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Predicting Stress Related to Basic Needs and Safety in Darfur Refugee Camps: A Structural and Social Ecological Analysis

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Abstract

The research on the determinants of mental health among refugees has been largely limited to traumatic events, but recent work has indicated that the daily hassles of living in refugee camps also play a large role. Using hierarchical linear modelling to account for refugees nested within camp blocks, this exploratory study attempted to model stress surrounding safety and acquiring basic needs and functional impairment among refugees from Darfur living in Chad, using individual-level demographics (e.g., gender, age, presence of a debilitating injury), structural factors (e.g., distance from block to distribution centre), and social ecological variables (e.g., percentage of single women within a block). We found that stress concerning safety concerns, daily hassles, and functional impairment were associated with several individual-level demographic factors (e.g., gender), but also with interactions between block-level and individual-level factors as well (e.g., injury and distance to distribution centre). Findings are discussed in terms of monitoring and evaluation of refugee services.

Keywords

refugee camps; current stressors; humanitarian aid; neighbourhood effects; hierarchical linear modelling

Research on psychosocial factors of refugee health has largely been limited to the effects of potentially traumatic events. In general, this literature supports the contention that exposure to severe wartime events is associated with psychological distress (Holtz 1998; Jaranson *et al.* 2004; de Jong *et al.* 2001; Mollica 2004; Shrestha *et al.* 1998; Tang and Fox 2001), and that this distress is associated with considerable functional impairment (Dubois *et al.* 2004; Mollica *et al.* 2001; Momartin *et al.* 2004; Tol *et al.* 2007; Thapa *et al.* 2003). International aid agencies and the United Nations' High Commissioner for Refugees (UNHCR) recognize that the psychological distress that accompanies mass displacement can be debilitating and thus a barrier to accessing services targeted at families, and when symptoms include aggressive behaviour, can be a very real threat to the safety of camp residents, humanitarian aid workers, and host country populations (Sphere Project 2004). The Inter-Agency Standing Committee Guidelines on Mental Health and Psychosocial Support in Emergency Settings (IASC 2007) propose that psychosocial perspectives be integrated into all humanitarian support activities in order to deliver services more effectively and protect

refugees' human rights. However, there is little empirical evidence concerning the stress related to structural and social ecological factors in the environments to which refugees are displaced—the factors that humanitarian aid agencies are designed to address. In one meta-analysis of studies on factors associated with refugee mental health (mostly studies undertaken outside of camps; Porter and Haslam 2005) findings suggested that poor quality of accommodation and restricted economic opportunity are both key factors in predicting psychological distress among refugees.

Research into structural factors in refugee camps has precedence in the public health literature. Among Palestinian urban refugees in Beirut, those with housing problems were twice as likely to report an illness in their families as those without housing problems (Habib *et al.* 2006). The presence of unsanitary latrines and the proximity of animals were associated with increased diarrhoeal incidence among children in camps in Malawi (Roberts *et al.* 2001). Findings such as these are the bases for camp site planning that explicitly link shelter, water, and sanitation to communicable disease prevention (Connolly *et al.* 2004), but as yet there have been no studies examining the effects of structural factors on psychosocial well-being. There is substantial evidence from US-based studies on disadvantaged communities that factors present in the immediate socio-economic environment (i.e., neighbourhood factors) are associated with physical and mental health outcomes, over and above individual-level socio-economic and health-related characteristics (e.g., Cérda *et al.* 2008; Cohen *et al.* 2003; Lochner *et al.* 2003; Morenoff 2003; O'Campo *et al.* 1997; Robert 1999; Sampson *et al.* 2002; Silver *et al.* 2002). Drawing on this literature and methodology, we explore how the refugee camp environment impacts individual mental health outcomes.

With the dominant focus on traumatic stress, there has been little focus on the daily hassles resulting from the structural and social ecological aspects of displacement experienced by refugees. However, daily hassles (e.g., arguments with family, commuting problems) have long been recognized as important determinants of psychological symptoms among non-displaced communities in the United States and Europe, often accounting for more variance in distress than major life events (e.g., divorce, death of a loved one; Kanner *et al.* 1981). Among US immigrant populations, frequent post-migration hassles include acculturation-specific stressors along with more general daily hassles (Lay and Nguyen 1998; Safdar and Lay 2003). Recently two studies have approached the issue of daily hassles in war-affected populations. Miller *et al.* (2008) found that among war-affected men and women living in Kabul, Afghanistan, the stress surrounding daily hassles (or, 'daily stressors', e.g. air pollution, quality of housing) accounted for as much variance in psychological symptoms and functional impairment as the number of war experiences they reported. Moreover, with more daily hassles the influence of war experiences on distress was decreased; i.e., the effect of war experiences on psychological distress was moderated negatively by daily hassles. Rasmussen, Nguyen *et al.* (in press) compared the contributions of daily hassles' and potentially traumatic events' (PTE) association with distress and functional impairment among refugees from Darfur living in camps in Chad, and found that the number of stressful daily hassles accounted for statistically greater variance than PTEs. Unlike Miller *et al.* (2008), multivariate models indicated that daily hassles mediate the effect of PTEs on distress rather than moderate them. This may suggest a more conventional 'change of baseline' hypothesis, in which PTEs reduce refugees' tolerance for the daily hassles of life in displacement camps, thus making daily hassles seem more distressing than they are to those with fewer PTEs. Whatever the relationship between trauma and daily hassles, daily hassles seem to be reliable predictors of distress among war-affected populations and thus they may also be promising targets for interventions.

The purpose of this paper is to examine the impact of structural and social ecological factors on stress related to the daily hassles of feeling safe and acquiring basic needs, as well as

their impact on general functional impairment. This includes examining the direct relationship between structural and social ecological factors at the refugee camp level (e.g., structural: location in camp, proximity to resources; or social ecological: percentage of dependents in block, percentage of single females in block) and stress, as well as looking at the interaction between these factors and individual-level ‘vulnerability’—demographic factors that may make individuals more vulnerable in displaced settings (e.g., age, gender, disability). This is in line with humanitarian goals which aim to protect vulnerable individuals and provide for their specific needs (Sphere Project 2004) and the sociological literature on factors associated with health outcomes (e.g., Cérda *et al.* 2008; Morenoff 2003). Data were from two refugee camps in eastern Chad run by UNHCR. As refugees were nested within ‘blocks’ (sub-sections of camps) with particular characteristics (described below), we used hierarchical linear modelling (HLM) to identify correlates while accounting for interdependence between participants residing in the same blocks. We conceptualized blocks similar to how sociologists have conceptualized neighbourhoods (e.g., Sampson *et al.* 2002): higher-level organizing units with characteristics that influence the well-being of residents. A multi-level approach is preferable to simply using residents’ individual reports of their locations and available resources: first, for methodological reasons, as individual residents do not often have access to precise information about their blocks; and second, for practical implications of findings, as camp authorities most often allocate resources based on higher-level units, not individuals. To which blocks individuals are assigned is based on family reunification (individuals are assigned to blocks in which they have family already present) and date of arrival (later arrivals are assigned to newer, more peripheral blocks).

Although the approach was largely exploratory, we had certain expectations that the impacts of structural and social ecological characteristics of these blocks would differ by the individual factors that indicate vulnerability. We used groups defined as ‘vulnerable’ by humanitarian aid organizations, including women, elderly, and persons with disabilities. We examined the effects of demographic characteristics (e.g., gender, number of children) and the effect of structural accommodations (e.g., the water resources available in an area of a camp) separately as main effects, and then as interactions—both within and across levels of analysis. Other individual-level data relevant to protection and aid concerns included number of children, marital status, and—as many marriages in Darfur are polygamous—number of wives in a marriage. As this is the first study of its kind to our knowledge, our hypotheses were general: women, the elderly, and people with disabilities would report more stress when they were further from resources such as water, food distribution, or health care facilities, or lived on the camp periphery.

Methods

This study was undertaken in April through June 2007 as part of a larger evaluation of psychosocial programmes in refugee camps in eastern Chad, and was reviewed and approved by the Institutional Review Board of New York University School of Medicine and UNHCR in Abéché, Chad, and the Council of Chiefs of the camps themselves. Detailed methods and procedures for this study are reported elsewhere (including measure development and staff training; Rasmussen, Katoni *et al.* in press), and only information relevant to the current analyses is reported here.

Recruitment

Participants were drawn from UNHCR registration records in two refugee camps in the Farchana administrative district. Our sampling frame included all adult residents (aged 18 or older), or 12,413 individuals (42.5 per cent for these camps in UNHCR records). Within each camp we used simple random sampling to obtain a sample of approximately 7.5 per

cent of the adult population ($n = 956$ in one camp, or 7.7 per cent; and $n = 485$ in the second, smaller camp, 7.7 per cent) using the SPSS 14.0 Data Selection module. This proportion was chosen in order to obtain a sample that would be large enough to satisfy statistical power needs but remain within the limits of how many people staff could reasonably expect to interview in the time allotted for the project.

Each day of the study research staff selected 20–25 individuals included in the sample and visited them at their homes. These individuals were then asked to come to a central location the next morning for an interview about the well-being of camp residents. If a targeted individual was not available, a family member was asked to participate. Those who arrived the next morning were informed of the study and their right to refuse to participate, asked for their oral consent, and then, if they agreed, interviewed. Women with small children were interviewed first, followed by the elderly. Those who waited were offered tea and peanuts. Participants received no other compensation for their time, although following the interview those with pressing material needs were referred to appropriate NGOs working in the camps.

Measures

To collect individual-level data we used a questionnaire consisting of demographics, current camp stressors, and functional impairment. Demographics included age, gender, years of education, marital status, and region of origin within Darfur.

Our three dependent variables were 1) stress concerning safety issues, 2) stress concerning basic needs, and 3) functional impairment. Our measure of daily hassles in the camp was developed using brief ethnographic methods which incorporated a free listing of problems in focus groups followed by discussions with key informants (Bolton and Tang 2004; Wilk and Bolton 2002; Handwerker 2001). A detailed account of this procedure is presented in Rasmussen, Katoni *et al.* (in press). The resulting measure included 21 daily hassles experienced in the camps, rated 'not stressful', 'a little stressful', or 'very stressful'. During focus groups, it became obvious that there were several categories of hassles among the types reported. We arranged these using rational reorganization into subscales. Those relevant to the current study were 'perceived safety' and 'basic needs'. Safety concerns included problems with other residents, locals, and camp guards; property stolen, recruitment by rebels, threats from militant groups, sexual assault, and not feeling safe in general. Basic needs included problems getting food, firewood, clean water, medical help and money, as well as problems with shelter, access to latrines, and finding privacy. Both attained good internal reliability statistics: for perceived safety, $\alpha = .82$; for basic needs, $\alpha = .71$.

To assess functional impairment we used the World Health Organization's Disability Assessment Schedule-Version II (WHODAS-II). The WHODAS-II comprises 12 items concerning a variety of activities of daily living, which are rated on difficulty in the past 30 days on a 1 to 5 scale. Example items include, 'taking care of your household responsibilities', 'walking a long distance, such as a kilometre', 'washing your whole body', and 'maintaining a friendship'. The WHODAS-II was developed internationally, and has been piloted and used to measure functional impairment in many countries worldwide (Deconinck 2003; Mogga *et al.* 2006). It has been used in two studies involving refugees and survivors of war trauma (Miller *et al.* 2008; Tol *et al.* 2007). Because of a concern that the WHODAS-II included items drawn from several domains of functioning, we used principal components analysis to examine its dimensionality. Examining the scree plot and item loadings (<6) showed us that the WHODAS-II represented one dimension in the current sample, accounting for 42.05 per cent of the variance. Internal reliability in the current sample was good: $\alpha = .87$.

Standard survey translation procedures (Bontempo 1993) from English to Arabic were applied to all survey content. Although most refugees' first language in the camps is Masalit, there exists no standard written Masalit, and thus we had to rely on simultaneous interpretation from Arabic into Masalit during survey administration. As reported in Rasmussen, Nguyen *et al.* (in press) we followed administration and interviewer training guidelines for mental health survey research involving refugee populations that use primarily nonwritten languages (Sabin *et al.* 2003).

Higher-level variables were taken from UNHCR records of camp residents and UNHCR maps of the camps themselves. From these records we calculated block population statistics that were consistent with the aforementioned neighbourhood literature on socio-ecological determinants of distress: size of population, percentage of single women, percentage of widows, and a 'per cent dependents' statistic comprised of the summed percentage of children under five years of age and the percentage of adults over 60 years of age. From UNHCR maps of the two camps (which include block locations, water resources, schools, health centres, NGO offices, and the location of food distribution centres) we were able to code whether or not a block was on the camp's periphery, whether or not a sanitary water source existed in the block, whether or not the block was adjacent to schools, and whether or not it was adjacent to NGOs. In addition, using our best estimate of blocks' centre and the scale provided on the maps, we were able to calculate the distance in metres from the centre of blocks to the nearest hospital centre and to the camps' food distribution centres. After examining the distributions of these variables, we transformed the distance from the food distribution centre (which was heavily skewed towards zero) into a bivariate measure: less than one kilometre, and a kilometre or farther.

Sample Characteristics

We obtained valid data for 848 of 1,441 (58.8 per cent) of our intended sample: 727 of the targeted individuals (50.5 per cent), and for 121 (8.4 per cent) who were not available we interviewed family members who were available.¹ These individuals were members of 827 households (i.e. 21, or 2.5 per cent, were drawn from households with other participants), and no household supplied more than two members. Three quarters of the interviewed sample ($n = 630$, 74.3 per cent) resided in the larger camp, compared to just over half the non-interviewed sample ($n = 326$, 55.0 per cent; $\chi^2[\text{df} = 1] = 58.32$, $p < .01$). Females outnumbered males by two to one, and Masalit vastly outnumbered those from other ethnic groups. The average age of the sample was 33.88 (SD 14.49), and the average number of years of education was 1.91 (SD, 3.36). Three-quarters of the sample was married ($n = 639$, 75.4 per cent), which was different from the non-interviewed sample ($n = 405$, 68.3 per cent; $\chi^2[\text{df} = 3] = 17.36$, $p < .01$). Polygamous marriage was common, with over half of the population reporting being in marriages with more than one wife per husband ($n = 433$; 51.6 per cent). Participants reported an average of 3.98 children (SD = 3.34). Polygamy examined in the context of parents' concerns (i.e., that women in polygamous marriages felt primarily responsible for only their children, while men felt responsible for children of all wives) necessitated that we calculate children per wife instead of children alone; the average number of children per wife was 3.38 (SD = 2.68; sons per wife, $M = 1.31$, $SD = 1.30$, daughters per wife, $M = 1.29$, $SD = 1.41$).² The vast majority of respondents reported that their primary work in Darfur was farming ($n = 795$, 90.2 per cent), and that in the camps

¹Substituting family members for targeted individuals was distributed unevenly across camps, with 110 (17.5 per cent of the camp sample) in camp 1 and 11 (5 per cent) in camp 2 ($\chi^2 (N = 848, \text{df} = 1) = 20.40, p < .001$). No other demographic differences existed between these interviewees.

²The number of children per wife was based on the full sample. Sons per wife and daughters per wife were based on a sample of those who reported the gender of their children, $n = 787$. The range for those reporting number of children (0 to 19) was greater than those reporting gender (0 to 12).

they had no occupation ($n = 662$, 78.1 per cent). The average time living in the camps was 36.04 months (SD, 5.89), with PTEs occurring an average of 8.07 months prior to arrival (SD, 8.98). Most interviews were conducted in Masalit ($n = 589$, 69.5 per cent), just over a quarter of the interviews in Arabic ($n = 225$, 26.5 per cent), three in another language (using a local interpreter; 0.4 per cent) and 31 were missing language of interview data (3.7 per cent).

Block Characteristics

The two camps comprised 74 separate blocks. Two blocks were missing map data, and thus structural data was not analysed for them. The average population of the block was approximately 600 people. Over half the blocks (55 per cent) were located on the periphery and over half (58 per cent) had a water source in their block. Just 11 per cent were located next to an NGO, while almost one third (30 per cent) were next to a school. Relevant data is included in Table 1.

Analyses

We used hierarchical linear modelling to estimate the effects of individual-(level 1) and block-level (level 2) characteristics on the following outcomes: stress about safety concerns, stress surrounding basic needs, and functional impairment. Main effects models were tested first, and then models including level 1 interactions (e.g., gender by number of children), level 2 interactions (e.g., availability of water in block by percentage of dependents in block), and finally cross-level interactions (e.g., gender by availability of water in block). Significant interaction effects were plotted and simple slopes were tested for significant difference from zero.

Results

We report relevant main effects from each model first, and then follow by reporting interactions. All coefficients and standard errors for hypothesized and final models are presented in Tables 2, 3, and 4. In Tables 2, 3, and 4, individual-level predictors are presented as headers of sections, with higher-level variables with which they interact directly below them. For example, in Table 2 gender was an individual-level predictor of Safety Concerns; higher-level variables with which gender interacted were whether or not the block was on the periphery of the camp, whether or not the block was next to an NGO, whether or not the block was next to a school, whether or not there was a water source in the block, the distance (in metres) of the block from the hospital, and the distance (in kilometres) of the block from the distribution centre (all listed in the Full Model). Of these, only the presence of a water source was a significant cross-level interaction with gender predicting safety concerns, as indicated in the Final Model by statistically significant coefficient and standard error.

Gender exerted main effects on all three outcome measures, with men reporting more stress than women. However, interactions with gender indicated that several higher order camp structure components moderated these differences. The interaction between gender and location of water source was associated with safety concerns; males who had no water sources in their blocks reported more safety concerns ($B = .20$; $p < .05$). Examining simple slopes revealed that men and women in blocks with water sources were equally concerned about safety. Gender also interacted with several camp structure components to predict functional impairment: being next to an NGO, next to a school, having a water source in the block, and distance in metres from the block to the nearest hospital. The latter two interactions, although statistically significant, were so small as to be irrelevant. Examining simple slopes revealed that for men, having a school near one's block was associated with

better functioning, but being adjacent an NGO was associated with worse functioning. These factors did not moderate women's functioning.

Number of children did not exert a main effect on any of the outcomes with the exception that those refugees with more sons (per wife) reported less stress about basic needs. Number of children in the family interacted with both higher and lower-level factors as significant predictors of stress concerning basic needs and functional impairment. The interaction between gender and sons (per wife) was significantly associated with stress about basic needs and functional impairment—females with more sons were more likely to report more concern for basic needs and those with more children in general reported more functional impairment (men's reports did not change according to children). There was also a statistically significant interaction between the number of children per wife and being near a school. However, examination of simple slopes revealed that this effect was small, and added little to the negative main effect.

Age exerted a main effect on safety concerns, with older residents reporting less stress than younger residents. The interaction between age and being next to a school was significantly associated with safety concerns ($B = .01, p < .001$) and a similar interaction was found for functional impairment ($B = .021, p < .001$). Plotting simple slopes revealed that in both cases younger respondents living in blocks next to schools reported fewer safety concerns and less functional impairment than those living away from schools.

Having a debilitating injury was associated with all three outcomes—main effects were statistically significant for safety concerns, and interactions were observed for stress related to basic needs and functional impairment. Having a debilitating injury and living on the periphery of the camp was related to more safety concerns. Plotting of simple slopes revealed that this effect was due entirely to the injured group (i.e., for non-injured participants, there was no effect of periphery). The interaction between debilitating injury and metres from hospital was associated with stress about basic needs, but this effect was so small as to be negligible ($B = -.0004; p < .05$). However, the same interaction was found for functional impairment: those reporting debilitating injury reported no difference in impairment dependent on how close they were to the hospital, while those without injury reported more functional impairment if they were further from the hospital. The opposite effect was found for the interaction between injury and distance from distribution centre, in which those who were injured and further from the food distribution centre reported more functional impairment, whereas distance was not a factor for those who did not have a debilitating injury.

Discussion

To our knowledge this is the first study to systematically explore the relationship between structural factors within camps and individual refugees' reports of stress using cross-level analyses. We believe that this methodology can provide an initial framework for monitoring and evaluating whether specific camp stressors differentially affect specific vulnerable groups. This study extends the work laying the theoretical foundation of psychosocial perspectives (e.g. Ager 1997; Boothby 1992; Miller and Rasmussen in press; Wessels and Monteiro 2004) by integrating higher-level factors into the empirical findings that support it. We found that the location of residents in refugee camps is related to stress for some subsections of the population more than for others. Humanitarian protection and psychosocial programmes are often interested in providing services to vulnerable individuals within refugee camps, and guidelines detail the importance of tailoring service delivery to meet the specific needs of these groups (Sphere Project 2004). Our findings suggest that

those designing and allocating residence to refugees should be concerned with gender, age, and disability during the allocation process.

We interpret our gender-related findings through the general frame that male refugees are more influenced by structural factors via their culturally-prescribed duties, and women by number of children via their childcare responsibilities. The somewhat surprising finding that men reported more stress overall than women runs counter to the trauma and psychopathology literature (e.g., Kessler *et al.* 1995; Tolin and Foa 2006), and likely reflects a culturally-prescribed gender role for men in which they are responsible for securing resources for the family. During pretesting many men told us that the Koran prescribes men's duties as making money and bringing resources into the family, whereas women's were relegated to domestic caregiving. In the refugee camps the female domestic sphere was maintained, while the male sphere of employment and money was more fragile. Men's concerns were even higher when living near NGOs. This may be related to a possible secondary gain, in which impaired functioning is reinforced by easier access to humanitarian aid. That secondary gain among refugees is a serious problem is subject to some controversy (Breslau 2005; de Jong 2005), but the potential for refugees to overemphasize stress when this will result in receiving more resources cannot be denied. Notably, the presence of schools and water sources was associated with similar rates of stress between men and women, possibly suggesting that men's concerns for what they no longer bring to the family may be lessened by access to resources that families can obtain themselves; this is in contrast to humanitarian aid, which is usually provided directly. Women, by comparison, reported more functional impairment and concerns about basic needs with more children, again consistent with culturally-prescribed roles.

Surprisingly, elderly camp residents reported no more stress than their younger adult neighbours. Age was a factor only in the presence of schools, where younger adults living near schools reported less concern for safety than those living further from schools. This may be because younger adults are more likely to have school-aged children. School may be viewed by parents as a protective environment for their children, thus reducing concerns for safety in general.

Findings related to injured individuals suggest that their settlement may be an important consideration for camp planning. As expected, residents with injuries who lived in peripheral blocks were more concerned about safety than those living in the camp interior, suggesting that location of residence is an important factor for those who are less physically able. However, it was surprising that there was no significant main effect for living on the periphery of the refugee camp. Given the history of raids from militia groups, and the increased exposure to a hostile host community, we expected that the entire population on the periphery would feel more concern about their safety.

Distance to the distribution centre was associated with functional impairment for those with injuries, suggesting that injured residents had difficulty travelling back and forth to obtain food and non-food items. Although assigning residents to specific areas of refugee camps may be a complicated practice, given arrival times and the nature of emergencies, this finding highlights the need for a risk and vulnerability assessment as described in the Sphere Project standards (2004) which considers disability in location planning. Surprisingly, those with injuries did not report more concerns or functional impairment when further from hospitals. Counterintuitively, it was non-injured residents who reported more functional impairment further from hospitals. We have no plausible explanation for this finding.

Non-significant findings may reflect that camps were designed in a thoughtful, well-planned and structured system. In developing our measures for the structural factors, we noted that

there was a relatively equal distribution of water points throughout the camp with almost all blocks having water in the block or in the adjacent block—meeting the Sphere Project standards of being closer than 500 metres (2004). The lack of a main effect for water availability in blocks seems to confirm this. Further, apart from the interaction between injury and distance from hospital, none of the camp structural components were significantly correlated with stress about basic needs.

While we believe that this paper represents an important first step, there are a number of limitations to this study. The maps available allowed only approximate distances rather than precise distance within the camp, although we adjusted for this by dividing distances into categories. Our measures of structural variables were also limited to the map and were not exhaustive. Further development of precise measures of camp factors is important for multi-level analysis. Although our study included a measure of injuries, we did not include a measure of overall physical health in general. It is likely that illness has a negative effect on the stress surrounding basic needs, and future studies should include physical well-being as a variable. Another limitation to our study was the 59 per cent response rate. Although we found no indication that settlement patterns of demographic groups were not at random, there is always the possibility that movement within the camps may have occurred based on needs, in which case the strength of our findings would be attenuated. Finally, we must stress that our data are cross sectional, and as such only suggest that relationships between our predictors and outcomes exist, not the directions of those effects.

Conclusions

Given that psychosocial factors can be debilitating for individuals and act as barriers to needed services, further understanding what predicts them is vital. Understanding the structural and social ecological factors and how they interact with individual vulnerabilities will allow for better refugee camp management and service delivery that responds to the needs of the most vulnerable, a goal that is central to many aid organizations' work. The analytic framework presented here provides a systematic method for monitoring and evaluating the provision of basic services for refugee populations, making specific considerations for individual needs and identifying areas in need of improvement and notable successes.

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Table 1Block Characteristics within Refugee Camps ($N=74$)

	<u>Bivariate measures</u>		<u>Continuous measures</u>	
	<i>n</i>	%	M	<i>SD</i>
Location on periphery	41	55.4		
Adjacent to NGO	11	14.9		
Adjacent to school	30	40.5		
Sanitary water in bloc	43	58.1		
One kilometre from distribution	15	20.3		
Metres from hospital			555.27	279.14
Population of block			598.16	378.55
% single women >18 years			30.54	4.63
% widows			11.04	3.66
% dependents			20.91	2.72

Table 2

Full and Final Models for Safety Concerns for Darfur Refugees

Fixed effect	Full model		Final model	
	Coefficient	SE	Coefficient	SE
Intercept	1.35	0.16 ***	1.28	0.12 ***
Periphery	0.20	0.19	0.04	0.05
Next to NGO	0.73	0.32 *		
Next to school	-0.61	0.19 **	-0.05	0.04
Water in block	-0.24	0.16	-0.28	0.16
Metres to hospital	0.00	0.00		
Block population	-0.00	0.00		
% dependents in block	-0.01	0.01 *	-0.02	0.01 *
Km from distribution	0.10	0.10		
Gender	-0.31	0.09 ***	-0.25	0.06 ***
Periphery	-0.08	0.11		
Next to NGO	-0.37	0.19 *		
Next to school	0.33	0.12 **		
Water in block	0.18	0.09 *	0.20	0.10 *
Metres to hospital	-0.00	0.00		
Km from distribution	-0.05	0.06		
Age	-0.01	0.003 *	-0.01	0.002 ***
Periphery	-0.00	0.00		
Next to NGO	-0.01	0.00		
Next to school	0.02	0.003 ***	0.01	0.002 ***
Water in block	0.00	0.00		
Metres to hospital	0.00	0.00		
Km from distribution	0.00	0.00		
No. of wives	-0.03	0.02		
No. of sons per wife	0.01	0.04		
No. of daughters per wife	-0.07	0.04		
Debilitating injury	-0.24	0.14	-0.14	0.07 *
Periphery	0.31	0.14 *	0.22	0.11 *
Next to NGO	0.28	0.21		
Next to school	-0.14	0.14		
Water in block	-0.01	0.16		
Metres to hospital	-0.00	0.00		
Km from distribution	0.08	0.07		
Gender X sons per wife	-0.00	0.02		
Gender X daughters per wife	0.02	0.02		

* $p < .05$;

**
 $p < .01$;

 $p < .001$;

†
 $.05 < p < .06$.

Degrees of freedom:

For Block-level: 62.

For individual-level: 587.

Table 3

Full and Final Models for Basic Needs Concerns for Darfur Refugees

Fixed effect	Full model		Final model	
	Coefficient	SE	Coefficient	SE
Intercept	1.70	0.11***	1.67	0.07***
Next to NGO	0.37	0.18*		
Next to school	-0.30	0.16		
Water in block	-0.07	0.12		
Metres to hospital	-0.00	0.00	0.00	0.00
Block population	-0.00	0.00		
% dependents in block	-0.01	0.01	-0.01	0.01*
Km from distribution	0.22	0.07**		
Gender	-0.22	0.08**	-0.19	0.04***
Next to NGO	-0.15	0.11		
Next to school	0.04	0.10		
Water in block	0.06	0.07		
Metres to hospital	0.00	0.00		
Km from distribution	-0.11	0.04**		
Age	-0.00	0.00		
Next to NGO	0.00	0.00		
Next to school	0.008	0.003**		
Water in block	-0.00	0.00		
Metres to hospital	0.00	0.00		
Km from distribution	-0.00	0.00		
No. of wives	0.00	0.02		
No. of sons per wife	-0.07	0.03*	-0.06	0.02*
No. of daughters per wife	0.00	0.04		
Debilitating injury	0.03	0.10	-0.00	0.05
Next to NGO	0.05	0.18		
Next to school	-0.06	0.15		
Water in block	-0.08	0.12		
Metres to hospital	-0.00	0.00	-0.0004	0.0002*
Km from distribution	0.08	0.08		
Gender X sons per wife	0.06	0.02**	0.05	0.02**
Gender X daughters per wife	-0.01	0.02		

*
 $p < .05$;**
 $p < .01$;***
 $p < .001$;†
 $.05 < p < .06$.

Degrees of freedom:

For Block-level: 63.

For individual-level: 591.

Table 4

Full and Final Models for Functional Impairment for Darfur Refugees

Fixed effect	Full model		Final model	
	Coefficient	SE	Coefficient	SE
Intercept	2.98	0.24***	2.95	0.23***
Next to NGO	0.65	0.34	0.67	0.31*
Next to school	-0.77	0.31*	-0.84	0.29**
Water in block	-0.32	0.24	-0.36	0.023
Metres to hospital	0.0009	0.0004*	0.0012	0.0003**
Block population	-0.00	0.00		
% dependents in block	0.01	0.01		
Km from distribution	0.00	0.18	-0.01	0.04
Gender	-0.45	0.15**	-0.42	0.14**
Next to NGO	-0.37	0.18*	-0.41	0.17*
Next to school	0.42	0.17*	0.46	0.16**
Water in block	0.22	0.14	0.24	0.12 [†]
Metres to hospital	-0.00	0.00	-0.0005	0.0001**
Km from distribution	0.00	0.00		
Age	-0.00	0.00	-0.00	0.00
Next to NGO	0.00	0.01		
Next to school	0.02	0.01***	0.021	0.004***
Water in block	0.00	0.00		
Metres to hospital	-0.00	0.00		
Km from distribution	0.00	0.00		
No. of wives	0.03	0.03		
No. of children per wife	-0.05	0.03	-0.05	0.03
Next to school	-0.04	0.03	-0.04	0.02*
Debilitating injury	0.07	0.18	0.04	0.10
Next to NGO	0.14	0.27		
Next to school	-0.19	0.20		
Water in block	-0.05	0.21		
Metres to hospital	-0.0012	0.0003***	-0.0012	0.0003***
Km from distribution	0.29	0.11*	0.26	0.10*
Gender X children per wife	0.04	0.02**	0.04	0.02**

* $p < .05$;

** $p < .01$;

*** $p < .001$;

[†] $.05 < p < .06$.

Degrees of freedom:

For Block-level: 64.

For individual-level: 649.