



Mental Health Worker Roles Post-Disaster: An Integrative Review

Kim Usher^a, Cindy Woods^b and Caryn West^c

School of Nursing, Midwifery & Nutrition, James Cook University, PO Box 6811, Cairns, Queensland 4870, Australia. E-mail: ^akim.usher@jcu.edu.au, ^bcindy.woods@jcu.edu.au, ^ccaryn.west@jcu.edu.au

Background: Mental health workers play an important role in caring for traumatised people after a disaster. While there is much literature about disaster responses, little has been written from the perspective of mental health workers.

Aim: The aim of this integrative review is to explore the current evidence related to the personal and professional responses to the impact of a disaster; the roles, actions, involvement, psychological preparation and reactions of mental health workers working in the aftermath of a disaster.

Methods: Relevant literature published between 1996 and 2012 was identified through electronic databases. Articles were reviewed if they discussed the roles of mental health workers in communities post disaster. Thirty-one peer reviewed journal articles met the inclusion criteria.

Results: Two themes emerged relating to the tasks, roles, skills and actions mental health workers perform during a disaster response, and the emotional impact of the work on the mental health workers.

Conclusions: Findings identified a gap in the literature about the education and preparedness of mental health workers to support traumatised survivors immediately after a disaster, and the long-term impact of a disaster on mental health workers who are themselves survivors yet continue to provide care to others in affected communities.

Keywords: Disasters, Community mental health services, Disaster relief planning, Survivors.

1. Introduction

A disaster can be natural or man-made and can strike with or without warning. Natural disasters include earthquakes, volcanic eruptions, tsunamis, hurricanes, tropical cyclones and floods. When a natural event harms property or takes human life, a natural disaster is said to have occurred. Man-made disasters include terrorist attacks, chemical spills, nuclear accidents, and industrial and transportation accidents.¹ The World Health Organization (WHO) defines a disaster as, “A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources”.² The effect a disaster has on a community depends on its vulnerability to impact and will

be influenced by factors such as hazard awareness, the condition of housing and infrastructure and the capabilities of disaster management organisations in the affected community.² Regardless of the type of disaster, the basic outcome remains the same; a significant number of people will experience emotional and physical consequences.³

Disaster-affected people are described as “people who are adversely affected by a crisis or a disaster and who are in need of urgent humanitarian assistance”.² Post-disaster humanitarian relief operations are “intended to respond to the immediate need to save lives, limit extraordinary suffering, prevent further injury to the population or damage to the society”.² Following recent disasters such as the Asian tsunami of 2004, Hurricane Katrina in 2005, and the Christchurch earthquakes in 2011, multi-country humanitarian relief teams were deployed to disaster-affected areas. Mental health workers are usually embedded in humanitarian relief teams to care for first responders and to work with disaster survivors.^{4,5} Often teams of volunteer mental health workers are also deployed to disaster-affected areas.^{6,7} A mental health worker is a health care practitioner who offers services for the purpose of improving an individual’s mental health or to treat mental illness. Mental health workers are responsible for providing counselling and support services to individuals and families experiencing mental health issues.

For the purpose of this review, the phrase ‘mental health workers’ has been used to describe the many professional people responsible for the emotional well-being of disaster survivors and includes but is not limited to social workers, counselors, psychiatrists, psychologists and mental health nurses.

Most research relating to disasters focuses on survivors, or on the impact of trauma on first responders and disaster volunteers.⁸ While there is literature that informs mental health workers’ response to disasters,^{9,10} very little research relates to the role and pressures on mental health workers who remain in communities post-disaster. Case studies feature prominently in disaster literature because disasters are unpredictable; they often strike with little or no warning and the aftermath is usually chaotic. It is therefore, difficult, if not impossible, to organise a research study or collect data during a disaster. Disaster management research, by its very nature, must be conducted after the fact. Review articles, such as this one, play an important role in this field by collating the stories and research, and comparing and contrasting the experience of workers in different settings and situations.¹

2. Aims

The aim of this review is to describe the current body of knowledge on the role of mental health workers in the aftermath of a disaster and to identify gaps in the current knowledge. Opportunities for further research in this substantive area of enquiry will be discussed.

3. Method

This literature review was conducted using an integrative approach, a method that draws on a diverse range of studies and methodologies to summarise the main points of past research and to delineate what is known about a topic. Literature searches were conducted in the databases PsychINFO, PubMed, and Google Scholar, using the keywords: disaster, emergency, disaster response, mental health, mental health worker, psychiatrist, psychologist, and nurse, in various combinations. The search strategy also included analysis of reference lists of retrieved articles. Specific journals (such as *Pre-hospital and Disaster Medicine* and *Disasters*) were also searched. A set of 134 papers was returned in the initial searches. Articles were reviewed in three stages - by title, abstract, then full text. The following inclusion criteria were applied to 134 full-text retrieved papers:

- Published in the English language;
- Published in the 16 year time frame between 1996 and 2012;
- Related to the roles, actions, involvement, psychological preparation and reactions of mental health workers delivering assistance in disaster-affected communities.

After reviewing each paper for relevance, a sub-set of 31 articles remained as illustrated in the PRISMA flowchart (Figure 1). Each of the 31 articles was appraised using the CASP critical appraisal check list by authors one and two.¹¹ The final 31 articles include narrative field reports, case studies, qualitative and

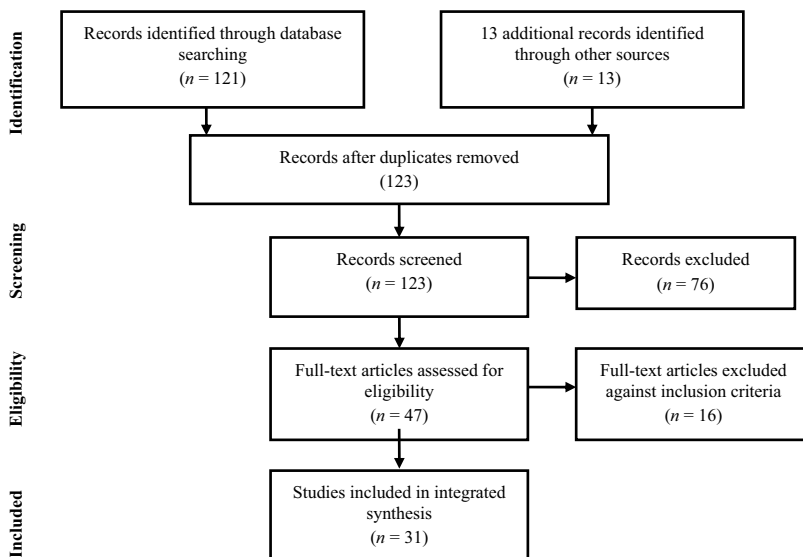


Figure 1 PRISMA flowchart.

quantitative studies, and reviews. The main strength of narrative field reports, and the reason they feature prominently in this review, is the depth of understanding that is gained from first-hand accounts of experiences in the field.

4. Results

Researchers thematically coded the data and identified two over-arching themes about providing mental health care in the aftermath of a disaster. Key findings from the synthesis of the final data set include: (1) *Mental health workers' roles and actions during a disaster response*; and (2) *mental health workers' emotions, reactions and attitudes during and after a disaster response*. A summary of each of the 31 articles is presented in Table 1.

4.1. *Mental health workers roles and actions during a disaster response*

This theme focuses on mental health workers' roles and actions: the skills they use, the roles in which they work, and the tasks they perform during a disaster response.

4.1.1. *Disaster training*

Varying levels of training are provided to mental health workers prior to deployment to disaster-affected areas. Training is influenced by how they are recruited and the humanitarian relief organisation with which they are affiliated. Mental health workers who live in a disaster-affected area tend to offer their services to a relief organisation or return to their previous employment upon their return to the disaster-affected area if they evacuated. The majority of the literature does not report if any disaster or trauma training occurs in this scenario.^{12,13} On the other hand, in the wake of the World Trade Centre terrorist attacks, where it was estimated more than one million people would need crisis counselling, the Federal Emergency Management Agency (FEMA) provided disaster relief conferences and workshops to mental health agencies around New York. FEMA provided information and the opportunity to practice crisis counselling techniques.^{14,15} This situation, like the World Trade Centre disaster, was unique. In most disaster scenarios, infrastructure damage is severe and service delivery is limited as a result, but the World Trade Centre bombings concentrated the damage to a relatively small area. Psychological service delivery was not as severely affected as it was in other disaster-affected areas.

The amount of training offered varied for volunteers recruited from outside a disaster-affected area. It ranged from a telephone briefing about what to expect [length of time unknown],¹⁶ to a one hour conference call training session,⁶ to a three hour workshop on basic mental health crisis intervention.¹⁷ Training

Table 1 Literature included in the review.

Author/Year	Aim	Country	Event	Research Design
Akin-Little, A., & Little, S. (2008).	Personal perceptions and experiences of a disaster responder	USA	Hurricane Katrina	Narrative
Anderson, K. (2007).	Personal insights about healing and recovery	Indonesia	Tsunami	Narrative
Boscarino, J., Figley, C., & Adams, R. (2004).	Identification of caregivers most vulnerable to compassion fatigue	USA	September 11 World Trade Centre attacks	Quantitative design
Clarke, V. (2008).	To raise awareness of issues around vicarious trauma		General	Review
Cohen, R.E. (2002).	A review of mental health services for victims of disasters		General	Review
Collins, S., & Long, A. (2003).	To examine the effects on caregivers working therapeutically with traumatised people	Northern Ireland	1998 Omagh bombing	Mixed methods longitudinal study
Dass-Brailesford, P. (2008).	A disaster responder's experience working with displaced survivors	USA	Hurricane Katrina	Narrative
Davis, J. (1996).	Personal experience of Critical Incident Stress Debriefing (CISD)	USA	Oklahoma bombing	Narrative
Dean, K., Langley, A., Kataoka, S., Jaycox, L., Wong, M., & Stein, B. (2008).	Dissemination of evidence-based treatment in schools following a disaster and needs of providers and school staff	USA	Hurricanes Katrina & Rita	Narrative
Diamond, H., & Precin, P. (2004).	Experience of helping disabled people manage the aftermath of September 11th	USA	September 11 World Trade Centre attacks	Narrative
Edwards, D., Burnard, P., Coyle, D., Fothergill, A., & Hannigan, B. (2000).	A review of stress and burnout of community mental health nurse teams	Range	Community mental health nursing	Review
Faust, D., Black, F., Abrahams, J., Warner, M., & Bellando, B. (2008).	The collective experiences of 4 New Orleans-based psychologists living in New Orleans after Hurricane Katrina	USA	Hurricane Katrina	Narrative
Haskett, M., Scott, S., Nears, K., & Grimmett, M. (2008).	To inform psychologists and other mental health professionals about this gratifying form of mental health service delivery by sharing experiences as volunteers	USA	Hurricanes Katrina & Rita	Narrative
Kamps, J. (2008).	One psychologist's experience before, during and after Hurricane Katrina	USA	Hurricane Katrina	Narrative
Levy, M. (2008).	Shares the impact of the experience of volunteering on a disaster mental health team to assist victims of Hurricane Katrina	USA	Hurricane Katrina	Narrative
Madrid, P., Garfield, R., Jaber, P., Daly, M., Richard, G., Grant, R. (2008).	Survey of mental health providers in school-based health centres (SBHC) to assess the impact of Hurricane Katrina on students and the needs of SBHC mental health providers	USA	Hurricane Katrina	Quantitative design
Madrid, P., & Grant, R. (2008).	Describes the mental health needs of the displaced and evacuee children and families and the steps taken to develop sustainable mental health programs to meet this need	USA	Hurricane Katrina	Narrative
Marshall, M. (2007).	Identify the lessons learned from the experiences of volunteering as a member of a mental health volunteer organisation in the shelters after Hurricanes Katrina and Rita	USA	Hurricanes Katrina & Rita	Narrative

Table 1 Contd.

McGuinness, K., Coady, J., Perez, J., Williams, N., McIntyre, D., & Schreiber, M. (2008).	6 psychologists describe their experiences and roles in the wake of a disaster	USA	Hurricane Katrina	Narrative
Mitchell, M., Witman, M., & Taffaro, C. (2008).	Discusses role in assisting to re-establish mental health services and assess mental health status of residents	USA	Hurricane Katrina	Mixed methods
Nikapota, A. (2006).	Lessons from observation of the aftermath of the disaster are described	Sri Lanka	Tsunami	Case study
North, C., & Hong, B. (2000).	Description of disaster education curriculum for mental health professionals adapted to train community leaders	USA	St Louis/ Mississippi River Flood	Field action report
Osofsky, J. (2008).	A psychologist specialising in trauma work describes her personal story in the aftermath of Hurricane Katrina	USA	Hurricane Katrina	Narrative
Persh, J. (2004).	A fieldwork occupational therapy students' experience with FEMA crisis counselling post 9/11	USA	September 11 World Trade Centre attacks	Narrative
Reyes, G., & Elhai, J. (2004).	Describes the impact of disasters on communities and individuals and the most commonly employed interventions	USA	General	Review
Rizzuto, T., & Maloney, L. (2008).	Describes the New Orleans LSPCA's response to Hurricane Katrina	USA	Hurricane Katrina	Case study
Rosser, B. (2008).	A Medical Reserve Corps member's description of what it is like to go into a disaster to provide emergency mental health	USA	Hurricanes Katrina & Rita	Narrative
Smoyak, S. (2005).	Describes differences in roles for mental health professionals responding to a disaster	USA	Hurricane Katrina	Interview
Vijaykumar, L., Thara, R., John, S., & Chellappa, S. (2006).	Describes the response by two non-government organisations to the tsunami in India	India	Tsunami	Narrative
Visanuvothin, T., Chakrabhand, S., & Bhugra, D. (2006).	Describes the work of a mobile mental health team after the Thailand tsunami	Thailand	Tsunami	Narrative
Weeks, S. (1999).	Description of the role and activities of psychiatric-mental health nurses post disaster	USA	Multiple	Narrative

was sometimes accelerated or waived for disaster-affected areas where people's needs were overwhelming and immediate. For workers who were affiliated with a humanitarian organisation such as American Red Cross (ARC), Project CREST (Community Resources for Education, Support, and Training), or National Organisation for Victim Assistance (NOVA), disaster training workshops occurred prior to deployment.^{5,16,18} Some mental health workers expressed a need for additional training. Although they initially felt unprepared, they often learned by doing.⁶ Other individuals reported their university training, their continuing education and their life experiences from practice were sufficient to provide the foundation for disaster work.^{17,19}

4.1.2. Mental health first aid

The tasks that mental health workers perform in disaster-affected communities depend on the timing of their arrival at a disaster-affected area.²⁰ Haskett *et al.* (2008) describes the acute crisis period immediately following a disaster as akin to working in chaos. He said the adverse conditions were filled with unpredictability, grief, stress and loss.⁵ In the acute crisis period, mental health workers provide immediate crisis assistance. Crisis assistance involves dealing with immediate necessities such as helping survivors obtain shelter, clothing, food and water, which may be in short supply.^{5,20–23} Mental health first-aid is commonly used in the field post-disaster and focuses on reducing emotional distress, and providing practical assistance and helping to solve immediate, and short-term problems.^{5,19,24,25}

4.1.3. Reflective listening

One of the most important roles identified for mental health workers after a disaster is to listen to disaster survivors' stories. By listening to stories, workers can provide reassurance and validate and normalise survivors' emotions and reactions.^{5,15,18–20,25,26}

4.1.4. Changes to practice

During the acute crisis period it is necessary for mental health workers to abandon some of their usual organised, systematic, clinical approaches. Instead of gathering extensive family and personal history information and making formalised comprehensive assessments, mental health workers favour a short, flexible approach. In the extreme setting after a disaster, mental health workers focus on offering practical help and support to put lives back together.^{5,19,20,25–27} Mental health workers must be willing to meet survivors as they are and where they are.²⁶ By necessity, interactions must be simplified and adapted to suit a one-time consultation with a survivor they may not see again.^{14,28}

4.1.5. *Caring for other relief workers*

Mental health workers provide support and care for first responders, volunteers, relief workers, shelter staff, doctors, and nurses. Mental health workers may also be called upon to promote coping strategies to relief workers suffering from compassion fatigue, therapeutic fatigue, psychological, emotional and physical burnout, guilt, stress, or secondary traumatisation.^{5–7,12,19–21,23,24,28,29} An additional role for mental health workers deployed to a disaster-affected area is to conduct exit interviews with volunteers returning home after their deployment ends. In exit interviews, volunteers may process their experience and mental health workers will assess an individual's need for emotional support and ongoing counselling on their return home.⁵ Mitchell, Whitman and Taffaro (2008) described going from devastation to "life as normal" as just as difficult as going from a non-affected area to a disaster-affected area.²⁸

4.1.6. *Education*

The short-term phase following the acute crisis period can last for weeks or months after a disaster.²⁰ During this period, mental health workers assess mental health needs and work with people suffering shock, trauma, guilt, grief, depression, anxiety, sleep disorders and post-traumatic symptoms.^{5,6,12,19} Services can include intervention, problem-solving, advocacy, referral and education.²⁶ Education may involve teaching relaxation techniques and coping strategies.^{6,20} In rural or country areas, mental health workers may also educate those people who come into contact with survivors. Shelter staff, teachers, church members, and local government officials may need to be taught how to recognise signs of disturbance and support and care for people with a mental illness.^{6,9,19,30}

4.1.7. *Normalising reactions*

Short-term crisis reactions can emerge in the weeks following a disaster. Depression, anxiety, acute stress disorder, substance abuse, and relationship breakdowns that occur in this time are often transitory and will resolve over time.^{15,16,20,25,30} Preventative mental health services are aimed towards at-risk populations whose coping capacity may be overwhelmed: those people who have lost loved ones, a home, property, belongings, community or employment.²⁰ Interventions include providing emotional support, helping survivors understand disaster-related stress and grief reactions, and clarifying their behaviours and reactions are normal and expected given the abnormal situation.²⁰

4.1.8. *Working with children and adolescents*

Some of the most vulnerable survivors of a disaster are children and adolescents.^{22,31} Intervention can include outreach visits to schools, which

provides an opportunity for students to discuss their experiences and talk about how they are coping. Mental health workers can also identify students in need of therapy.^{6,32} Mental health workers may need to educate adults to help children cope with loss.³¹ After the Asian tsunami of 2004, disaster-affected Sri Lankan people followed culturally-common practices to protect children from grief. Family members withheld information about the death of a close family member from children, preventing them from grieving.³¹ Mental health workers believed it was necessary to discuss telling the children the truth about death and allow them to grieve with the adults.³¹

4.1.9. Interventions

Cohen's (2002) description of the purpose of outreach or intervention is two-fold. Intervention must first assist survivors to talk about and understand post-disaster stress, grief reactions, and disrupted sleep patterns, then help them to return to equilibrium and normal functioning. Intervention focuses on enabling and empowering survivors to move away from the victim role, restore their capacity to cope with a stressful situation, and help to re-organise their changed lives and circumstances.^{20,33} Other forms of post-disaster intervention include organising support groups, providing positive reinforcement to shelter and other relief workers. and creating an opportunity for people to tell their story.^{4,19}

4.1.10. Social capital

In rural areas with few resources, mental health workers may be required to train relief personnel to screen survivors for psychosocial issues. Workers may also recruit and train local teachers, church leaders, community leaders and healthcare workers to perform culturally-appropriate mental health crisis interventions such as supportive listening, problem solving and disaster coping.^{4,17,20,21,30,34} This is especially important in kinship-based societies where people are most likely to accept help only from within kinship relationships.^{21,30} North and Hong (2000) support this conclusion stating, "During disasters, victims seek support from trusted members of their own communities rather than mental health professionals" (p. 1058).¹⁷ However, Nikapota argued it may not always be appropriate to recruit counsellors with minimal training and expect them to provide mental health services when they have suffered their own losses.³¹

4.2. Mental health workers' emotions, reactions and attitudes during and after a disaster response

Much of the emotions and attitudes mental health workers experience is documented in the narrative reports of their experiences after a disaster. These reports demonstrate that mental health workers experience both positive and negative emotions, including helplessness, fatigue, burnout, satisfaction and fulfilment.

4.2.1. *Commitment*

The literature suggested that when a disaster occurs, mental health workers feel a sense of commitment and a willingness to respond.^{6,20,24} However, the sense of commitment or willingness to respond may be affected by the nature of the disaster (widespread or limited patterns of damage), and whether the worker resides in the disaster-affected area and experienced personal losses.¹² Dean *et al.* (2008) reported only 22 of 196 psychiatrists in the New Orleans area were still practicing one year after Hurricane Katrina.²² Many psychologists had also left New Orleans after being displaced or losing their positions.¹² Conversely, a study conducted 18 months after the World Trade Centre attacks showed a high number of social workers still resided and worked in New York City.⁹ This difference is likely to be related to the extent of damage and destruction post-disaster. Hurricane Katrina, and the subsequent flooding caused severe widespread damaged and destruction to infrastructure and essential services. In contrast, the World Trade Centre bombings concentrated the damage to a relatively small area, which limited the impact on psychological service delivery.

4.2.2. *Occupational hazards*

Working with disaster survivors has an emotional impact on mental health workers.⁷ Providing support to disaster survivors can be rewarding and stressful.⁹ The nature of the profession exposes mental health workers operating in a disaster-affected area to a greater risk of burnout than mental health workers who do not work in the field with disaster affected people.^{28,36} Mental health workers tend to be empathetic and put others first, which makes them vulnerable to emotional, psychological and physical fatigue leading to burnout.^{5,28,37} Unconditional caring and support can exhaust and deplete mental health workers.²¹

4.2.3. *Care givers as survivors*

Mental health workers who reside in a disaster-affected area are survivors of the same trauma and have endured their own losses, yet they continue to help others to cope and recover.²² Mental health care can be complicated by close relationships within the community, which may not affect quality of care but may increase negative personal effects on mental health workers.^{7,21,22} Faust *et al.* (2008) notes there is scant literature or research on the long-term impact a disaster has on psychologists who are disaster survivors themselves and who continue to provide care in the affected community.^{9,12,38} Comparatively, there is much literature that deals with the post-traumatic stress experienced by disaster rescue workers.^{39–42}

4.2.4. *Satisfaction*

Not all post-disaster mental health workers succumb to traumatic stress. Volunteers who provide assistance can develop close relationships with other

relief workers in a supportive environment which provides a buffer to traumatic stressors and protects some mental health workers from psychological difficulties.^{5,7} Altruistically giving to and doing for others can be a powerful source of fulfilment,¹⁸ and disaster mental health workers express profound inner satisfaction and gratification at being able to reach out and help others in their hour of need.^{5,18}

5. Discussion

A significant theme through the literature was that mental health workers must change their usual clinical practice during a disaster response. The skills that mental health workers use and the roles in which they work in the field during a disaster response are situation-specific and vary from those used in daily clinical practice. Supportive and reflective listening and validation of experiences are used more frequently than in daily clinical practice. Some of the skills needed during a disaster are not so commonly used in clinical practice like the provision of practical assistance, psychological first aid, educational interventions and exit interviews with volunteers. A significant difference to usual clinical practice during a disaster response is the need to abandon the formal therapist–client relationship for a flexible, pragmatic approach that aims to meet needs, problem-solve and provide emotional support.^{5,19,20,25–28}

Despite evidence of disaster training for mental health workers affiliated with humanitarian organisations,^{5,18} gaps were identified in the waived or accelerated training provided for unaffiliated disaster volunteers.^{6,16,17} This finding indicates a need for disaster education and training to be incorporated into tertiary education for mental health workers.^{7,43,44}

The other key theme to emerge from the literature relates to the long-term impact of disaster work on the psychological and physical welfare and functioning of mental health workers permanently residing in disaster-affected areas. There is limited discussion in the literature related to the ways mental health workers manage negative emotions such as psychological fatigue and burnout, therapeutic and compassion fatigue, guilt, and secondary traumatisation. Deployments for volunteer mental health care workers are necessarily of a fixed term (usually two weeks) to minimise long-term effects of involvement in a disaster response, and co-workers who are also on deployment often provide emotional support. However, mental health workers permanently residing in a disaster-affected area are exposed to overwhelming emotion and long-term effects of involvement in a disaster response. Mental health workers who have suffered their own losses, trauma and devastation, but continue to provide counselling to disaster-affected communities and are at greater risk of suffering fatigue and burnout. There is a need to explore how this risk is managed by mental health workers and at a broader organisational level.^{24,28} This finding has a significant impact on a world where disasters are increasing, as are the number of people affected by disasters.⁴⁵

6. Conclusions

This review reports on the experiences, perceptions, actions, and emotions of mental health workers in communities after a disaster. Much of the reviewed literature was case studies and first-hand accounts by mental health workers.

The role a mental health worker takes on in a disaster response situation is context specific depending on the type of disaster and the resources available in the disaster-affected area. Some of the roles identified include organising and co-ordinating mental health worker teams, monitoring the mental health of other first responders and emergency workers, providing outreach services with a mobile health team, or working with survivors in shelters.

Some actions of mental health workers in a disaster-affected area are similar to those used in daily clinical practice such as supportive and reflective listening and validation of experiences. Other actions less commonly used in daily clinical practice are provision of practical assistance, mental health first aid, educational interventions and exit interviews with volunteers. The most commonly reported actions were a flexible, pragmatic approach aimed at meeting needs, problem-solving and providing emotional support.

Two significant gaps exist in the current body of knowledge and they relate to the education offered to mental health workers before they enter a disaster-affected area and the monitoring of mental health workers own emotional well-being after working in a disaster-affected area. The first gap relates to training. This review identified that the duties and roles performed by mental health workers in a disaster were similar regardless of the location or type of disaster. Disaster workers in many different contexts identified the same skills and competencies as important in a disaster setting. Standard training in these disaster-related skills, which are not often used in clinical practice, may allow mental health workers to operate more effectively during a disaster response. Further research is required to quantify mental health workers' disaster education/training received prior to deployment to a disaster-affected area, and their perceptions of the adequacy or deficiency of their training after returning from a disaster-affected area.

The second gap in the literature highlighted that the well being of mental health workers is rarely tracked after they finish their duties in a disaster-affected area. Some mental health workers, particularly those who lived and worked in an area before, during and after a disaster, said they were forgotten when the crisis passed. They were not well supported and had to manage their own well-being, including any emotional stress and trauma related to their work in the disaster-affected area. Further research is needed to explore how to better support mental health workers after they manage the mental health of disaster survivors, particularly those who live and work in a disaster-affected area.

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