

ORIGINAL RESEARCH

Role of Academic Institutions in Community Disaster Response Since September 11, 2001

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ABSTRACT

Objective: To describe the role of academic institutions in the community response to Federal Emergency Management Agency–declared disasters from September 11, 2001, to February 1, 2009.

Methods: We conducted a review of the published literature and Internet reports to identify academic institutions that participated in the community response to disaster events between September 11, 2001, to February 1, 2009, inclusive. From retrieved reports, we abstracted the identity of the academic institutions and the resources and services each provided. We characterized the resources and services in terms of their contribution to established constructs of community disaster resilience and disaster preparedness and response.

Results: Between September 11, 2001, and February 1, 2009, there were 98 published or Internet-accessible reports describing 106 instances in which academic institutions participated in the community response to 11 Federal Emergency Management Agency–declared disaster events that occurred between September 11, 2001, and February 1, 2009. Academic institutions included academic health centers and community teaching hospitals; schools of medicine, nursing, and public health; schools with graduate programs such as engineering and psychology; and 4-year programs. The services and resources provided by the academic institutions as part of the community disaster response could be categorized as contributing to community disaster resilience by reducing the consequences or likelihood of an event or to specific dimensions of public health preparedness and response, or both. The most common dimensions addressed by academic institutions (in order of occurrence) were resource management, enabling and sustaining a public health response, information capacity management, and performance evaluation.

Conclusions: Since September 11, 2001, the participation of academic institutions in community disaster response has contributed to community resilience and the achievement of specific dimensions of disaster preparedness and response.

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Key Words: community-institution relations, disaster medicine, emergency preparedness, universities

Homeland Security Presidential Directive-21, signed into law in 2007, called upon the United States to establish the discipline of disaster-related medicine and public health; develop and disseminate education, research, and training in the field; and better integrate private and public disaster response systems.¹ The directive identified community disaster resilience as 1 of the 4 critical components of public health preparedness along with mass-casualty care, mass distribution of pharmaceuticals and vaccines, and biosurveillance.¹ Before 2007, improving the resilience of US communities against disasters had been articulated as a national goal by multiple federal agencies, including the Centers for Disease Control and Prevention.²

Despite the growing emphasis upon disaster preparedness and response and community disaster resilience, responses to recent disaster events demonstrate persistent gaps in education, training, and leadership at all levels of government.³⁻⁹ As noted in the National Response Framework,¹⁰ disasters are inherently local and ultimately the responsibility of the lowest jurisdictional level present within the affected area. Thus, the relationships govern-

ment agencies forge with community partners contribute to the resilience and preparedness of a community.

Academic institutions of higher education—including colleges, universities, and schools and programs of medicine, veterinary medicine, public health, nursing, allied health, business, law, engineering, government, among others—are home to a wealth of resources in the community. In 1994, the Department of Housing and Urban Development established the Office of University Partnerships to encourage and expand partnerships between universities and their communities in recognition of the role these partnerships play in addressing local problems and revitalizing communities. A description of the myriad ways in which institutions of higher education have supported local communities in terms of facilitation of economic development, delivery of social services, and provision of technical assistance is available, although disaster preparedness and response activities are not addressed.¹¹

Academic health centers, which consist of a medical school and one or more other health profession schools

or programs (eg, schools of allied health professions, pharmacy, public health, nursing), in conjunction with an affiliated teaching hospital, educate students and residents, perform research, and provide patient care, often serving as safety net providers for the most vulnerable people. Networks of academic health centers can act as a critical resource for other academic health centers and community hospitals that are affected by disaster and for surge capacity within communities needing highly trained health care providers and appropriate facilities. The responsibilities of and opportunities for academic health centers to participate in community disaster response have been described elsewhere.¹²

In response to the national emphasis upon disaster resilience and public health preparedness and response, professional organizations and academic institutions have developed competencies for training health professionals and emergency responders.¹³⁻¹⁵ Furthermore, recognition of the important potential role of academic health centers has prompted the specification of effective planning and actions for them to take in preparing for emergencies.¹⁶

In 2000, the Centers for Disease Control and Prevention established the Centers for Public Health Preparedness (CPHP). The stated goals for the establishment of CPHPs were to strengthen public health workforce readiness through implementing programs for lifelong learning; strengthen capacity at state and local levels for terrorism preparedness and emergency public health response; and develop a network of academic-based programs that contribute to national terrorism preparedness and emergency response capabilities by sharing expertise and resources across state and local jurisdictions.¹⁷ The CPHP program ended and was succeeded by a program of preparedness and emergency response learning centers. Both the CPHP and the preparedness and emergency response learning centers programs are or have been established within accredited schools of public health.

The literature yields several examples of academic institutions' leveraging their resources for the benefit of the broader community in response to a disaster event; however, the scope of the contribution of academic institutions to community disaster resilience and response has not been fully explored or described. The purpose of this review was to more fully describe the role that academic institutions have played in community response to disaster events since September 11, 2001, and to characterize their contributions in terms of established frameworks for community disaster resilience and preparedness and response. The frameworks for conceptualizing community disaster resilience and public health preparedness and response are described below.

Community disaster resilience has been defined as the ability of a community to mitigate hazards, contain the effects of disasters, and carry out recovery activities in ways that minimize social disruption and mitigate the effects of future disasters.¹⁸ Community disaster resilience is a component of community resilience in general, which has been described as a process that links adaptive capacities (particularly economic development, social capital, information and

communication, and community competence) with dynamic attributes to adaptation after a disturbance.¹⁹ In theory, disaster-resilient communities would experience less loss of life and property from natural, technological, and human-induced disasters because of this rapid deployment of appropriate resources. The key to rapidly mobilizing services for a disaster response is preexisting organizational networks and relationships.¹⁹

According to the Multidisciplinary Center for Earthquake Engineering Research (MCEER) framework, disaster-resilient communities exhibit 3 characteristics²⁰:

1. Reduction in the likelihood of damage to and failures of critical infrastructure, systems, and components
2. Reduction in the consequences of damage and failures in terms of injuries, lives lost, and economic and social effects
3. Reduction in the time to recovery

Dimensions of public health preparedness and response that relate to the US Public Health Functions Steering Committee's essential public health functions include the following²¹⁻²³:

1. Health risk assessment—identifying hazards and vulnerabilities in communities and populations through the conduct of community risk, capacity, and needs assessments
2. Command and management—roles such as defining and assigning roles and responsibilities, managing public health resources, and coordinating actions with other agencies
3. Public engagement—educating the public and engaging it to participate in public health preparedness activities
4. Information capacity and management—ensuring epidemiologic and laboratory capacity to identify health threats, monitor trends, and conduct investigations and integrating, interpreting, and summarizing information for disease surveillance, epidemiologic investigations, laboratory tests, and environmental assessments
5. Resource management—providing or ensuring access to mass health care services and countermeasure and mitigation strategies to prevent disease, reduce morbidity and mortality, and mitigate environmental hazards
6. Public information and risk communication—communicating with the public, media, and community leaders regarding recommendations to protect the public's health
7. Public health response—ensuring public health workforce development and training, maintaining logistic and administrative capacities to deliver services, and protecting the physical and mental health of the response workforce
8. Robust supply chain—identifying critical resources for public health emergency response and practice to deliver resources throughout the supply chain
9. Performance evaluation and management—evaluating and reporting on performance in terms of the reach, effectiveness, and impact of strategies

METHODS

We conducted a review of the literature to identify academic institutions that have participated in the community response to disaster events between September 11, 2001, and February

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1, 2009, inclusive, and to characterize the contribution of identified academic institutions to community disaster resilience and public health preparedness and response. We searched PubMed for English-language articles published since September 11, 2001, using the terms provided in Table 1. We also searched published and presented abstracts using BioWizard, which provides Internet access to a database of preclinical and clinical abstracts from biomedical meetings worldwide. In addition, we used Google to search the Internet and we directly searched the Federal Emergency Management Agency (FEMA) Web site using the same search terms to compile published and posted reports outside the peer-reviewed literature. We identified additional citations using the “related articles” link provided on PubMed and by manually reviewing references cited in relevant journal articles and reports and examination of Web sites of relevant disaster management and response organizations.

Retrieved articles and reports were examined and included if the article described or mentioned a role for an academic institution as part of the community disaster response. Articles included in the final analysis described or mentioned a role for the academic institution as part of the community response to the disaster event or the immediate recovery phase, or participation in the evaluation of those responses. Articles or reports that described preparedness activities, without evidence of disaster response, were omitted from the review.

Articles and reports that met inclusion criteria were reviewed further. The review process was conducted as follows: 2 members of the research team thoroughly read each of the articles, abstracts, and reports independently, and then categorized the community disaster response of the academic institutions in terms of the resource or service that was provided, the MCEER characteristic of community disaster resilience that was addressed by the resource or service,²⁰ and the dimension of disaster preparedness and

response that was addressed by the resource or service.²¹⁻²³ We selected the MCEER framework for categorizing the contribution of the resources to community disaster resilience because the framework incorporates the all-hazards approach to allow for the consistent qualitative categorization of the dimensions of resilience for research and evaluation purposes.^{18,20}

First, the categorical service or resource code was applied. Based upon review of the literature, the research team developed the categorical codes for the services inductively. A description of the categorical resource or service codes and their definitions are found in Table 2. Once a categorical code was applied to the service or resource provided by the institution, the study

TABLE 1

Search Terms
PubMed Search Terms
“Disaster” (SH; KW) and “Case report” (SH; KW) limited to 2001-2009
“Disaster” (SH; KW) and “Health care delivery” (SH; KW)
“Disaster” (SH; KW) and “Community health services” (SH; KW)
“Terrorism” (SH; KW) and “Case report” (SH; KW)
“Anthrax Attacks,” “California Wildfires,” “Columbia Space Shuttle Disaster,” “Hurricane Katrina,” “Hurricane Rita,” “Hurricane Jeanne,” “Hurricane Ike,” “Hurricane Gustav,” “Hurricane Ivan,” “Hurricane Isabel,” “Hurricane Frances,” “Hurricane Floyd,” “Hurricane Charley,” “Influenza Vaccine Shortage,” “Iowa Floods,” “Kentucky Ice Storms,” “Northeast Blackout,” “San Diego Wildfires” (all as KW)
Google Search Terms
“Anthrax Attacks,” “California Wildfires,” “Columbia Space Shuttle Disaster,” “Hurricane Katrina,” “Hurricane Rita,” “Hurricane Jeanne,” “Hurricane Ike,” “Hurricane Gustav,” “Hurricane Ivan,” “Hurricane Isabel,” “Hurricane Frances,” “Hurricane Floyd,” “Hurricane Charley,” “Influenza Vaccine Shortage,” “Iowa Floods,” “Kentucky Ice Storms,” “Northeast Blackout,” “San Diego Wildfires” (all as KW)

SH: Subject Heading; KW: Key Word.

TABLE 2

Codes Applied to Resources/Services Provided by Academic Institutions During Disasters	
Service/Resource Code	Definition
Case management or social work services	Assessment or planning for psychosocial or material needs and facilitation with meeting those needs
Casualty care: in-house	Health care services delivered in established in- or outpatient facilities
Casualty care: in-field	Health care services delivered in shelters or other community sites, including pharmacy services
Cause or damage assessment	Evaluation of the underlying cause of a disaster event or extent of damage
Command	Assumption of a leadership role that involves assigning responsibilities, managing public health resources, and coordinating actions or response
Communication/health information technology	Transmission of information about the events, their impact, available services, and/or recommended actions for people who are affected; development and/or provision of electronic means of storing, transmitting, or accessing health information
Mental health services	Mental health screening, counseling, or medical services delivered at established medical or ad hoc sites
Pharmacy services	Provision of pharmaceuticals and/or vaccines
Response evaluation	Evaluation of the successes and/or shortcomings of the response
Shelter, facilities, or physical space	Provision of physical space and/or facilities house evacuees
Surveillance	Systematic collection and analysis of data and provision of information to understand the extent of and/or to control a disease or event
Training	Delivery or provision of activities during a disaster response to facilitate the learning and development of new and existing skills, and to improve the performance of specific tasks or roles

team categorized the service or resource in terms of whether it addressed a characteristic of disaster resilience (eg, reduced the likelihood of damage and failures to critical infrastructure, systems, and components; reduced the consequences from damage and failures in terms of injuries, lives lost, and economic and social impacts; or both)²⁰ and/or a dimension of public health preparedness and response.²¹⁻²³

Two reviewers reviewed each article, abstract, and report and assigned codes; the assigned codes were then compared for interrater agreement. If there was a discrepancy in the codes assigned, then discussion with consensus was used to assign a final code.

RESULTS

Our search strategy yielded 98 unique manuscripts (n = 58), abstracts (n = 3), or lay articles or reports (n = 37) that described 106 instances in which academic institutions participated in the community response to 11 FEMA-declared disaster events that occurred between September 11, 2001, and February 1, 2009. The identified academic institutions included academic health centers and community-based teaching hospitals; schools of medicine and nursing; schools of public health; other types of graduate schools, including engineering and psychology; and 4-year university programs. Of the 106 instances in which academic institutions were described as having participated in the community disaster response, 38 instances related to Hurricane Katrina and 16 to other hurricanes, 25 related to the terrorist attacks of September 11, 2001, and 12 related to the California wildfires (Table 3).

The specific types of resources and services provided by academic institutions to the 11 FEMA-declared disaster events are shown in Table 4. A majority of the reports described the provision of health care services, including both in-house (45 academic institutions) and in-field (48 academic institutions) mass-casualty care. Twenty-seven academic institutions provided communications or health information technology services; 16 provided an assessment of extent, quality, or rapidity of the response services; 14 provided mental health outreach or management services; 10 provided surveillance or investigations; and 8 provided incident command and management during the response.

The characteristics of community disaster resilience addressed by the resources and services provided by academic institutions as part of the community response to FEMA-declared disaster events between September 11, 2001, and February 1, 2009, are given in Table 5. Note that when the contribution of a school of public health, medicine, or Nursing was an element of a broader academic medical center response, the response was attributed to the academic medical center and not the individual school. The majority of academic institutions described in the literature contributed to the reduction in the consequences of the disaster by providing services or contributing resources that reduced the damage or extent of failures in terms of health, economic, and social effects and injuries or lives lost. In particular, 63 of the 64 instances in which academic health centers or teaching hospitals took part in the community disaster response, they contributed to reducing the consequences of the disaster. Resources or services that contributed to consequence reduction ranged from the provision of casu-

TABLE 3

Type of Academic Institutions Responding to Specific Disaster Events

Disaster Event	Type of Academic Institution							All Academic Institutions
	Academic Health Center*	Teaching Hospital	School of Medicine	School of Nursing	School of Public Health	Other Graduate	4-Year University	
September 11, 2001, attacks	16	5	1	0	0	2	0	24
2001 anthrax attacks	2	1	0	0	1†	1	0	5
California wildfires	3	1	0	0	1	6	1	12
Columbia space shuttle explosion	3	0	0	0	0	5	0	8
E5 tornado	0	1	0	0	0	0	0	1
Hurricanes Frances/Jean	1‡	0	0	0	0	0	0	1
Iowa floods	1	0	0	0	0	0	0	1
Hurricane Isabel	0	0	0	0	1§	6‡	1	8
Hurricane Katrina	19§	6	5	2	3§	3‡	0	38
Hurricanes Gustav/Ike	2	3	0	2	0	0	0	7
Kentucky ice storms	0	0	0	0	0	1	0	1
All events	47	17	6	4	6	24	2	106

*When the contribution of a school of public health, medicine, or nursing was an element of a broader academic medical center response, the response was attributed to the academic health center and not to the individual school.

†Includes a center for civilian biodefense.

‡Includes a center for disaster preparedness.

§Includes a center for public health preparedness.

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ality care in the field and in facilities, case management of mental health and social services needs, and intraevent communication and coordination of the response. A substantial number of academic institutions, particularly graduate schools, also contributed to the reduction in the likelihood of damages to and

failures in critical infrastructure. Academic institutions also have evaluated the effectiveness of medical care, risk communication, and evacuation procedures during the response to the event; the needs of disabled and mentally ill people that went unmet during the response; and underlying factors that contributed

TABLE 4

Resources and Services Supplied During Disaster Response According to Type of Academic Institution

Disaster Event	Resource or Service Supplied by Academic Institutions During Disaster Response											
	Case Management	Casualty Care In-House	Casualty Care In-Field	Cause or Damage Assessment	Command	Communication or Information Technology	Mental Health Services	Pharmacy Services	Response Evaluation	Shelter/Facilities	Surveillance	Training
September 11, 2001, attacks	4	17	18	1	3	5	6	—	—	3	—	—
2001 anthrax attacks	—	1	—	—	—	3	—	—	3	—	2	1
California wildfires	1	4	1	—	1	5	—	—	4	—	2	—
Columbia space shuttle explosion	—	—	—	2	—	—	—	—	—	—	2	—
E5 tornado	—	1	—	—	—	—	—	—	—	—	—	—
Hurricanes Frances/Jean	—	—	—	—	—	—	—	—	1	—	—	—
Iowa floods	—	—	1	—	—	1	—	1	—	—	—	—
Hurricane Isabel	1	—	1	5	1	3	—	—	—	—	1	1
Hurricane Katrina*	3	17	23	—	5	9	8	3	8	4	3	5
Hurricanes Gustav/Ike	0	5	4	0	1	0	0	—	—	2	0	0
Kentucky ice storms	—	—	—	—	—	1	—	—	—	—	—	—
Totals	9	45	48	8	11	27	14	4	16	9	10	7

*Four schools of medicine accepted medical students who were evacuated from medical training programs in New Orleans, LA.

TABLE 5

Characteristic of Disaster Resilience Addressed by Response of Academic Institution, According to Type of Institution and Disaster Event

Disaster Event	Type of Academic Institution									
	Academic Health Center/Teaching Hospital, n = 64*		School of Medicine or Nursing, n = 10†		School of Public Health, n = 6		Other Graduate School, n = 24		4-Year University, n = 2	
	Reduced Likelihood	Reduced Consequences	Reduced Likelihood	Reduced Consequences	Reduced Likelihood	Reduced Consequences	Reduced Likelihood	Reduced Consequences	Reduced Likelihood	Reduced Consequences
September 11, 2001, attacks	—	21	—	1	—	—	1	1	—	—
Anthrax attacks	2	3	—	—	1	—	1	—	—	—
California wildfires	—	4	—	—	—	1	3	3	1	—
Columbia space shuttle explosion	—	3	—	—	—	—	2	3	—	—
E5 tornado	—	1	—	—	—	—	—	—	—	—
Hurricanes Frances/Jean	1	—	—	—	—	—	—	—	—	—
Iowa floods	—	1	—	—	—	—	—	—	—	—
Hurricane Isabel	—	—	—	—	—	1	4	2	—	1
Hurricane Katrina	6	25	—	7	1	2	—	3	—	—
Hurricanes Gustav/Ike	—	5	—	2	—	—	—	—	—	—
Kentucky ice storms	—	—	—	—	—	—	—	1	—	—
Totals	9	63	0	10	2	4	11	13	1	1

*When the contribution of a school of public health, medicine, or nursing was an element of a broader academic medical center response, the response was attributed to the academic health center and not to the individual school.

†Schools of medicine and nursing are grouped together because both provide training in professions that provide direct clinical care to patients, typically in clinical settings.

to the disaster event or the scope of damage caused by the disaster event.

The dimensions of public health preparedness addressed by the academic institutions reported as participating in the community response to FEMA-declared disaster events since September 11, 2001 are provided in Table 6. Of the 106 instances in which academic institutions participated in the community disaster response, the service or resource contributed to the dimension of resource management (74 instances), enabling and sustaining the public health response (23 instances), performance evaluation and management (20 instances), information capacity management (19 instances), and public information and risk communication (15 instances). Resource management was a particularly important role for academic health centers, whereas graduate schools (medicine, public health, or other disciplines) contributed services or resources across a broader array of the dimensions of public health preparedness, which included enabling and sustaining the public health response (eg, training public health nurses for mental health assessments), providing information capacity management (eg, establishing clearinghouses for surveillance data, avail-

able resources, and recommendations for the public), and providing risk communication (eg, crafting and disseminating risk information to the public). Specific dimensions of public health preparedness and response that were less often described in the articles and reports we reviewed included ensuring a robust supply chain (4 instances), community health risk assessment (8 instances), and incident command and management (8 instances).

COMMENT

Between September 11, 2001, and February 1, 2009, there were 106 identified instances in which academic institutions contributed to a community disaster response. The disaster events for which the greatest number of reported academic institutional responders exist include the terrorist attacks of September 11, 2001, and Hurricane Katrina; however, there are reports of academic institutional responders to 9 other FEMA-declared disaster events since September 11, 2001. The most commonly described resources provided by academic institutions to these events included mass casualty care delivered in-house or in-field, communication and information technol-

TABLE 6

Dimension	Type of Academic Institution					
	Academic Health Center or Teaching Hospital*	School of Medicine or Nursing†	School of Public Health	Other Graduate School	4-Year University	All Academic Institutions
Health risk assessment: identifying hazards and vulnerabilities in communities and populations through the conduct of community risk, capacity, and needs assessments	0	0	0	7	0	7
Incident and command management: defining and assigning roles and responsibilities, managing public health resources, and coordinating actions with other agencies	5	1	1	1	0	8
Information capacity management: ensuring epidemiologic and laboratory capacity to identify health threats, monitor trends, and conduct investigations; integrating, interpreting, and summarizing data from surveillance and studies	8	1	3	7	0	19
Resource management: providing or ensuring access to mass health care services and countermeasure and mitigation strategies to prevent disease, reduce morbidity and mortality, and mitigate environmental hazards	54	10	3	7	0	74
Public information and risk communication: communicating with the public, media, and community leaders regarding recommendations to protect health	8	0	2	4	1	15
Enable and sustain the public health response: ensuring public health workforce development, maintaining logistic and administrative capacities to deliver services, and protecting the physical and mental health of the response workforce	11	0	2	9	1	23
Ensuring robust supply chain: identifying critical resources for public health emergency response and practice to deliver resources throughout the supply chain	4	0	0	0	0	4
Performance evaluation and management: evaluating and reporting on performance in terms of the reach, effectiveness, and impact of strategies.	7	1	2	5	1	16

*When the contribution of a school of public health, medicine, or nursing was an element of a broader academic medical center response, the response was attributed to the academic health center and not to the individual school.

†Schools of medicine and nursing are grouped together because both provide training in professions that provide direct clinical care to patients, typically in clinical settings.

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ogy services, and postevent analysis and evaluation of response effectiveness.

Review of these reports indicates that the services and resources provided by academic institutions as part of the community disaster response served to bolster community resilience to disaster events (according to the MCEER framework of community disaster resilience)²⁰ and/or addressed identified dimensions of public health preparedness and response.²¹⁻²³ The most common dimensions addressed in order of occurrence were managing resources, enabling and sustaining a public health response, managing information capacity, and evaluating performance. Less often addressed were dimensions such as ensuring a robust supply chain, assessing community health risk, and providing incident command and management.

In our review of the literature, approximately 60% of the academic institutions identified were academic health centers or community teaching hospitals. It is recognized that academic health centers and teaching hospitals may be likely to have published reports on their experiences, and in so doing would be recognized as important contributors to community disaster response. Academic health centers represent a reservoir of people with the skills to provide services that are needed often in emergencies. In addition, a number of other types of academic institutions, representing a wide range of academic disciplines, also have contributed meaningfully to community disaster resilience and/or community disaster response. Specific examples include the provision of support to local schools and child care facilities (by a graduate school of human development), architectural assessment of building damage and safety (by a graduate school of architecture), spatial awareness of the extent of damage (by a graduate school of geology and space sciences), and assistance to homeowners in filing claims (by a school of law).

A noted limitation of the community disaster response capabilities of academic health centers is the lack of a well-established mechanism to integrate their resources and services into the federal, state, or local response structure.¹² Lack of integration is not isolated to academic health centers, but it can be generalized to hospitals. Several authors have expressed concern that hospitals are not adequately integrated into community planning.²⁴⁻²⁷ Hospitals are said to be isolated in their planning activities. For hospitals in general, the effectiveness of hospital staff response to the disaster is enhanced greatly by integration into the community emergency preparedness and response planning process.²⁴ It has been recommended that, in moving forward, academic health centers should better integrate into all of the phases of disaster preparedness and response, with an emphasis on community preparedness.¹²

In summary, our review of the literature and Internet reports reveals that academic institutions have made a sizeable contribution to the communities in which they reside by enhancing community resilience and dimensions of disaster prepared-

ness and response. Given that this review addressed only reports published in the peer-reviewed literature or otherwise accessible via Internet search, it is likely that it underrepresents the true contribution of academic institutions because instances of their involvement in the wider community response to disaster events may have gone unpublished or unreported. Nevertheless, there also are likely areas in which academic institutions could enhance their contribution to community disaster preparedness and response. Areas for improvement for academic institutions may specifically involve broadening the scope of the dimensions of public health preparedness and response to which they are able to contribute resources and enhancing the extent to which they engage with public health and emergency management agencies to ensure the appropriate coordination of resources during a disaster event. Important future areas of inquiry into academic–community collaborations for public health preparedness and response include research to better understand unmet needs or unfulfilled dimensions of public health preparedness and response that could be met by academic institutions and strategies for facilitating and enhancing collaborations between academic institutions and public health and emergency management agencies.

The topic of academic–community collaborations for enhancing public health preparedness and response is of growing importance. The recent economic recession has led to cuts in public health staffing and has eroded the capabilities of state and local public health agencies to respond to public health emergencies.^{28,29} It is reported that the budget cuts affecting state and local public health agencies will exacerbate the existing gaps in US emergency preparedness, including a workforce gap defined by an insufficient number of trained public health workers and funded positions to effectively respond during a public health emergency; a surge capacity gap defined by insufficient capacity of the medical system to respond to a massive influx of patients with appropriate personnel, equipment, and facilities; a surveillance gap defined by the lack of an integrated, national approach to biosurveillance necessary for timely response to biological threats; and a gap in community resilience defined by an insufficient number of trained public health workers to build the relationships needed to foster communities' capacity to cope with and recover from disasters.³⁰

Academic institutions are plentiful and distributed throughout the nation. We layered shape files of the FEMA-declared disaster sites since September 11, 2001 (available from www.gismaps.fema.gov/archives.shtm) and geocoded addresses of academic institutions that provide four-year degrees and/or graduate degrees and lie within counties affected by FEMA-declared disasters since September 11, 2001 (obtained from the National Center for Education Statistics <http://nces.ed.gov/collegenavigator/>). In so doing, we were able to discern that a total of 1168 academic institutions providing four-year or greater degrees geographically reside within counties of the 24 states in which there were FEMA-declared disaster sites after September 11, 2001.

Particular opportunities offered by academic institutions include the following:

1. Highly trained medical, public health, nursing, and other technologically proficient professionals and students available to augment the workforce and provide specific technical expertise to local public health and emergency management personnel

2. Opportunities for faculty and students to participate in service learning,³¹ which is a collaborative relationship that provides unique learning and research opportunities while meeting critical needs in the community

3. A sense of social justice to strive to improve resilience of communities' most vulnerable members, including racial and ethnic minorities. This is particularly important because racial and ethnic minorities have been identified as being more likely to experience adverse health consequences as a result of a disaster event.³⁰

The plethora of undergraduate and graduate programs in disaster preparedness and management reinforces that academic institutions of higher learning have recognized the importance of addressing the biotechnical, sociocultural, ecological, and economic aspects of disaster preparedness and response and community resilience. These academic programs are not limited to a few academic disciplines, but rather range from the health and medical sciences to the physical and social sciences. It is critical that in moving forward to achieve community disaster preparedness and response that makes an impact, the resources and expertise of academic institutions are effectively interfaced with governmental public health and emergency management agencies. Research to better understand factors that facilitate sustainable academic–community partnerships and the effective engagement of academic institutional resources for community disaster preparedness and response will contribute to sustainable community disaster resilience.

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