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POLICY AND PRACTICE

Emergency housing in the aftermath of Hurricane Katrina: an assessment of the FEMA travel trailer program

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Abstract Hurricane Katrina devastated the Gulf Coast of the United States in 2005. More than 1800 persons died, and the disaster stands as the costliest in U.S. history. Over 200,000 former residents of New Orleans continue to reside elsewhere. The U.S. Federal Emergency Management Agency (FEMA) emergency housing program, and specifically the design, manufacture, and deployment of its travel trailer housing units, remain the subject of controversy. The FEMA travel trailer program is critiqued, as is recent empirical evidence on the deleterious health outcomes experienced by many trailer occupants. The results of a pilot investigation are reported, whereby the post-occupancy assessments of a group of occupants of single-site FEMA trailer installations were compared to a group residing in two FEMA trailer park communities in New Orleans. Among the findings, the travel trailer unit was assessed by occupants as difficult to personalize to occupants' preferred patterns of use, inadequate in size, affording few site amenities, and little overall privacy, and the unit itself functioned as a source of chronic environmental stress. The findings are translated into a theoretical/operative model of person-environment interactions, to assist in further research on this subject.

Keywords Adaptability · Temporary dwelling · Disaster mitigation · FEMA emergency housing communities · Health outcomes · Hurricane Katrina · Stress · Locus of control

1 Introduction

Global warming will likely have a profound effect on the well-being of hundreds of millions of humans in the coming decades. Government bureaucracies are likely to be less and less effective in terms of implementing rapid response solutions and the consequences will be devastating unless appropriate, preemptive mitigation measures are taken

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(Borenstein 2007; Bourne 2007). Many climatologists and housing experts view Hurricane Katrina, which made landfall on August 29, 2005 along the American Gulf Coast, as a harbinger of the future of global warming (Barnett and Beckman 2007). Eighty percent of New Orleans was inundated by Katrina's floodwaters. The death toll was 1860, and 2.5 million internally displaced persons (IDPs) were forced to find alternative housing literally overnight, with 125,000 residences destroyed or severely damaged (Booth-Thomas 2006). Hurricane Katrina stands as a human tragedy of epic proportions, and the costliest natural disaster in American history (Figs. 1, 2). This disaster epitomized the consequences for persons who do not have the means to evacuate or otherwise cope with the ensuing chaos (Fothergill et al. 1999; McDowell 2002). At $48 billion and running, this catastrophe has led to significant repercussions throughout American society, and has given voice to concerns internationally with regards to the efficacy of government-provided emergency housing (Verderber forthcoming, 2008).

Widespread consensus exists that Katrina and its aftermath overwhelmed the Federal Emergency Management Agency (FEMA). By May of 2006 more than 98,000 FEMA

Fig. 1 Aftermath of Hurricane Katrina, 2005

Fig. 2 Aftermath of Hurricane Katrina, 2005

trailers had been deployed to the U.S. Gulf Coast region. Forty-eight thousand were in use in Louisiana and the remaining units were set up in Mississippi and Alabama. These housing units, however, were designed and manufactured to withstand winds of only 40 miles per hour, according to FEMA's own minimum construction specifications (Sack 2006). Ironically, the federal government, in seeking to quickly provide aid and assistance, provided housing that has been linked to adverse health outcomes including stress disorders and psychological maladjustments, including severe chronic depression (Kinsey 2006).

The FEMA trailer was conceived and built as a generic, no frills, and strictly utilitarian building type. In fact, recipients are threatened with legal action if they attempt to personalize their trailer. No painting, rearrangement of the interior amenities, nor site relocation opportunities are allowed once installed. Each and every unit is painted the identical institutional color—white. Sixteen different manufacturers were contracted by FEMA to build the emergency dwellings in the aftermath of Hurricanes Katrina and Rita in 2005. Detailed design and construction specifications for three basic unit types were provided to vendors although in reality each vendor retained some autonomy in terms of actual materials and fabrication procedures. Four large corporations built more than 80% of the housing units requisitioned by the federal government. FEMA claimed this was inevitable due to the need to deliver units as quickly as possible.

The units were transported to their installation sites via truck and rail. Deployments in the field ranged from single units placed on concrete blocks upon the front lawns of destroyed homes, in front of a business, on the site of an oil refinery in Chalmette, Louisiana near New Orleans, to hundreds of units on a single open field, as in the case of Renaissance Village in Baker Louisiana. Renaissance Village was a large, remote encampment set up near Baton Rouge. Individual unit deployments therefore represented one end of the spectrum while large-scale encampments represented the other end. The interior of the typical unit was spartan.

Anecdotal and empirical evidence suggests that consequences of the Federal Emergency Management Agency (FEMA) travel trailer housing program may include an increase in domestic violence, increased divorce rate, higher incidence of depression, anxiety and overall uncertainty, sleep disorders, hyper-vigilance, flashbacks, and increased suicide rates. Among children, deleterious outcomes cited include regressive behaviors, nightmares, aggression towards others and towards oneself, social withdrawal, isolation, school avoidance, decline in nutrition, and fear of darkness. Among the aged, outcomes cited include sleep disorders, memory loss and disorientation, loss of appetite, overeating, and an inability to concentrate. These factors may be characterized as symptoms of posttraumatic stress disorder. These aforementioned disorders have been attributed to indoor toxicity of the units, their materials of construction, and overall unsafe conditions. Additional deleterious health outcomes attributed to the FEMA travel trailer include nervous disorders, headaches, nausea and vomiting, skin rashes, aches and pains, and respiratory disorders (Spengler et al. 2000; Samet and Spengler 2003).

Assessment of a housing unit is centered on person-environment transactions (Baum and Valins 1977), including acts of aggression against the unit itself (Kuo and Sullivan 2001). A poor fit between the occupant and the emergency housing setting can cause complications, as maladjustments may arise (Tomea 1969; Newman 1973). Adverse outcomes can result from the following: avoidance of the housing unit, learned helplessness, overcrowding, or failed measures on the part of the inhabitant to modify or change the interior or exterior of the unit.

Population displacement is itself a major source of stress (Noji 2000; Levine et al. 2007). At this writing nearly 200,000 IDPs from New Orleans continue to reside elsewhere

Fig. 3 Single unit installation

Fig. 4 Multiple unit installation

in the U.S. (Eaton 2007). Many have opted to reside in their FEMA-issued travel trailer only during weekdays, returning to one's temporary "home base" locale on weekends, or vice versa. FEMA travel trailers were installed in single-unit (Fig. 3) and in multiple-unit site aggregations, often referred to by the agency as "villages" (Fig. 4).

The deleterious health outcomes experienced by occupants center on the existence of a hazardous chemical, formaldehyde, in the FEMA travel trailer's palette of construction materials. Formaldehyde is a chemical used in a variety of products, including composite wood and plywood panels, and is considered a cancer-causing substance by the International Agency for Research on Cancer, and a probable human carcinogen by the U.S. Environmental Protection Agency. The Institute of Medicine, a private think tank based in Washington, D.C., has cited its deleterious health effects (1993) as has the federal U.S. Centers for Disease Control and Prevention (2003). Critics attributed this gas to the cause of immediate health risks soon after FEMA had provided more than 120,000 travel trailers to hurricane victims in 2005. Upon occupancy, thousands of persons began to complain of adverse health symptoms (Brunker 2006; Jason 2006).

The three objectives of the following discussion are to examine key aspects of FEMA's emergency housing travel trailer program from the standpoint of: 1: Empirical evidence to date on the health outcomes associated with the FEMA travel trailer program in the aftermath of Hurricane Katrina; 2. The articulation of a theoretical and operative framework to assist in future research on this subject from the standpoint of key environment-behavior transactions in post-disaster emergency housing; and 3. To critically review the United States' policies with respect to post-disaster emergency housing.

2 Recent empirical research

The International Medical Corps (IMC), based in California, conducted a survey of nearly 400 trailer park residents upon the one-year anniversary of Katrina in 2006. IMC, one of the nation's largest emergency response agencies, found that survivors living in "temporary" trailers in Louisiana and Mississippi were fifteen times more likely to take their own lives than people in the rest of the United States (International Medical Corps 2006). A veteran of more than two decades of overseas relief operations, IMC responded domestically to a housing crisis for the first time in the aftermath of Katrina. Its team of researchers found that the rate of clinically diagnosed depression among those residing in FEMA trailers was far greater than the national average.

At the time of the study, there were 48,000 FEMA travel trailers in Louisiana, and 99,000 units in Mississippi. Surveys were conducted in 47 and 50 trailer parks in the two states, respectively. Major Depressive Disorder was assessed using the Patient Health Questionnaire (PHQ-9), a well-validated instrument.[1] Among the key findings, 50% of respondents met criteria for Major Depressive Disorder, more than seven times the U.S. national rate. Since displacement, reported suicides were fifteen times higher and the rate of suicide attempts were 70 times higher than the Louisiana state average. Few (21%) reported no form of security on site at night, and 49% did not feel safe walking outdoors at night. Among respondents with children, 45% did not feel safe letting their children play in the trailer park during the day. The authors of the study concluded that these IDPs were in a state of personal crisis.

As for the toxicity of the FEMA travel trailer, air quality tests of forty-four trailers conducted by the Sierra Club in 2006 found formaldehyde concentrations as high as 0.34 parts per million—a level nearly equal to what a professional embalmer would be exposed to on the job. All but four of the housing units tested higher than the 0.1 parts per million that the EPA considers to be an "elevated" level, capable of causing watery eyes, burning in the eyes and throat, nausea, and respiratory distress in some occupants. Residents complained of headaches and nosebleeds as soon as they moved in. Critics called attention to the absurdity of spending billions to build and deploy these "toxic tin cans."

A class action lawsuit was filed in 2006, naming the federal government (FEMA) and trailer manufacturers as defendants, alleging this temporary housing as "unsafe and presenting a clear and present danger to the health and well-being of plaintiffs and their families" (Brunker 2006). At the time, official FEMA policy maintained the travel trailer

[1] In the IMC study, surveys were conducted in parks with more than ten emergency housing units, and a total of 578 households were contacted. The survey instrument consisted of 134 questions, centered on demographics, basic survival needs, domestic and sexual violence, security concerns, and overall health status, i.e. flu-like illness, stomach viruses, common colds, diabetes, hypertension, and heart and kidney disease. Additional questions focused on mental health, morbidity, access to health care, substance abuse, and questions on one's IDP status and one's pre- and post-disaster self-perceived social status.

program was "safe." Since then, FEMA unofficially, quietly, began to soften its hard-line policy and even started to conduct its own tests in the field (Keim 2007). In the meantime, FEMA sent out an impersonal form letter to all trailer inhabitants informing them to keep their housing unit's windows open, even in winter, as a health measure to adequately ventilate the unit. At the time of this mailing there were 115,000 housing units in use on the U.S. Gulf Coast.

In the aftermath of catastrophe it is assumed, for purposes of this discussion, that emergency housing must afford, promote, and reinforce critical aspects of human health and well-being. Well-being denotes in part, in theory and in practice, the ability to *make sense* of and exert a *locus of control* over one's overall living condition as well as the tangible physical properties of the dwelling itself and its immediate environs.

3 Person-setting transactions in the FEMA travel trailer: a pilot study

In 2006 a pilot investigation was conducted by this author to learn more about occupants' response to FEMA travel trailers installed across the Gulf Coast region. The experiment was conducted in New Orleans. The occupants of thirty ($N = 30$) FEMA travel trailers were surveyed. Occupants' patterns of use of the physical space in the unit and in the immediate exterior environs were documented using a standard floor plan diagram, one for each of the three generic unit sizes (discussed below). The objective of the survey and diagramming procedure was to learn about the unit's adaptability/non-adaptability. Survey questionnaire items addressed the housing unit's physical properties, its appearance, and flexibility with respect to daily human inhabitation. A second set of questions addressed issues of occupants' actions taken to modify or personalize their unit, and if the unit itself functioned as a source of stress. The number of questions and overall length of the survey was kept to a minimum (Zeisel 2006). The survey itself was two pages in length, printed front to back on a single sheet of paper. Some respondents had occupied their unit for a few weeks, others for a few months, at the time of the survey/interview.

Interviews were conducted at individual installation "scatter sites" in the uptown section and at two large-scale neutral site installations in the lakefront section of New Orleans. In the uptown section, interviews were conducted with occupants residing in fifteen units on their own private property (Group 1). In the two large-scale sites in the lakefront section, interviews were conducted in fifteen units on a "neutral" site, i.e. not on their personal property (Group 2). These two sites were on the grounds of the University of New Orleans campus (200 units), and on the grounds of The USDA Research Station (100 units). Responses to questions in the survey were reported vis-à-vis a "yes" or "no" response, or a "agree" or "disagree" response. Interviews were conducted during an eight-week period in April and May 2006.[2]

[2] A household was defined as "people sleeping and eating under the same roof or same structure." The interviewer (this author) interviewed a male or female household member (aged 18 or older), and the session lasted on average 25 min. Each interview session was conducted in the most private setting possible. Interviews were conducted during daylight hours only, and volunteers were solicited for participation in the study. A similar solicitation protocol was employed as in the prior IMC study: the head of household was interviewed, 18 years of age or older, in as private a setting as possible. All responses were strictly confidential and no names of occupants were revealed at any point. Each interview was conducted one on one (by this author), and lasted on average one half hour. The diagrammation procedure lasted another 15–20 min on average.

Part I consisted of questions on the extent the FEMA travel trailer unit's exterior could be personalized, the amount of interior storage space for personal possessions, the ability to reconfigure or rearrange the interior "furnishings," its overall size, overall quality of construction, the degree the unit was quiet, the perceived safety of the materials of construction, the ability to maintain an adequate indoor comfort level (temperature and humidity), the ability to alter its interior walls and partitions, the safety of the neighborhood context, the intent of the occupant to purchase their housing unit to own, ease of the unit's ingress-egress, the adequacy of the exterior space adjacent to the unit, and the extent to which the unit was a source of stress. Each of the fourteen core survey items was responded to on a five-point (1—low, 5—high) Likert response scale: do you "not at all," "a little," "somewhat," "quite a bit," to "very much" agree, i.e. "To what extent do you agree with each of the following statements…" Three additional questions, comprising Part II of the questionnaire, asked, "Do you have control over your housing situation at this time?" (yes/no). This question was followed by "What three aspects of your dwelling unit are you most pleased with at this time?" followed by "What three aspects of your dwelling unit would you change at this time?" Respondents were instructed to provide brief verbal responses to the latter two questions.

3.1 Analysis and results

The Part I data were analyzed vis-à-vis descriptive statistics (means, standard deviations, percentages). The results are reported below. In terms of respondents' background information, their collective profile was as follows: the average age was 41.4 years, and 48% were male and 52% female. The average length of residency in New Orleans pre-Katrina was 26.8 years, and the average length of residency post-Katrina was 3.9 months. Total average length of post-Katrina residency in the city was 4.1 months at the time of the study. The average number of unit occupants was 2.6 persons, with an average age of 27.6 years, with 12.8% aged 65 or older. In terms of race/ethnicity, 45% were Caucasian, 49% were African-American, and 6% indicated "other." As for the location of the unit, 47%, in Group 1 (G1), had had their unit installed on their private property, adjacent to their residence, whereas the majority occupied housing units within encampment sites, with 53%, in Group 2 (G2), in the two large-scale "trailer park" aggregations.

The results reported in Table 1 illustrate differences (and similarities) between the two cohorts, with those living autonomously (G1), being somewhat more positive about their housing unit compared to those occupying a unit on a site with dozens of identical units (G2). Respondents, regardless of site context, were in consensus in stating that their unit did not allow for much personalization of its exterior, i.e. "To what extent do you agree that the unit allows for me to make changes to its exterior appearance?" Nor was the unit judged to be of sound construction quality in response to the statement "To what extent do you agree that your unit is of sound construction quality?" Similarly, both groups were in accord in decrying the miniscule storage space ("…do you agree that your unit provides adequate storage space for your personal belongings?") and in the inability to reconfigure the rigidly fixed interior furnishings, i.e., bed(s), table, bench seating, and appliances ("…do you agree that you can rearrange the unit's interior furnishings?"). Both groups did not believe their unit was safe in terms of the materials used in its construction ("…do you agree that the unit's materials of construction are safe?"), and both groups had similar difficulty in maintaining a suitable interior comfort level ("…do you agree that you are able to control the indoor temperature and humidity levels?"). Both groups were similarly

Table 1 Occupant assessment of FEMA travel trailer

		Autonomous site (G1)		Multi-unit site (G2)	
		Mean	S.D.	Mean	S.D.
1	Personalization amenity	1.17	0.82	1.22	0.98
2	Quality of construction	1.84	0.94	1.54	0.77
3	Amount of storage space	1.32	1.02	1.59	1.22
4	Ability to reconfigure furnishings	1.50	0.94	1.66	1.01
5	Materials of construction	1.70	0.76	1.95	0.91
6	Ability to control indoor temperature/humidity	1.72	1.11	2.01	1.05
7	Ability to reconfigure interior walls/partitions	1.84	1.22	2.05	1.12
8	Interest in purchasing unit	2.05	1.06	2.15	0.93
9	Ingress-egress amenity	2.21	1.04	2.35	0.95
10	Size of unit	2.29	0.94	1.77	1.16
11	Acoustical amenity/noise control	2.57	0.92	1.70	1.14
12	Safety of neighborhood	3.45	1.04	2.66	0.97
13	Safety of immediate environs	3.44	0.94	2.10	1.25
14	Unit as a source of personal stress	3.59	0.95	4.10	1.09

in accord in indicating their inability to alter the interior walls and partitions of the housing unit ("…do you agree that you are able to rearrange the interior walls and partitions of your unit?"), and both groups were in accord that they were only "a little" interested in purchasing their unit to own ("…do you agree that you would wish to purchase your unit to own?"), even through for most respondents the unit was judged to afford only somewhat unobstructed ingress-egress amenity ("…do you agree that your unit affords adequate physical access for you?).

The two cohorts differed somewhat with regards to their assessment of the size of their FEMA travel trailer unit ("…do you agree that your unit is of adequate size for your needs?"). The groups also differed somewhat with regards to whether their trailer unit was adequate as a buffer against intrusive exterior sounds ("…do you agree that your unit is built to block out unwanted sounds from the outside?"). Respondents who resided in single-unit installations assessed their trailer unit as more quiet compared to those who lived in the two trailer park settings. Similarly, respondents occupying single-site installations stated their neighborhood was safer than respondents who lived in the two trailer parks ("…do you agree that your neighborhood setting is safe?"). Those who lived independently in single unit installations were also generally far more satisfied with the size of the outdoor exterior space surrounding their unit versus those residing in units in the two trailer park settings ("…do you agree that the exterior space surrounding your unit is adequate in size?"). Finally, both groups were in consensus that their unit was a source of much stress for them at the time of the survey ("…do you agree that that your unit is a source of personal stress to you at this time?"). Respondents in trailer park aggregations were most dissatisfied with this aspect over all other issues addressed in the survey. Moreover, from this it may be speculated that only seven respondents of the cohort of thirty believed they were able to maintain any reasonable degree of control over their overall housing situation at the time of the study.

In Part II, respondents did cite a number of things they liked about their travel trailer, principally, among occupants of autonomous units, its close proximity to their permanent

residence (42%). Second, they listed this as a main reason why they had been able to begin repairs on their flood damaged home (35%). Third, having a FEMA travel trailer made it possible to return to the city and to one's job and family members (32%). Disliked aspects of their housing unit centered on its small size (62%), the inability by federal law to make any modifications to the unit's interior or exterior (54%), and the health problems that they had experienced themselves or heard of through friends or the media since moving into their housing unit (44%). These assessments tended to reinforce the responses to the fourteen core survey items (agree/disagree) in Part I. These open ended questions shed light on how the "word of mouth" had begun to spread among occupants on the deleterious health consequences of the FEMA travel trailers, as much as on the importance of being near to one's job and other family members who had returned to the city to begin rebuilding their lives.

The diagramming task that occurred apart from the interview/survey (Part III), documented how occupants were actually making use of their housing unit. A separate diagram was produced for each of the three main templates: small ($8' \times 24'$), medium ($8' \times 32'$) and large ($10' \times 32'$) housing units. Efforts to personalize the unit were noted on these three standard floor plan diagrams. It was found that very few interior modifications had been made. The bulk of modifications occurred on the exterior. Most consisted of fences, tent-like canvas devices attached to the side or roof of the unit, address signs posted to doors, and witty, at times obscene, hand painted slogans, usually directed at FEMA.

4 Toward an operative theory framework for further research

The IMC survey delved into occupants' health status without addressing the influence of the housing unit itself. Based upon this research, the subsequent pilot study conducted by this author extended this line of inquiry but expanded it to include occupants' assessments of their immediate physical setting. Taken together these two studies provide a fuller picture than either alone. A transactional locus of control model is presented below. It is based upon a critical review of the literature and the recent empirical research. Three core assumptions drive this model: 1. antecedent factors, 2. key consequences of the FEMA travel trailer unit on habitability, health, and occupant well-being, and 3. the degree of spatial adaptability/non-adaptability of the housing unit. Antecedent factors consist of the pre-disaster state of the individual, centered on the individual's mental health status, and ability to function successfully on a day-to-day basis. Additional antecedents include one's cultural background, socio-economic background, age, disposition, physical health, and length of occupation. These relationships are illustrated in Fig. 5.

These assumptions are framed as two principal constructs—one in the horizontal axis, *unit adaptability* (from low/minimum to high/maximum) and one in the vertical axis, *locus of control* (ranging from low/uncertainty to high/certainty). Hence, four quadrants are articulated within the space of these two axis and these are then crossed at their centerpoint by two diagonal axis—housing type options (ranging from low/high), and Freedom of Choice (also ranging from low/high) cut though diagonally. In this model it is assumed that occupants with a low degree of housing options and a low degree of freedom of choice in the unit's design, its configuration, or its site context will experience the highest level of environmental stress. By contrast, the findings reported above suggest that the freedom to self-select the unit that best suits them, and to adapt it to their personalization needs, may likely result in less environmental stress during the period of occupancy. The need to exert

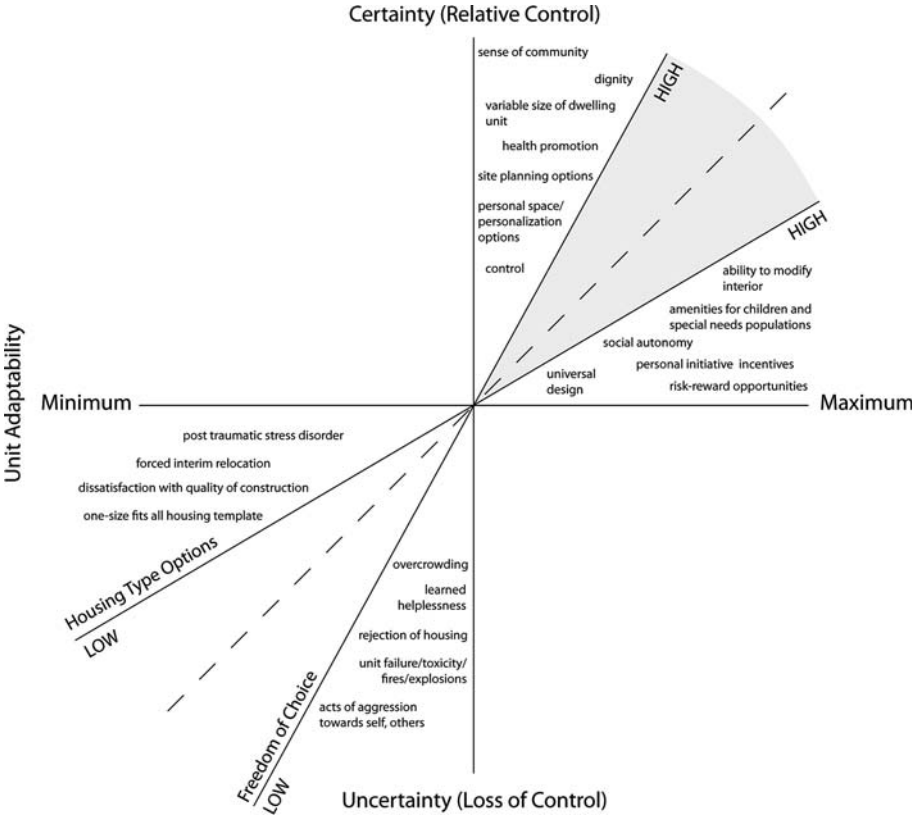

Fig. 5 Dimensions of habitability

direct control over one's personal space expresses key principles of why certain physical settings are preferred over others (Kaplan and Kaplan 1983, 2003).

The findings reported above also suggest that stress occurs where low freedom of choice exists with few housing options. This may be compounded by the belief that one does not know, for instance, exactly why or to what extent their unit may be the source of their current health problems (Moos 1977). Worse, posttraumatic stress disorders may be triggered, made worse by the effects of forced relocation. As an IDP, certain aggressive or non-conformist behaviors are likely to manifest during occupancy due to environment-induced stress (Evans 1982). Related concerns may include dissatisfaction with the quality of construction, FEMA's generic three-unit-sizes-fit-all template, and in general, overcrowded living conditions (Jones 2007). These factors may result in learned helplessness, or a "why bother" attitude because little will change anyway (Seligman 1975). Worse, total rejection of the housing is likely to occur due to its shoddy construction, indoor air toxicity, low quality appliances, poor interior layout, and lack of safety. In fact, the typical FEMA travel trailer was prone to propane gas leaks and explosions. This led to the death of a number of occupants post-Katrina.

On the other hand, the findings reported above suggest that occupants who experience a relatively high degree of personal control, autonomy, freedom of choice in housing options, and hence, greater certainty over their fate and that of their loved ones, may in fact

experience an entirely different reality. This, in theory, denotes a greater sense of dignity, sense of shared purpose (community), and greater health promotion as a function of the essential support afforded by the built environment. Additional benefits include site planning options one can self-select, the ability to personalize one's unit and its environs, the provision of amenities for children and adolescents, social autonomy, and options for prospect-refuge behaviors. Importantly (aside from the unit as a source of deleterious health conditions), benefits may include a relatively low level of risk invested in return for an array of benefits accruable through occupancy. Such risk-reward attractors are at the core of housing-based preference models—and symbolize the very meaning of home. Even in non-emergency housing contexts an uncertain, unacceptable housing situation is restrictive by nature, resulting in, for example, little personal autonomy to make the unit fit one's needs better, adverse effects on personal health, or adverse effects due to poor quality construction (Frank et al. 2003).

The findings reported above also suggest that aesthetics is also a factor that drives the acceptance or rejection of an emergency housing unit. Persons who have resided all their lives in conventional homes often, and understandably so, have difficulty when suddenly forced to occupy a cramped travel unit for months or years at a time. Measures of aesthetic adaptation of the unit may consist of applying holiday ornamentation, repainting it (although this is prohibited by FEMA housing authorities), ad hoc signs, mailboxes, lawns, fences, tents as room extensions, and attempts to reconfigure the interior, i.e. relocating the beds, within a dense spatial matrix and highly limited palette of options.

5 An assessment of the FEMA travel trailer program

In the aftermath of the U.S. catastrophe in 2005, one positive outcome has been a general consensus among housing specialists in the U.S. that the federal government must provide a more health-promoting, safer, adaptable temporary housing alternative to the ubiquitous FEMA travel trailer. The uninhabitability of the standard-issue FEMA travel trailer—particularly its failure to afford inhabitants a locus of control with respect to the unit's physical properties—has resulted in a search on the part of some U.S. architects (sometimes working in consort with FEMA) to develop functional, aesthetically appropriate, sustainable housing alternatives (Smith 2007).

The provision of adequate, sustainable housing must remain a global critical priority, the United States notwithstanding (Saegert et al. 2003). The facts suggest that the standard FEMA trailer has been the direct cause of myriad health problems for its inhabitants. For its part, FEMA *dismissed* these claims but eventually recanted its official position under heavy public scrutiny combined with growing scientific evidence. Only reluctantly did the agency initiate its own inquiry to examine the thousands of claims by occupants and advocacy groups clamoring for an inquiry into the alleged health hazards of the standard-issue FEMA travel trailer (Babington 2007; Hsu 2007).[3]

[3] In January of 2007 a health advisory was issued by the federal Centers for Disease Control and Prevention (CDC) to the 44,000 families still residing in FEMA travel trailers 2.5 years after the catastrophe. This advisory declared that the presence of potentially harmful levels of formaldehyde was found to exist in a significant number of units, based upon hundreds of field assessments conducted by CDC staff. Subsequently, the Department of Homeland Security, FEMA's parent agency, issued a joint policy statement with the federal Department of Housing and Urban Development (HUD) to relocate all occupants who wished to be relocated to other temporary housing. Thousands opted to relocate to hotels within the immediate disaster strike zone. However, the local housing market could not absorb the many thousands of twice-uprooted

In stark contrast to the aftermath of this catastrophe, America has maintained a long held love affair with the travel trailer for more than a century. The "motor home" has been romanticized films, literature and in popular music. To Americans, the freedom to pursue the lure of the open road remains a principle firmly embedded in American culture. The Airstream travel trailer epitomized this relationship and continues to symbolize unfettered individuality and the pursuit of the adventure of the highway (Burkhart and Hunt 2000). Owners were always invited to personalize their trailer, and this trend continues today throughout the "by choice" motor home industry, i.e. Winnebago and other manufacturers provide myriad personalization options. Kronenburg (1995) correctly places the American travel trailer in its broader international context within the history of portable architecture.

The FEMA travel trailer debacle in the aftermath of Hurricane Katrina will not soon be forgotten by the American public. Perhaps Katrina transformed the public's romantic connection with the classic travel trailers of the 1930s through 70 s period. Now, Americans, seeing a group of travel trailers, first think of the images conjured by Katrina. The media fueled (accurately) the public's altered attitude—by broadcasting images worldwide, for instance, of more than 11,000 of these units sitting empty in an Arkansas field, rotting amid the elements (Lipton 2006). As the public's consciousness became altered the hurricane season of 2005 came to symbolize a call to arms among socially conscious architects and not-for-profit humanitarian agencies.

FEMA, since Katrina, has launched a new initiative in an effort to demonstrate its openness to alternatives to the standard travel trailer. One such mass-produced alternative emergency housing solution was quickly dubbed the "Katrina Cottage" by the popular media in the U.S. This option reflected an attempt to achieve a non-institutional, inviting, more "home-like" aesthetic appearance vis-à-vis an expression of the indigenous vernacular of the region. This resulted in "homey" pitched roofs, exterior wood-composite horizontal siding and trim, front porches, and some degree of personal choice in its interior configurability. In an unprecedented step, the U.S. Congress, in the disaster's aftermath, had mandated FEMA to search for something *better* than the ubiquitous, sterile, FEMA travel trailer. This resulted in the funding of a pilot program to build Katrina Cottages in the Gulf Coast region and to assess their efficacy. In 2006, Marianne Cusato unveiled a prototype 600 square foot cottage that featured two small bedrooms, a kitchenette, a full bathroom, and living room (Bullard 2007; Eaton 2007). Such alternatives are being touted as more cost effective than the $70,000 per unit cost of the standard government-issued unit deployed after Katrina.

Meanwhile, the reconstruction of the devastated region's permanent housing stock is occurring, albeit slowly. As of December 2007 work had begun on only 75 "Louisiana Cottages" in the state (of 600 funded to be built). The Louisiana initiative was based on a $75 million grant from FEMA to develop alternatives to the standard travel trailer. The Louisiana program became bogged down in allegations of political corruption among

Footnote 3 continued
trailer occupants. This soon caused an upwardly spiraling ripple effect on rent rates throughout the New Orleans housing market. The unintended consequence of this policy was that it exerted further pressure on an already tight housing market. Second, with hotels and apartments already scarce, persons suffering from health problems due to exposure to trailer-induced toxigens were in some cases being relocated to hotels outside (even many hundreds of miles away from) the disaster strike zone. This only exacerbated the challenges faced by citizens coping with the inherent problems encountered in rebuilding their homes and personal lives. As for the trailers themselves, tens of thousands sat unused, decaying in rural settings in Arkansas and northern Alabama.

contractors, their subcontractors, and political finger pointing while a critical housing shortage persisted.

By contrast, Mississippi is currently in the midst of building 20,000 alternates to the generic FEMA travel trailer (Bullard 2007; Barrow 2007). This has created a new industry. The practice of reaping wholesale profits from emergency housing initiatives such as this has been termed "Disaster Capitalism" (Klein 2007). Klein predicts that an entire industry will emerge globally in the coming decades as a result of the effects of global warming, terrorism, natural disasters, and their broad ramifications. Unfortunately, it is a global economy based on profiting from catastrophe and the misery of many millions of people.

FEMA must devise policies that humanely respond to critical needs *prior* to natural disasters. In South Florida, some disaster victims still occupied FEMA travel trailers more than thirteen years after Hurricane Andrew. The effects of global warming are predicted to only magnify in the coming decades, with coastal communities threatened by rising sea levels (Barnett 2007; Barnett and Beckman 2007). New policies are needed at the local, regional and federal level. Protocols proven effective in the past in "normal" housing scenarios can yield much insight (Thompson 1996; Hester 1998), yet these protocols need to be adapted by architects within a paradigm of rapidity of response (Verderber 2003). As for the federal and state bureaucracies charged with rebuilding the U.S. Gulf Coast, only minor progress has been made in rebuilding the region's ruined permanent housing stock (Barrow 2007; Warner 2007). Louisiana's federally funded "Road Home" program remains beleaguered by mismanagement and a slow rate of payouts to qualified persons (only 40% of 115,000 qualified applicants as of March 2008) who lost their homes. Suffice to say, the Katrina-induced FEMA travel trailer emergency housing debacle need not be repeated elsewhere.

As for its role in the housing disaster, the U.S. Army Corps of Engineers, the federal agency responsible for protecting New Orleans from future flooding, perpetuated polices that resulted in profound failures centered on the design, construction, and maintenance of what was revealed to be a dysfunctional storm protection system. The soul-searching that has taken place throughout American society in Katrina's aftermath has centered in large part on, first, how a federally built and maintained levee system could have ruptured in nearly 50 locations virtually at once. Second, on how the wealthiest nation in the world could have allowed its flood defense technologies to become so weakened, antiquated, and hence, susceptible to total failure.

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