# Companion animals and natural disasters: A systematic review of literature

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## ARTICLE INFO

## ABSTRACT

In 2014, 317 natural disasters were reported, impacting 94 countries, resulting in an estimated 7963 global deaths and costing nearly US$100 billion [28,29]. This issue becomes even more problematic when animal guardianship is considered during disasters. Therefore, this narrative systematic review of literature investigates the impact of companion animal guardianship before, during, and/or after a natural disaster. Nineteen peer-reviewed, empirical articles were included in this review. Articles were located using search terms and inclusion criteria via EBSCOhost, JSTOR, MEDLINE, and Google Scholar. The included articles covered a range of natural disasters in various countries. Findings from the included articles are discussed within methodological streams (mixed methods, qualitative, and quantitative descriptive) as well as synthesized across methodological streams. Findings suggest that companion animal guardianship can impact disaster-relevant decisions, behaviors, psychological symptoms, and willingness to work during a time of disaster. These findings are discussed in terms of their relevance to disaster planning, preparedness, response, recovery, and mitigation. Particularly, implications are discussed for public health and safety, disaster professionals and officials, resiliency, and contextual factors. The review concludes with a discussion of limitations and areas for future research.

## 1. Introduction

It is estimated that nearly 80 million American households include companion animals and over half of the global population has at least one companion animal. Other estimates approximate this figure to surpass 75% of American households, which exceeds the number of households with children ([20]; Humane Society, 2016 [30];). As people continue to share their homes and lives with companion animals, many develop strong emotional relationships with these beings (e.g. [12,32,34],). Some even consider companion animals as family members [14,48,8]. For example, over 80% of companion animal guardians in the United States (U.S.) say they would risk their lives to rescue their companion animal(s) [1].

Whether it be in the form of companionship, livelihood, or guardianship, human-animal relationships can have a large impact on how people make decisions, formulate feelings and attitudes, and behave. Heath et al. [22] claims that "companion animal guardianship can be a significant threat to public and animal safety during disasters," calling for greater attention to disaster preparedness regarding companion animals (p. 664). As such, animal guardianship is important to consider within the context of natural disasters.

The [28,29] reported 317 natural disasters in 2014, impacting 94 countries, and resulting in an estimated 7963 global deaths. Also in this report, it was estimated that these disasters costed nearly US$100 billion ([29], p. 222). Disaster planning, preparedness, response, recovery,

and mitigation can become quite labyrinthine when natural disasters occur at such a high rate. This can become even more complex due to varying contextual factors among affected populations. Thus, the purpose of this narrative systematic review is to investigate the implications of companion animal guardianship and its impact on guardians across the phases of natural disasters. In what follows, a detailed process of methods is provided, followed by results. These are organized *within* methodological streams and *across* methodological streams. Implications are discussed for public health and safety, disaster professionals and officials, resiliency, and contextual factors. Limitations and areas for future research are also discussed in light of the results. As such, the following research question (RQ) guides this review:

RQ: What are the impacts of companion animal guardianship before, during, and/or after a natural disaster according to existing empirical research?

## 2. Material and method

This systematic review aims to narratively synthesize what is known and what is not known about the impact(s) of companion animal guardianship across the stages of a natural disaster. Articles for this review were searched for using four databases: EBSCOhost, JSTOR, MEDLINE, and Google Scholar. These databases were searched using subscriptions accessed via the author's employing university. English language articles were searched from 2006 to August of 2016. A list of

**Table 1**
Search Terms and Number of Total Yielded Articles.

| Search terms | EBSCOhost | JSTOR | MEDLINE | Google Scholar | Total |
|---|---|---|---|---|---|
| Disaster and pet | 66 | 467 | 19 | 25,500 | 26,052 |
| Crisis and pet | 52 | 1392 | 2 | 38,600 | 40,046 |
| Natural hazard and pet | 7 | 5318 | 1 | 19,500 | 24,826 |
| Natural disaster and pet | 39 | 5364 | 0 | 18,300 | 23,703 |
| Natural disaster and nonhuman animal | 3 | 54,405 | 1 | 16,500 | 70,909 |
| Disaster and nonhuman animal | 7 | 2805 | 0 | 16,500 | 19,312 |
| Crisis and nonhuman animal | 9 | 7788 | 1 | 17,100 | 24,898 |
| Disaster and companion animal | 20 | 3995 | 0 | 18,800 | 22,815 |
| Crisis and companion animal | 7 | 11,972 | 0 | 24,900 | 36,879 |
| Natural disaster and companion animal | 8 | 64,042 | 0 | 16,700 | 80,750 |
| **Total** | 218 | 157,548 | 24 | 212,400 | 370,190 |

search terms and number of yielded articles is listed in Table 1.

## 2.1. Data collection and analysis

Articles were screened using inclusion criteria. The inclusion criteria established that articles had to be: an empirical study that sampled from natural disaster affected-populations or populations likely to be affected by natural disasters (e.g., flood plain residents), published between 2006 to 2016, and companion animal(s) were a part of the article's findings. These criteria were established to ensure that articles were relevant to the research question. Of the 370,190 total yielded articles, 2139 were screened using inclusion criteria and the remainder of this section provides details on the process.

Within the four databases, each of their unique search engines organized the yielded articles by relevancy, pertaining to the used search terms (see Table 1). Screening consisted of reading the title and abstract of the provided search results in each database. Once repeated and/or irrelevant articles populated the list of yielded results, screening ended and the next search terms were input. The total number of screened articles in each database was: all 218 in EBSCOhost, 847 in JSTOR, all 24 in MEDLINE, and 1050 in Google Scholar. Of the 2139 screened articles, 49 were deemed relevant based on the inclusion criteria. These were downloaded to read in full. A total of 19 articles passed full screening based on inclusion criteria (see Appendix A for a list of excluded articles).

The 19 articles that passed full screening were coded regarding their: relevancy to the research question (i.e., "direct" if companion animals were a primary topic or "indirect" if they were a secondary topic), type of natural disaster, phase of natural disaster (i.e., preparation, onset, containment, and recovery), location, population characteristics, driving question(s) of interest, methodology, and guiding theory/framework (if any). Next, articles were categorized by methodology and assessed for methodological quality (see Appendix B). Since there were no randomized group comparisons or non-randomized group comparisons in the final 19 articles, the methodological groupings were reduced to three categorizations: quantitative descriptive surveys (and similar designs) (QN), qualitative (QL), and mixed methods (MM). Quantitative studies were assessed using an adapted version of Davids and Roman's [17]) quality appraisal criteria for quantitative descriptive surveys. Qualitative studies were assessed using Critical Appraisal Skills Programme (CASP) [16] checklist. Mixed method studies were assessed using Pluye et al.'s [44] Mixed Methods Appraisal Tool (MMAT). Some studies were one-time interview or survey designs that used newly developed questionnaires and thus, had not been tested for reliability or validity. For reasons such as this and lack of other details, many of the 19 articles received a moderate to low/weak rating. This is *not* to say that the studies that received this rating had low/weak information, but rather reflected a lack of methodological information based on the standards of the appraisal tools. Data extraction followed this step.

Data extraction of the 19 articles' findings aimed to identify

evidence that related to the research question. This was done by reading the articles' findings/results, discussion, and conclusion sections. Narrative and/or supportive numerical findings were extracted for all methodologies. Article findings were condensed to statement(s) that encapsulated the primary findings in relation to the review's objective, which were supported by direct quotes and/or paraphrases from the primary articles. For quantitative and applicable mixed methods articles, numerical information was also used as support for the condensed finding statements. Page numbers were recorded for this supportive information, which were catalogued and segmented by methodology.

## 2.2. Data synthesis

A meta-analysis was not appropriate to the data as multiple methodologies were included. Additionally, studies using the same methodology used a variety of scales, measures, operationalizations, etc., which made a meta-analysis inappropriate. Thus, results of the studies are reported in a narrative format, following principles of the Cochrane Handbook (Section 11.7.2) [25]. Significant and non-significant results that were deemed relevant to this review's objective were recorded and reported. Two stages of synthesis occurred. First, the finding statements for each primary study were synthesized *within* methodological streams. Quantitative studies were synthesized following principles of the Cochrane Handbook (Section 11.7.2). Qualitative studies were broadly guided by the framework synthesis model [45,7] and mixed method studies were guided by a combination of the previously mentioned processes. This was followed by certainty evaluations using tools/checklists relevant to the corresponding methodologies.

Synthesized finding statements within each methodological stream were assessed for certainty. The quantitative descriptive surveys were assessed using the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach [49]. Qualitative studies were assessed using the GRADE Confidence in the Evidence from Reviews of Qualitative research (CERQual) approach [36]. Mixed method studies were assessed using both GRADE and GRADE-CERQual.

Second, findings were synthesized *across* methodological streams. To do this, the synthesized finding statements from within methodological streams and corresponding certainty evaluations were compiled, along with relevant information pertaining to: context/country, disaster phase, sample, and type of disaster. Next, finding statements that amplified and supported one another from across methodological streams were compiled to create higher-level finding statements. Any within method finding statements that were extraneous and could not be amplified across methodological streams were kept as separate finding statements, which were incorporated into an existing across method finding.

## 3. Results

Of the 19 articles that passed full screening and were included for