. This ensured that all participants in the study were under comparable pressures of economic demand and family responsibility, thereby providing consistency of samples for each city and for equitable comparisons of emotional distress and anxiety responses across men and women. The sample was equally divided at data collection into females and males, by predesignating that the gender of the person to be interviewed would alternate in successive households. Thus, the gender of the person to be interviewed was pre-recorded on the front of the questionnaire booklet.

Procedure and Measures

Questionnaires were administered orally in face-to-face interviews conducted within each participant's home. Oral administration was necessary to cope with the illiteracy of some participants and thus uniformly employed throughout the interviews to ensure consistency of data collection.

Initial calls on households were made at various times throughout the day. Interviewers carried an identification card with their picture and the name of the university. Upon arrival they introduced themselves as student researchers from the Federal University of Paraíba conducting a survey. They then asked to talk with the maternal or paternal head of the household. When the person to be interviewed was met interviewers explained the research objective. In Queimadas, it was explained that the objective was to identify how people feel about the drought, and in the no-drought city, Areia, it was explained that the objective was to assess how they feel living in that community. Participants were asked if it was a convenient time for the interview and encouraged to choose a room that would be the quietest for conducting the interview. If it was not convenient, the prospective participants were asked to reschedule for a more convenient time. The participants were not compensated in any way. It was totally a voluntary choice of the participant to take part in the study.

The interview schedule. Participants were told that the study was completely voluntary and that their responses would be anonymous and kept confidential. It was explained that all participants would be identified by a number so that, no one could associate their answers with their name. They were also assured that they could stop the interview at any time or refuse to answer any questions they might object to. The interview began with six introductory questions to create rapport. These questions asked how long

the participant had been living in the community, if he/she liked it, what he/she did not like about it, and if he/she had family members who moved away and where they went. The psychological measures followed the introductory questions. The order of presentation of the psychological measures was varied in three different sets to minimize test order influence: STAI (State & Trait), SRQ-20, and PTSD; SRQ-20, PTSD, and STAI (State & Trait); and PTSD, STAI (State & Trait), and SRQ-20.

The State-Trait Anxiety Inventory (Spielberger, Gorsuch, & Lushene, 1970) was employed to assess participants' level of anxiety. This measure is comprised of separate self-report scales of 20 items each for assessing two distinct anxiety concepts: state anxiety (A-State), which measures how the person feels at the moment of the interview, and trait anxiety (A-Trait), which measures how the person generally feels. These were developed for research with non-psychiatrically-disturbed adults. Sample items of the A-State questionnaire are: "I feel upset," "I feel at ease." Sample items of the A-Trait questionnaire are: "I am inclined to take things hard," "I am a steady person." The Portuguese versions of these scales (Biaggio, Natalício, & Spielberger, 1976) used in this study had been translated and backtranslated for use in Brazil. Biaggio et al. (1976) evaluated the construct validity of the STAI- State & Trait, and found that the A-State scale was sensitive to situational stress, whereas the A-Trait was relatively unaffected by situational factors. Spielberger et al. (1970) had shown similar results for the English version of STAI (State & Trait).

The Self-Reporting Questionnaire (SRQ-20), designed by Harding et al. (1980), was employed to evaluate participants' level of emotional distress. The questionnaire is a screening instrument used to identify non-psychotic psychiatric disturbance in primary care settings and in the community. The SRQ consists of 20 questions which are to be answered by yes or no, indicating whether or not the indicated symptom was present over the last month. A sample of items of the SRQ-20 includes: "Do you often have headaches?" "Is your digestion poor?" This questionnaire has been used as either a self-administered or an interviewer-administered questionnaire [World Health Organization (WHO), 1994] and was available in Portuguese, the translation and backtranslation having been undertaken by Harding et al. (1983).

Mari and Williams (1986) conducted a validity study using the SRQ-20 at three primary care clinics in São Paulo; 875 patients completed the questionnaire, with a subsample of 260 being interviewed by a psychiatrist. The results showed that the SRQ-20 was a practical screening instrument for psycho-emotional disturbance in these

settings. For the case/non-case threshold, using 7/8 as the cutoff score, sensitivity was 83% and specificity 80%. The questionnaire was a good indicator of morbidity.

To evaluate the incidence of PTSD among the residents, the Trauma Sequelae Questionnaire (Koverola, Proulx, Hanna Battle, & Chohan, 1992), a 23-item measure designed to assess PTSD occurrence based on the DSM-IV criteria, was used. Although in the process of validation, there is preliminary evidence of this measure’s concurrent validity (Hanna, Koverola, Proulx, & Battle, 1992). Sample items of the questionnaire include: “Do you have recurring, distressing dreams about the experience?” “Have you experienced flashbacks (e.g., replaying of vivid memories of the experience)?” This questionnaire had to be translated to Portuguese and backtranslated for this study.

The interview concluded with ten questions regarding demographic variables such as age, income, religion, and working situation. Following the completion of the questionnaires, participants were asked if the interview raised any concerns, or if they had any questions regarding the study. Feedback was then provided, and the interviewer thanked the participant for their time and contribution to the study. The entire interview took approximately one hour.

Results

The study was designed to compare psychological responses of individuals within a community in a drought-prone area (Queimadas) with those living within a drought-free city (Areia) of the same state. The two samples were compared on several demographic variables. Participants ranged from 18 to 78 years of age in Queimadas (drought) and from 21 to 85 years of age in Areia. The average age of the participants in Queimadas was 46,50 with a standard deviation of 14,54. The average age of the participants in Areia was 45,16 with a standard deviation of 14,53.

Income data were obtained as they were categorized by units of the minimum wage in Brazil at the time of the data collection, rather than as a continuous variable. At the time of the data collection, the minimum wage was the equivalent of US\$ 100.00 per month. The categories a) up to 1 minimum wage, b) 1 to 2 minimum wages, c) 2 to 5 minimum wages, and d) more than 5 minimum wages were selected from the Brazilian Geographic and Statistics Institute protocol (Instituto Brasileiro de Geografia e Estatística - IBGE). Although the differences between the participants earning less than five minimum wages were not great, 73,5% in Queimadas, and 68,6 % in Areia, the percentage of participants earning more than five minimum wages was substantially greater in Areia (20,59% vs. 1,85%). Moreover, it is interesting to note that 24,51% of the participants in Queimadas would not declare their income level when asked during the interview; this percentage was comparable to the percentage of the participants earning more than five minimum wages in Areia.

The most noticeable difference between the two samples was in terms of educational attainment. In Areia (no-drought) 31.37% of the participants had high school or university completed, whereas in Queimadas (drought) only 8.82% of the participants had reached that level. However, when illiteracy levels were compared, both communities were similar: In Queimadas 28.43% of the participants were illiterate and in Areia 21.57%. It is interesting to notice that in Areia the number of male participants who were illiterate was twice the number of illiterate women.

Distress Differences: City and Gender

The descriptive statistics for test scores on the STAI1 (State Anxiety), STAI2 (Trait Anxiety), and SRQ-20

Table 1
Means and Standard Deviations of Psychological Measures by City and Gender

		Queimadas (Drought)			Areia (No-drought)		
Measures		<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>
STAI1 (State)	Male	33,22	5,18	51	31,25	5,18	51
	Female	42,14	11,42	51	37,22	10,72	51
	Total	37,68	9,9	102	34,24	8,90	102
STAI2 (Trait)	Male	36,04	5,99	51	34,43	6,21	51
	Female	46,75	9,76	51	40,90	11,59	51
	Total	41,39	9,64	102	37,67	9,80	102
SRQ-20	Male	4,16	3,16	51	2,24	2,46	51
	Female	6,61	4,32	51	5,63	4,82	51
	Total	5,38	4,33	102	3,93	4,16	102

(Emotional Distress) for males and females within each city are reported in Table 1. The possible range for both scales of the STAI is 20 to 80, with the higher scores reflecting higher levels of anxiety (State & Trait). The SRQ-20 scores range from 0 to 20, with the higher scores indicating higher levels of emotional distress. Satisfactory levels of internal consistency were found for all three measures in both cities. In Queimadas (drought), the alpha values were STAI1 ($\alpha=.86$), STAI2 ($\alpha=.86$), and SRQ-20 ($\alpha=.90$), and in Areia (no-drought), STAI1 ($\alpha=.89$), STAI2 ($\alpha=.89$), and SRQ-20 ($\alpha=.92$).

The results of the analyses for STAI1 (State Anxiety) showed a significant main effect for city. Participants living in Queimadas (drought) reported significantly higher levels of state anxiety than participants living in Areia (no-drought) ($M=37.68$ vs. 34.24 , $F(1,202)=8.07$, $p<.05$). Post hoc analyses, computed by SPSS MANOVA procedure for estimating simple effects (Keywords, 1993), revealed that the difference between females across cities was primarily responsible for these significant results across cities. Females in Queimadas (drought) ($M=42.14$) showed significantly higher levels of state anxiety than females in Areia (no-drought) ($M=37.22$), $F(1,200)=8.26$, $p<.05$. There was also a significant main effect for gender of participants, with females across cities showing higher levels of state anxiety than males ($M=39.68$ vs. $M=32.24$, $F(1,200)=37.75$, $p<.01$). The interaction effect was not significant.

The results of the analyses for STAI2 (Trait Anxiety) also showed a significant main effect for city. Participants living in Queimadas (drought) scored significantly higher in trait anxiety than did participants living in Areia (no-drought), $M=41.39$ vs. 37.67 , $F(1,200)=9.32$, $p<.01$. According to post hoc analyses, the significance of these results was due primarily to the differences among females; males did not show any significant differences. Females in Queimadas ($M=46.75$) showed higher levels of trait anxiety than females in Areia ($M=40.90$), $F(1,200)=1.46$, $p<.01$. There was also a significant main effect for gender of participants, $F(1,200)=49.52$, $p<.01$, with females ($M=43.82$) showing higher levels of trait anxiety than males ($M=35.24$) across cities. The interaction effect was not significant.

For the SRQ-20 results, there was a significant main effect for city, $F(1,200)=6.69$, $p<.01$. The participants living in Queimadas (drought) scored significantly higher in the emotional distress levels than persons living in Areia ($M=5.38$ vs. 3.93 , $F(1,200)=5.94$, $p<.01$). Post hoc analyses revealed that this main effect was due to males ($M=4.16$) in Queimadas (drought) having significantly higher levels of emotional distress than males ($M=2.24$)

in Areia (no-drought), $F(1,200)=5.87$, $p<.05$. There was also a significant main effect for gender, with females ($M=6.12$) having significantly higher levels of emotional distress than males ($M=3.20$), $F(1,200)=27.14$, $p<.01$. This difference was consistent across cities, with females in Queimadas ($M=6.61$) scoring significantly higher in emotional distress than males ($M=4.16$), $F(1,200)=9.55$, $p<.01$, and females ($M=5.63$) in Areia had significantly higher levels of emotional distress than males ($M=2.24$), $F(1,200)=18.29$, $p<.01$. The interaction effect was not significant.

Post-Traumatic Stress Disorder (PTSD) by City and Gender

Post-traumatic stress disorder (PTSD) incidence has been frequently assessed during the aftermath of fast-onset disasters. For comparison with this research, the incidence of PTSD occurrence within the present slow-onset disaster context of drought was examined. PTSD occurrences were quite infrequent, with no significant differences between the two communities. There were six cases in each community. The majority of the cases with PTSD (11 of 12) were found to be among women in both communities. A car accident and viewing a tragic death were examples of traumatic events reported by participants with PTSD. The participants of the study never spontaneously reported drought during the interview as a traumatic event.

Discussion

The present study, unlike traditional research conducted on fast-onset disasters in developed countries, has taken a different direction by studying in a developing country the effects of environmental conditions that gradually developed into a physical disaster with psychological consequences for persons living within a drought-prone area. Because there has been little research and not much understanding of the psychological consequences of drought, this study was somewhat exploratory, attempting to identify the range of psychological responses to the drought.

Psychological Responses to Drought

The results of this exploratory study identified several measurable psychological responses to the cumulative effects of drought. Participants in the drought area showed significantly higher levels of anxiety and emotional distress than participants in the no-drought area. To understand these effects, it is necessary to consider the nature of the impact of drought on the

individual and on the affected community. Unlike fast-onset disasters, there is no visible acute impact phase in the case of drought. The effects and consequences are not identified immediately and may even accumulate and grow over long periods of time. As a result, by the time there is public and government awareness and intervention is sought, it is often too late for effective response. When relief is provided it is more in the form of mere subsistence rather than targeted towards rebuilding and restoring the community. In this context, the problem does not go away; it is a constant threat to the individual and to the community. The uncertainty and unpredictability of the future result in psychological manifestations of pervasive anxiety and heightened levels of emotional distress.

Confirmation of this pattern of psychological response is a valuable insight in the absence of prior research into the effects of this slow-onset disaster. This pattern is also somewhat different from that encountered in fast-onset disasters such as earthquakes or volcanic eruptions. Among reactions to fast-onset events, post-traumatic stress disorder (PTSD) has been the most typically studied. Some of the risk factors associated with PTSD occurrence are direct consequences of the event such as threat to life, severe physical injury, exposure to grotesque injuries to others, and loss of loved ones. Because there is no single identifiable traumatic event and these risk factors are typically not found in the drought context, PTSD among participants in the present research was infrequent and its causes in those rare occurrences unrelated to the drought.

Drought Does not Affect Everyone the Same: Gender Effects

Although disasters are viewed as stressful events, it is an oversimplification to consider they affect everyone the same. Within the present study, psychological responses to the cumulative effects of drought were differential across gender. Women were significantly more anxious in Queimadas than in Areia. Women were significantly more anxious and emotionally distressed than men in general. And men were significantly more emotionally distressed in Queimadas than in Areia. To explain and understand these results, gender roles and responsibilities within this social and cultural context need to be considered.

The higher levels of anxiety shown by women in the drought area reflect their greater role vulnerability to the effects of disaster. The effects and consequences of drought undermine women's roles as producers and providers. Women are typically responsible for provision and preparation of food, collection of water, and the

management of the home. In the drought context, all of these activities are disrupted and become a daily challenge. Crop failure impacts on the quantity and quality of food available, and not being able to feed the family properly increases women's frustration. Women may frequently deprive themselves of food in order to feed their dependents. The reduction of water supplies contributes to health problems. These typically affect children first, increasing women's concerns and workload. In addition, because of the drought, husbands may look for better jobs elsewhere, this aggravating these conditions. The woman takes on responsibility for the total care of the household, in addition to the work for which their partner was responsible. All these factors likely contributed to the significantly higher levels of anxiety for women in the drought area found in the present study.

In most developing countries, even in the absence of disasters, women are burdened with a greater amount of stress associated with social roles and expectations. This explains their generally higher levels of anxiety and emotional distress than men. Although the norms for the STAI do not address gender differences, there are reasons to expect that women might have higher levels of stress than men. And, that these levels might be additionally elevated under certain stressful conditions. For example, within North America, research (Cleary, 1987) has shown that even when there has been an increase in women's financial resources, women had less leisure time, were more dependent on their own income, and had increased financial responsibilities for their children. Some of these factors could be similar in developing countries.

Even though men undoubtedly experience stress under drought conditions, no significant differences were obtained on anxiety measures between men living in the drought and no-drought areas. A likely explanation for this could be within the cultural tendency almost universal among Brazilian men not to express or to report their "feelings or emotions" for fear of being seen as weak. Although it may seem to be inconsistent, men in this study reported significantly higher levels of emotional distress in the drought than in the no-drought area. This measure, the SRQ-20 scale, contains some somatic items on which men may have felt comfortable reporting their distress.

Conclusions

Because this study was one of the first to address the psychological responses of individuals living in a drought prone area in a developing country, the results obtained in this location may require confirmation elsewhere. However preliminary, the study has provided insights to

help guide future research. In a few cases, it has even identified hypotheses to test in these studies.

First, a distinctive pattern of psychological response to the cumulative effects of drought was found. The findings revealed that participants in the drought area had significantly higher levels of anxiety and emotional distress. This is likely to be a common response to slow-onset disasters. Unlike fast-onset disasters, the occurrence of acute psychological response such as PTSD was found to be very low and unrelated to drought. Although no causal relationships were tested, this pattern of response seems to be associated with the recurrent nature of the drought, its chronic, pervasive effects, and the absence of a precipitous traumatic event.

Second, the psychological measures used in this study should not be viewed as assessing the only possible responses to drought. The diffuse and indirect consequences of drought, and its seemingly interminable nature provide a unique set of conditions confronting individuals daily. Repeated exposure to events over which one does not have control often result in feelings of helplessness and resignation. A frequent accompaniment to such "learned helplessness" (Western, 1999) is depression. This reasoning suggests that future research should include such a measure to determine the frequency and intensity of depression under chronic drought conditions.

Third, an important finding was the significant gender differences in psychological response. Gender differences generally have been overlooked in disaster research in developing countries. Traditional psychological measures have been developed and standardized on university students within industrialized countries. Such measures often consider men and women to be equal, and disaster research has proceeded on the assumption that both have the same social status and equal access to available resources. Neither is true in most developing countries. Because gender differences have been minimally researched in a disaster context within developing countries, the present finding of such differences provides a strong argument for their inclusion in subsequent research.

Finally, the dramatic differences in demographic makeup of the two cities selected for the study was unexpected. Cities were selected with consultative assistance as roughly comparable in size and composition. The only clear difference was to be a pattern of recurrent drought in one city and its absence in the other. However, following testing and data analyses, substantial socio-economic and educational differences emerged. Rather than a failure of random sampling, or improper selection of cities to study, likely these differences had developed

in response to the cumulative effects of periods of drought on Queimadas. Considering the widespread and chronic consequences of drought, such sampling differences are not likely unique to the present study but will contaminate virtually all studies of drought. It is impossible to identify and test people from comparison cities before the cumulative effects of drought have begun to erode the social fabric of the city in the drought area. This may be one of the greatest methodological challenges confronting research on this topic.

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