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Disaster preparedness of licensed private veterinary practitioners in Mississippi

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DISASTER PREPAREDNESS OF LICENSED PRIVATE VETERINARY PRACTITIONERS IN MISSISSIPPI

By

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This study's purpose was to describe the disaster preparedness of licensed private veterinary practitioners in Mississippi. A mail survey was distributed assessing disaster training, response plans, and disaster-related organization knowledge. Individuals who have experienced a disaster are more likely to have a personal plan, a clinic plan, or both than those who have not. County residence along the Mississippi Gulf Coast showed 3.62 times likelihood of having a personal plan and 3.09 times likelihood of having a clinic plan than those in other districts. Many veterinarians failed to identify their local emergency management agency as their point of contact in a disaster situation, and few indicated having disaster education materials for their clients. Twenty percent of respondents indicated having obtained formal disaster training. More than two-thirds of respondents were interested in disaster training.

Keywords: Disaster, veterinarian, preparedness, and animals

DEDICATION

I would like to dedicate this research to my father, Stephen H. Leech, Jr. Although he is not present for this publication, he has always been the driving force behind all my academic pursuits.

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CHAPTER I

LITERATURE REVIEW

When a disaster is mentioned, most people think of events such as earthquakes, hurricanes, and tornadoes. With 41 tornadoes in 2010, constant hurricane exposure, and geographic location along the New Madric fault line, Mississippi alone is frequently exposed to disasters and their potentially damaging effects (NWS 2011). Hurricanes are by far the most costly disaster. Eight of the ten costliest hurricanes have occurred in the last decade with three of them occurring in the same season: Katrina at $81 billion, Wilma at $20.6 billion, and Rita at $11.3 billion (Blake 2007). Although there are many definitions for a disaster, they all include the concept that a disaster is an incident caused by man-made or natural events that requires a response action to prevent further damage and loss of life. A risk of a disaster is determined by its potential destructive effects from local to catastrophic and by its source such as biological, natural, etc. (Heath "Participation" 1997). It is believed that if the environment post-disaster is too life-threatening for humans and requires a mandatory evacuation, then it is also life-threatening for animals (Heath "Risk" 2001).

In reality, the initial response to disasters occurs locally. Local communities including individuals and businesses such as veterinary practices are the first to respond following a disastrous event. The greatest disaster-related costs for individual veterinary practitioners are correlated with "everyday disasters" such as fires, isolated tornadoes, and local flooding due to excessive rainfall (Heath "Mitigating" 2005). Between 2004-

2008, U.S. fire departments responded to an average 3,830 structural fires per year in office properties (Evarts 2010). Veterinary personnel provide local services and are, therefore, implemented into local management services. Personal, business, and community preparedness are all key in handling a disaster because disasters are threats to public health, the economy, and the environment.

Animal Considerations in Disaster Preparedness and Response

Animal welfare in disasters may be related to human health and welfare. Without adequately caring for animals following a disaster, whether companion or food animals, animal diseases may occur leading to animal-animal disease transmission or animal-human transmission (Appleby 2008). About 75% of new emergency/re-emerging diseases are zoonotic, transmitted through direct contact, vectors, or contaminated food and water (Wohl 2007). Public health concerns can be related to pet animal rescue, owner's resistance to evacuate without their animals, environmental concerns of carcass disposal and farm-waste management, decreased surveillance of infectious organisms, and treatment of both animals and humans.

It is thought that due to disrupted environmental conditions, disease outbreak potential is at an epidemic proportion after a disaster (Watson 2007). When a disease outbreak occurs following a disaster, it is commonly due to population displacement, poor water quality, low nutrition quality, inadequate vaccination immunity, and poor healthcare availability; not necessarily the presence of dead human or animal carcasses (Watson 2007). Animal corpses are an issue if they are exposed to the water supply allowing potential fecal contamination or communicable disease transmission of a

zoonotic disease (PAHO 2004). However, most zoonotic diseases do not survive in animal corpses due to pH and other physiological changes.

Disease potential is not only related to infectious organisms. More recently, the April 20, 2010, British Petroleum Deepwater Horizon oil spill caused an estimated 1.4 million barrel oil release into the Gulf of Mexico (Restorethegulf.gov 2010) with a 68,000 square mile surface slick (Cleveland 2010). With the damaging effects on the fish and wildlife in the Gulf coastal area, the Food and Drug Administration along with the National Oceanic and Atmospheric Administration continues to monitor potential contamination levels in fish and seafood products (Nolen 2010). Monitoring efforts are focused on public and environmental safety. At this time, few results have been released (Taylor 2010), but the effects of the oil could be lasting on the environment and the health of those exposed.

Animals provide people with not just food but livelihood and psychological support. With over 43 million households owning at least one dog and over 37 million households owning at least one cat (AVMA U.S. Pet Ownership and Demographics Sourcebook 2007), over 49% of owners consider their pets as part of their family in a 2006 survey (AVMA U.S. Pet Ownership and Demographics Sourcebook 2007).

In the event of an evacuation, leaving animals behind places them at risk for injury or drowning as well as lack or contamination of food and water. A 2001 study showed that 80% of owners who do evacuate with their animals often attempt to stay with friends or family (Heath “Epidemiologic” 2001). Many evacuees without that option won’t enter shelters or camps if they have to abandon their animals (Appleby 2008) and refuse to leave disaster affected areas (Wohl 2007). This strong bond indicated an increased value that Americans place on their pets, as we have seen with increased need

for veterinary specialized care and is indicated by American Veterinary Medical Association (AVMA) Market Research statistics. In 2001, the average cost spent per animal in a household in 2006 was $366 (AVMA U.S. Pet Ownership and Demographics Sourcebook 2007); whereas in 2001 the average cost per animal in a household was $179 (AVMA U.S. Pet Ownership-2001). Though the average cost per animal increase can be attributed to inflation or more emphasis in veterinary care, animal activist efforts and emphasis as pets as part of the family have indicated the increase in the value of pets (AVMA U.S. Pet Ownership and Demographics Sourcebook 2007).

Some reports indicated that emergency management personnel encouraged owners to leave their pets behind following a disaster. In one study, 25.4% of owners indicated they were directly informed by such personnel to leave their animals behind to rescue later (Heath "Risk" 2001). In a 2001 study, 41% of pet owners who left their animals following a hazardous chemical spill attempted to return to retrieve those animals (Heath "Epidemiologic" 2001) thus risking their own safety. Evacuation efforts not only place the animals at risk, but can potentially put the owners at risk, too. Owners who chose to evacuate without their pets may make arrangements with those who don't evacuate to care for the animals, but this solution is ineffective if significant damage occurs to the entire surrounding area.

Recent emergency management agency recommendations include that owners' evacuation with their animals, whether pets or livestock, is the best choice despite the expense. Studies have shown an increased failure risk to evacuate in pet-containing households. Failure of pet owners to evacuate is linked to multiple pets and previous lack of veterinary care (Heath "Human" 2001). In one study, the odds of evacuation failure were 4.5 times more likely for each dog owned (Heath "Human" 2001). In this same

study, respondent's higher attachment scores to their pets correlated with regular veterinary care (a visit within the past year) and proved to be a significant contributing factor to evacuation. Those animals that are not killed as a direct result of a serious disaster may wander off due to damaged fences and building structures and can sustain injuries that, if too traumatic, can lead to death of the need for euthanasia.

Refusal of owners to evacuate without their pets reportedly occurred in New Orleans with Hurricane Katrina. (Appleby 2008). This action resulted in President Bush creating the "no pet left behind" in disaster planning and evacuation clause to be added to the Stafford Act. The Robert T. Stafford Disaster Relief and Emergency Assistance Act was signed into law by Congress on November 23, 1988 in order to assure that special measures would be taken to aid and assist affected states during cases of disaster (Stafford Act 2007). With the Pet Evacuation and Transportation Standards (PETS) Act amendment in 2006, the Stafford Act would "address the needs of individuals with household pets and service animals following a major disaster or emergency" (Pet Evacuation and Transportation Standards Act of 2006). This Act requires that state and local emergency management authorities must include these animals in their plans. More than 100 people from various disaster-related organizations, including the United States Department of Agriculture, the Humane Society of the United States, and the American Veterinary Medical Association, met after this amendment passed during a two day National Animal Disaster Summit in 2006 to discuss implementation of animals into organizational plans (Beaver 2006).

Overview of Disaster Preparedness and Response

The National Response Framework (NRF) was created for "the prevention of, response to, and recovery from an incident of any size caused by any natural disaster or accidental or intentional dissemination of a CBRNE [Chemical, Biological, Radiological, Nuclear, or Explosive] agent" (National Response Framework 2008). It was initiated through Homeland Security Presidential Directive-5 (HSPD-5) and falls under the direction of the Department of Homeland Security. The National Response Framework is a unified all-hazards national response to disasters and emergencies. Because the Federal Emergency Management Agency (FEMA) now falls under this Department, an animal disaster can be considered to be an issue of homeland security (Wohl 2007). Because of the varying agencies involved in a disaster response, coordination under an organized structure such as Incident Command System (ICS) is paramount to deliver effect healthcare (Watson 2007). Within the framework, veterinarians commonly fall under the planning or operations section of the disaster command staff to support both the search and rescue animals as well as those animals who are rescued.

Although the AVMA originally pushed for veterinary incorporation into the Federal Response Plan in the early 1990s (Heath "Participation" 1997), the new directives provide more specific integration of veterinarians in disaster preparedness. Under the new directives, disaster response begins at the local level starting with the Office of Emergency Management whether through the city, town, or county (Engelke 2009). Resources can deplete rapidly so these agencies may then call on State Offices of Emergency Management for support which can include the State Department of Agriculture or specifically the Board of Animal Health in Mississippi. While multiple federal agencies may be initially involved, ultimately, the Department of Homeland

Security's Federal Emergency Management Agency is in charge if a federally declared disaster occurs as addressed in the Robert T. Stafford Disaster Relief and Emergency Assistance Act.

Experts agree that an emergency cycle for a disaster event has four general phases- mitigation, preparedness, response, and recovery (Engleke 2009). Mitigation can be defined in reference to animals as attempts to prevent or reduce hazard impacts on community animal populations or agricultural operations (Wingfield 2009). In the case of animals, some experts believe that the best mitigation practice is to promote responsible pet ownership through identification and licensing (Heath 1999). In one study, lost dog recovery time was compared using different factors including whether the dog had a form of identification on at the time of becoming lost from its home (Lord 2007). Dogs with a form of identification, whether a rabies tag, dog license, or microchip, were 1.6 times more likely to be recovered than those dogs without a form of identification ($p<0.05$). In this study, the author links identification use to a higher likelihood of recovery. Mitigation efforts include any effort to reduce the loss of life or property, which in the case of an animal disaster, may include educating owners to microchip their animals beforehand (Engleke 2009) and enrolling farms in premise identification programs. Surveillance systems set up to monitor and control disease outbreaks can also serve as mitigation efforts in the cases of a disaster incident (Wingfield 2009).

Preparedness measures may include planning and practicing response elements through trainings and table-top exercises. Preparedness should be a continuous process to identify threats as well as resources available and to instill awareness of potential risks (Wingfield 2009). Employing hazard analysis techniques helps to identify these risks and select ways to control and eliminate them to reduce vulnerability. Previously, state

agriculture departments took measures in regards to livestock preparation. With the passage of the PETS Act in 2006, household pets are included in many state plans so companion animal veterinarians may be asked to assist with preparedness. Response includes all elements immediately post-disaster event and recovery includes all actions to get the community/affected area back to normal which often is a long, engaging process (Engleke 2009). Recovery encompasses both short-term and long-term efforts to restore services back to a community and should include plans for business continuity throughout response and recovery.

Veterinarian's Role in Disaster Preparedness and Response

Veterinarians are essential for preparedness and response to disasters involving animals. One of the first articles encompassing the need for veterinarians in disasters was in 1948 discussing the potential health affects of atomic explosions on animals such as burn injuries and secondary shock, quarantine and clean zones, and public health affects on the food supply when livestock exposure occurs (Kester 1948). In 1984, the American Academy on Veterinary Disaster Medicine was created as a call for veterinarian involvement in disasters (Heath "Participation" 1997). This organization appears to have been dissolved as of 2001 (AAVDM) but other organizations have since implemented animal disaster response into their agendas both on the state and national level.

Most believe that private federally accredited veterinarians serve as the first line of defense in both agriculture and public health biosecurity. They can also regularly promote recognition and prevention of infectious animal diseases (Wenzel "Veterinary" 2007). The United States Department of Agriculture (USDA) established the veterinary accreditation program in 1921 so private practitioners could aid in controlling animal

diseases (USDA "Animal Health" 2010). With revisions in both 1992 and 2010, the program strengthens the private practitioner's knowledge and understanding of ongoing animal issues. Since topics included in the orientation process include animal health emergency management and rules on interstates movement of animals, veterinarians should receive training in handling emergency response, be aware of the hazards associated with a disaster, and be comfortable with a training regimen for government response. The administrators of this national veterinary accreditation program, USDA APHIS, proposed to expand the accreditation orientation to include additional information on foreign animal diseases and animal emergency management (Wenzel "Veterinary" 2007) as a two phase orientation process (USDA "Animal Health" 2010). One idea based off of the national accreditation program was to create a national disaster response accreditation program to ensure proper credentialing of those involved in a response (Wohl 2007).

Veterinarians deal with biosecurity issues and personal protective equipment on a regular basis, giving them a working-understanding of these concepts that could be used during a disaster (Wenzel "Veterinary" 2007). When the response is so complex due to different habitats, different animal species, and the potential numbers of animals affected, it may be necessary to have both large and small animal practitioners available. In rural areas, there may be more animals, specifically livestock, than there are humans (Hsu 2008) increasing the need for veterinary involvement. In the 2007 USDA Census of Agriculture, Mississippi, which is traditionally known as a rural state, reported a total of 161,749,296 livestock animals within the state (USDA 2007). These numbers include cattle, swine, and poultry. Comparing to the 2007 U.S. Census Bureau population

estimate of 2.92 million people, livestock animals outnumber people approximately 55:1 (US Census Bureau 2007).

All veterinary graduates take an oath to use their knowledge and skills to benefit society through not just animal health and welfare but through public health, disease prevention, and medical advancements (Veterinarian's Oath 2010). Through this, many veterinarians feel they have an obligation to society to serve in disasters. Examples include (AVMA Council on Education 2010):

- Veterinarians are trained in population health, zoonotic diseases, comparative medicine, and hazardous waste control.
- Veterinarians obtain the knowledge and training to prevent disease spread such as during a case of mass animal depopulation and carcass disposal.
- Veterinarians can be the first line of defense in the public health arena since animals can serve as sentinels for disease. Examples include vaccination efforts against zoonoses like rabies and potential biological agent or agroterrorism attacks.
- Veterinarians are also trained in pet loss and death bereavement, a necessary element to an animal disaster due to the greater potential for animal loss.
- Private practice veterinarians are essential because of their medical knowledge and capabilities to reduce animal suffering. In particular, veterinarians are experienced in handling dangerous animals and proficient in the use of chemical restraint.

Disaster Training Opportunities for Veterinarians

Although advanced in animal care, veterinarians need to be trained the same as everyone else in an emergency response (Wenzel "Organizational" 2007). Training

methodologies and goals may vary based on the type of disaster. To be utilized in a disaster, all participants must meet the training requirements to be integrated into preparedness plans. Veterinarians may feel they lack the experience to participate in disaster response, while others do not know of all the possibilities that exist. In one study on bioterrorism training, more than 80% of respondent veterinarians indicated they had not had any kind of previous training in the area (Hsu 2008). Furthermore, two times as many respondents lacked confidence in their abilities in a bioterrorism event than those who did feel confident. In this same study, over two-thirds of respondents desired additional information about bioterrorism training. Often times, disaster courses are considered too vague as a requirement for a response, but this "vagueness" allows integration of various entities, breaking down professional barriers and creating community (Heath 2003). Professionally, veterinarians may have the operational knowledge to participate in a disaster, but they must prove that they understand the structure and the laws that govern disaster management.

Because emergency management officials may not be specifically trained in animal issues due to lack of training requirements in animal care for first responders (US Department of Transportation 2005), they may not be adequately prepared to deal with animal issues. Therefore, veterinary health professionals are critical in understanding and communication to others how to properly handle animals in a disaster situation.

Self-deployment is rarely appreciated or tolerated especially in large scale disasters involving medical conditions (American College of Emergency Physicians 2008). Prior self-deployment efforts resulted in the establishment of the Medical Response Corps under President Bush which created a system for persons to volunteer within the federal system (U.S. Department of Health and Human Services 2010).

Without proper training, volunteers may become liabilities and themselves a burden to the response effort. Theoretically, volunteers of any capacity can be trained in rescue and basic animal care, although live and possibly injured animals may need extended care for full recovery. While it is recommended to be as prepared as possible, the minimal training required for all-hazard disaster situations should be obtained through online courses and local in-person trainings. Many veterinary state boards are recognizing the value of these trainings and offering completion of these type trainings as continuing education credits required for licensing (Nusbaum "Veterinary" 2007). Veterinarians may actively seek these courses particularly since disaster training modules apply to not just larger disasters, but fires and local flooding as well.

There are many training opportunities present for veterinarians, and training is often done in a two-teared fashion: the basic ICS requirements and then veterinary specific training (Ablah 2009). There are both on-site and online courses available for veterinarians. An onsite training example includes FEMA's Center for Domestic Preparedness (FEMA 2011). FEMA also offers courses online including an "Animals in Disaster Module" which contains two parts addressing awareness and preparedness along with community planning. Many FEMA courses are available online, and local county emergency management agencies may provide access to trainings as well.

Due to time constraints of daily clinical practice and family obligations, veterinarians want self-paced training with focus on what they specifically would do in a response, and not just preparedness training (Hsu 2008). If hands-on training is required, studies associated with public health strategies show that short learning sessions are more attended by busy professionals than multi-day training events (Savoia 2009).

The AVMA has provided an Emergency Preparedness Guide since 1994 for veterinarians' personal use (Heath "Participation" 1997). This guide, now in electronic form, provides information on the National Response Framework; model plans and information on preparation; fact sheets for individual disasters; animal preparedness suggestions for all types of animals including livestock, companion animals, hoofstock, laboratory animals, wildlife, and poultry; example forms for medical records and logs; and important agency contact information (AVMA CD-Rom 2010). Recent additions include foreign animal disease recognition, pet and livestock feeding, and oil spill information.

A more formal, extended training opportunity includes the post-doctoral Centers for Disease Control and Prevention Epidemiologic Intelligence Service and Preventative Medicine Residencies which can be engineered in a more disaster medicine focus (CDC 2009). Initiated in 1951 with twenty-two physicians and one sanitary engineer, the EIS program investigates outbreaks and other public health matters. Specifically in regards to national disasters, EIS investigated the need for mental health services post-Hurricane Andrew in 1992.

It is recommended that all veterinary employees receive and remain current in first aid training to protect fellow volunteers (Richards 2008). Psychological first aid training is also recommended due to the mass casualty/depopulation and intense biosecurity measures that may take place in a large scale disaster such as occurred during the 2001 Foot and Mouth Disease outbreak in England (Nusbaum "Psychologic" 2007).

Disaster Medicine Education in Veterinary Schools

Early studies indicate there was little evidence that disaster medicine education has been provided at veterinary schools, and funds for related research have been deficient (Heath "Participation" 1997). Nowadays, disaster training and education is being provided in veterinary schools through electives and other organizational activities (Riddle 2004). After Hurricanes Katrina and Rita, Louisiana State University implemented a Special Topics in Large Animal Shelter Management Elective as a part of their fourth year curriculum due to experiences with horses during these two storms (McConnico 2007).

Some schools offer the option of a doctoral/public health dual degree program. As of 2008, nine colleges of veterinary medicine provide a dual Masters of Public Health within the university, and three other ones have a Masters of Veterinary Public Health (Hueston 2008). Four of the seven Masters of Public Health degrees are offered as a veterinary dual degree program and three other program are post-DVM (Murray 2006). In 2007, North Carolina State University College of Veterinary Medicine initiated their Veterinary Credentialed Responder Training Program providing classes to third year veterinary and public health students (Dunning 2009).

Although founded on the principles of population medicine and public health, in recent years with urbanization and affluence, the veterinary profession has trended into an increased companion animal medicine education (Hoblet 2003). The major focus of veterinary education is individual companion animal care, and disaster management education has not yet been extensively incorporated into the veterinary curriculum (Dunning 2009). It is essential for the profession to maintain its public health emphasis because they are still the only health professionals trained in multispecies medicine. This

type of broad training is important since multiple animal species are affected in a response. In an informal survey of the 28 national veterinary colleges, Deans of the colleges of veterinary medicine were contacted regarding disaster preparedness education in the schools. Of the twelve schools that responded, four provide Incident Command Training, eleven of them provide disease outbreak training as part of the curriculum, five are involved in their state organization response teams, and six veterinary colleges have a student disaster response club (Haven 2010). At this time, there is still no formal publication or presentation on this topic indicating the need for formal emergency management training in our veterinary schools. The American Association of Veterinary Medical Colleges is actively making changes in the veterinary curriculum on a yearly basis to hopefully address this issue (AAVMC 2010).

Disaster-related Organization Opportunities

On a national basis, veterinarians have the opportunity to participate in disaster response through various agencies which include the USDA's National Animal Health Emergency Response Corp (NAHERC) under NAHEMS, the AVMA Veterinary Medical Assistance Teams (VMAT), and Department of Health and Human Services National Veterinary Response Teams (NVRT). As federally recognized animal health response entities, Emergency Support Functions guide all these agencies on how to respond in case of dangerous disease or disaster (FEMA 2008). Previously known as REDEO or USDA Vet Reserves Corp, NAHERC falls within USDA APHIS Veterinary Services hiring veterinarians to serve as temporary employees of the federal government while responding (Burns 2009). Established in 1993 as a collaboration between the AVMA and the Department of Health and Human Services under the National Disaster Medical

System, VMATs were created to respond to injured animals and set up to prevent disease spread. The organization serves as the AVMA and the American Veterinary Medical Foundation's disaster response team (Burns 2008). This group is comprised of veterinarians, veterinary technicians, microbiologists, pathologists, and others to service both those affected by an animal disaster as well as those as working animals deployed during the events. The Department of Health and Human Services now employs the United States Public Health Service veterinary teams and epidemiologists to respond to veterinary needs assessments, occupational safety issues, and rabies quarantines if necessary (FEMA 2008) now known as National Veterinary Response Teams (US DHHS 2009).

Other opportunities for veterinarians to participate in disasters include involvement through state and other animal-affiliated organizations. The United States Fish and Wildlife Service was most recently involved with the Deepwater Horizon Oil Spill assessing injuries to wildlife for cleaning, treatment, and release which allowed zoological and wildlife veterinarians to respond (Nolen 2010). More direct opportunities are offered through state agencies, most of which have their own ICS and other training requirements to be on a deployment list (Nusbaum "Commentary" 2007). In 1999, North Carolina developed the first State Animal Response Team (SART) after Hurricane Floyd (NC SART 2010). They used human emergency management procedures as a model to animal disaster response, and other states have followed suit (Hsu 2008, Dunning 2009). These types of teams serve as task forces for animal search and rescue, emergency animal shelter management, and veterinary care (Wenzel "Organizational" 2007). To date, there are nineteen active state animal response teams (SART), including six Gulf Coastal states and five other states have teams in development (SART 2010). In addition, many local

teams such as County/Community Emergency Response Teams (CERT), County/Community Animal Response Teams (CART), and local emergency management agencies rely on veterinarians to volunteer their services to be able to execute their function (Madigan 2000).

Some other non-governmental organizations that have veterinary components include the American Kennel Club, the American Humane Association, and the Humane Society of the United States (Beaver 2006). Other groups not exclusive to veterinary service include the American Red Cross (ESF-11 2008). Whether or not a private practitioner joins or relies on these groups to respond, he or she needs to still be involved and become prepared (Nusbaum "Commentary" 2007) having disaster plans for themselves and educating their clients (Burns 2009).

Disaster Communication Elements

Because of a previous lack of veterinary involvement in planning, many emergency management agencies have been unaware of the veterinary community's needs (Heath "Participation" 1997). In a study through The Ohio State University surveying Ohio animal shelters and affiliated animal care agencies, less than half of the responding agencies had been in contact with emergency management teams in regards to animal preparation in disasters. Of those in the study that responded, only 12% of those agencies had a written plan while another 19% were in the process of writing a plan (Decker 2010). Communication is essential during the emergency planning process. Poor communication can be attributed to poor relationships between veterinarians and members of other disaster agencies, poor relationships among veterinarians, and veterinarian's busy schedules (Ablah 2009).

Relationships should be formed with local fire departments and other local emergency personnel to ensure flexibility and coordination during a response involving animals (Beaver 2006). Familiarizing themselves with local and state disaster resources for humans and animals, veterinarians can see what assistance is available for their own personal use when necessary (Huston 2007). Good relationships can be fostered by side-by-side disaster training with emergency management personnel (Madigan 2000) through tabletop/simulation exercises (Hudson 2001) and lecture-based educational training. Emergency personnel may then allow veterinarian entry into a restricted area once adequate training requirements are met (Madigan 2000). This cooperation effort falls into the National Incident Management System's Incident Command Structure to emergencies and disaster response plans (Beaver 2006). While some believe that communication among veterinarians can be limited due to competition, it is more likely due to varying specialty interest among the professional field (Ablah 2009). Veterinarians participating in an assessment of emergency preparedness of veterinarians in New York noted incidents in which physicians have been reluctant to accept advice from veterinarians in respect to zoonotic disease (Ablah 2009). By training with various disciplines, this type of communication gap can be bridged for successful planning and response.

Communication with the public is essential as well (Hudson 2001). A hotline should be established during a disaster for both those wanting to donate veterinary supplies and those with questions (Hudson 2001). Pet owners need to have verbal access and reassurance that a veterinarian is caring for their animal (McConnico 2007). Studies in a literature review of public health systems agencies show that those agencies who coordinate with the media and who understand the public's attitude about the disaster tend to better bridge the communication gap during a crisis (Savoia 2009).

Veterinarians are the key communicators to animal owners in regards to animal disaster preparedness. Veterinarians should take the time to discuss preparedness with their clients and producers and keep the lines of communication open for discussion. Owners want to know what to have in case of a disaster especially in regards to their pets. A recent study on post-Katrina evacuees indicated such a desire with up to 67% of them wanting preparedness information and 26% of them specifically citing they did not want to leave their pets (Blendon 2007). In this same study, approximately 62% of participants wanted to know what supplies to have ready in case of a disaster.

Veterinary Disaster Plans

Animal plans need to be made in regards to both man-made and natural disasters. While the disaster itself may be short-lived, the recovery period can be much longer (Richards 2008). Client education includes assisting client in creating animal plans, covering the different kinds of disasters as well as common animal injuries seen in each (Madigan 2000). One example is the 2006 Texas wildfires where 2,000 head of cattle were killed and multiple others were injured and had to be sold (Rutherford 2007). Following these wildfires, it has taken years for farmers in that area to re-build what they lost of the course of a few days (Rutherford 2007). Losses included livestock, pastures, and barns. Losses may have been prevented or reduced with pre-planning of the possibility of wildfires in their geographic region.

Some believe that disaster preparedness education likely aids in saving lives just as much as disaster response itself (Madigan 2000). Studies show that rescuing and sheltering animals often costs more than owners individually providing for their animals (Heath “Epidemiologic” 1998). By properly educating clients, veterinarians can help

avoid the influx of affected clients and displaced individuals (Ablah 2009). Opening the door to preparing for their pet in a disaster can lead to self-preparation on the owner's part. Animal owners are the primary responsible party for animals during a disaster and its evacuation efforts (Beaver 2006). By providing owner with the names and locations of pet-friendly hotels and regional veterinarians, owners can begin to properly prepare (Engleke 2009).

Clients should be educated in preparation as well by having animal medical record copies, species specific supplies, and a form of permanent pet identification (AVMA CD-Rom). Such examples include pictures and full descriptions of the animal, indentification tags, and microchipping (Soric 2008). While microchipping is permanent, chip readers are not always available so visual identification should be utilized as well. Livestock should be identified as well and traditional methods include branding, tags, and tattoos (Hampton 2010). Previous universal identification methods have been proposed for livestock with the most recent being an Animal Disease Traceability Framework (USDA "Animal Disease Traceability" 2010). While proposed for use with traditional interstate livestock movement, this system can also be used for animal identification in disaster situations. Ensuring proper transportation methods during a disaster involving animals should be considered in the planning process. Cages, leashes, and vehicles for small animals should be considered (Heath "Human" 2001). Portable corrals, trailers, and four-wheelers along with equine slings and proper protective equipment are essential in livestock transport (Robinson 2006). Because livestock are difficult to move, it is often recommended to evacuate them to higher ground rather than try to capture them (Richards 2008).

Although best efforts are made to save and re-unite animals with their owners, euthanasia efforts are used in cases of disease commonly seen in disasters involving livestock. Trained personnel in both the execution of proper euthanasia techniques approved by the AVMA and grief management are necessary. Veterinarians are trained in both.

Private practitioners should be prepared because most disasters, no matter the magnitude, are personal (Heath "Participation" 1997) and will affect their clients. While fire is the most common disaster emergency in veterinary hospitals, veterinarians should be ready for "all hazards" (Adcock 2006) with a written disaster preparedness plan (Engleke 2009). The entire staff at a clinic or hospital should be involved in planning before and response after a disaster so a written disaster plan should be constructed and practiced (Huston 2007). An all-hazards plan can be created instead of one for each individual type of disaster due to commonalities of communication issues, damage, and injuries (Heath 2003). It is suggested that this plan should encompass an emergency location for animal transfer, medical file back-up both on- and off-site, security coverage, and insurance and legal coverage (AVMA CD-Rom). Practice insurance is advised as indicated in one study where 38% of practices owners paid for practice repairs themselves with 29% paying out of their personal saving following a disaster (Heath "Mitigating" 2005). Since such damages can occur, it is beneficial to have a sister practice or alternative location for animal housing for both animals and on-site staff (AVMA CD-Rom). Basic needs such as shelter, water, food, and medications should be addressed beforehand since there can be delays in emergency management agency activations in the first few days following a disaster (Beaver 2006).

In a *Time* magazine poll in 2006, approximately half of the respondents explained that they weren't "prepared" for a disaster because they didn't think they lived in a high-risk disaster area (Ripley 2006). An assessment by the Hazards and Vulnerability Research Institute at the University of South Carolina showed that 91% of Americans do live in a high-risk disaster area (Ripley 2006). About half of Americans live specifically in a coastal area exposing them directly to hurricane and flooding issues, but only 20% of the country has flood insurance. Studies like these show that, while education may be out there, owners are still not as prepared as they should be.

Clearly veterinarians can play a major role in disaster response. While multiple training opportunities through various organizations and a wide variety of disaster education materials exist, many veterinarians remain unaware of the availability of these items. Most of the publications in the field of public health emergencies (62%) are commentaries rather than primary research (Savoia 2009) indicating that the field is still relatively new despite the number of resources and testimonials. Whether a lack of communication or time, it is imperative that veterinarians become an intricate part of animal disaster response plans and be exposed to these training opportunities. It is also their responsibility to education clients and be personally prepared themselves. One of the best ways to determine what veterinarians feel is lacking in their disaster planning education is to survey them as a population (Ablah 2009), but there have been few studies of this type performed. The purpose of this study was to characterize the disaster preparedness and awareness of licensed veterinarians in the state of Mississippi who are active private practitioners. It is proposed that those who have experienced a disaster personally and those who live in the state's coastal counties are more likely to have both veterinary and personal disaster plans as well as more likely to have formal training and

be interested. Given the recent emphasis on homeland security and disaster response, it is also more likely that those who are more recent graduates will be more interested in training with the increased awareness for preparation in the past few years.

CHAPTER II

MATERIALS AND METHODS

Target Population

A listing of all licensed veterinarians in Mississippi (as of July 27, 2010) was obtained from the Mississippi Board of Veterinary Medicine. This list contains all veterinarians who currently hold a valid veterinary license, are member in good standing, and have obtained adequate continuing education credits. The interviewer and major professor reviewed the list, and any known public practice, governmental, or non-private practicing veterinarians were removed from the mailing list. Private practice was defined as practicing veterinary medicine in a non-governmental sponsored facility such as a clinic or privately-owned hospital. Random numbers ranging from 1001-1706 were assigned to the private practitioners. For confidentiality purposes, this number assignment was kept under lock and key with limited assess provided only to the investigators. These numbers were used as identification for postcard reminder distribution, incentive distribution, and raffle entry. The numbers were not used as an identifying factor in any other way.

Pilot Survey

A pilot study was executed before the official survey distribution. Ten faculty members at Mississippi State University- College of Veterinary Medicine were selected based on the faculty member's previous private practice experience. The surveys were distributed to the participants via the campus mail system at the university. Within a two

week time period, selected participants were asked to complete the survey as well as correct it for content and clarity. Corrections and suggestions were documented and incorporated based on the interviewer's discretion. Eight of the ten distributed surveys were returned within the specified time frame. For analysis, each completed survey was randomly assigned a letter (A-J). While the pilot study data were not included in the final study results, the answers were visually assessed and corrections were made as needed to the survey and resubmitted to the Mississippi State University Institutional Review Board for the Protection of Human Subjects (MSU IRB) for approval.

Survey Production

The cover letter, survey instrument, and all associated materials were submitted to the MSU IRB for release and use. Approval was granted and labeled as study #10-192.

A cover letter was constructed based on MSU IRB format; the body of the letter addressed the purpose of the study, why the respondent was selected, the voluntary nature of the survey, the confidentiality of the respondent's answers, and incentives for answering (Appendix A). Incentives offered included a mailed complimentary AVMA Emergency Preparedness and Response CD-Rom and Disaster Preparedness for Veterinary Practices brochure upon survey return and enrollment in a raffle for the Veterinary Disaster Response textbook by Wingfield and Palmer (2009 edition).

A three page survey instrument was constructed from an extensive disaster preparedness and response literature review and from the interviewer's and mentor's personal experience. Survey design was modeled after suggestions from Dillman's Tailored Design Method including question format, layout design, and survey

implementation (Dillman 2000). Following the pilot study, questions were revised to ensure quality of the questions and answer clarity. (Appendix B)

Survey Distribution

Each survey was numbered directly with the number assigned to that recipient from the initial participant listing. Surveys were mailed using Priority Mail to the respective veterinarians during the same week. Recipients were given one month to complete and return the survey via the stamped return envelope, email, or fax indicated on the cover letter. A reminder postcard was constructed with similar information to the cover letter. The postcard was mailed approximately three weeks after initial survey mailing to recipients on the original spreadsheet who had not returned the survey to increase response rate (Dillman 2000). (Appendix C) Cut-off date for survey return was approximately six weeks after the start of the study.

Analysis

Data were entered into a Microsoft® Excel[1] spreadsheet and analyzed using simple and descriptive statistical methods. Counties were divided into their respective County Emergency Management District (Mississippi Emergency Management Agency 2010) for geographic analysis. The Centers for Disease Control and Prevention's Epi Info™ Version 3.5.1[2] was used for further data analysis utilizing Chi-square statistics and logistical regression. The independent variables analyzed included years since veterinary school graduation, large animal primary focus vs. small animal primary focus, gender, state region, and personal disaster experience. The dependent variables analyzed included

[1] Microsoft® Office Excel Version 2007, Redmond, Washington

[2] Centers for Disease Control and Prevention Epi Info™ Version 3.5.1, Atlanta, Georgia

acquired formal training, interest in training, response plans for both personal and veterinary clinic use, veterinary clinic disaster preparation, and knowledge of disaster-related organizations in regards to trainings.

CHAPTER III

RESULTS

Of the 706 surveys that were distributed, 237 (33.5%) were returned. Some unopened surveys were returned for various reasons: 3 were returned and re-mailed to the new indicated postal address, 7 surveys were returned but were marked “unable to forward”, 1 survey was returned completely blank, 1 survey was returned with deceased written on it, and 3 surveys were returned after the data collection closure date. Of the 500 postcards that were mailed, 19 postcards were returned with the label “unable to forward”.

From the 237 returned surveys, 209 were eligible to participate due to their current private practice status. Of the 209 analyzed, 120 respondents were males (57.4%), 88 respondents were females (42.1%), and 1 did not indicate gender (0.4%). Respondents recorded attendance at 11 different veterinary schools (Table 1). The values in this table are the survey respondents’ veterinary school responses compared to the Mississippi Board of Veterinary Medicine’s veterinary school listing distribution.

Table 1 Respondent and Veterinary School Representation

Veterinary School	Respondent Number (n/209)	Respondent Percentage	Actual Number* (n/705)	Actual Percentage
Mississippi State	121	57.9 %	413	58.6%
Auburn University	59	28.2%	183	26.0%
Louisiana State University	12	5.7%	40	5.7%
Texas A&M University	4	1.9%	14	2.0%
University of Tennessee	3	1.4%	9	1.3%
University of Illinois	2	1.0%	3	0.00%
University of Missouri	2	1.0%	4	0.00%
Oklahoma State University	2	1.0%	9	1.2%
Tuskegee University	2	1.0%	18	2.6%
Ross University	1	0.5%	4	0.6%
St. Matthew's University	1	0.5%	0	0%

Notes: Data includes public practice veterinarians who hold a veterinary license in Mississippi

*Actual numbers retrieved from the Mississippi Board of Veterinary Medicine which maintains demographic information on all licensed veterinarians in the state

All but 5 respondents indicated states in which they are licensed to practice veterinary medicine. One hundred thirty-six were licensed in Mississippi, 21 were licensed in Tennessee, 20 were licensed in Alabama, 15 were licensed in Louisiana, 7 were licensed in Florida, 7 were licensed in Arkansas, 4 were licensed in Texas, 3 were licensed in Kentucky, 3 were licensed in Georgia, 2 were licensed in Colorado, and one person each was licensed in New Mexico, New York, Oklahoma, Illinois, Ohio, and North Carolina, each. Veterinary school graduation year ranged from 1948 to 2010.

Years in private practice in Mississippi ranged from 0 (new graduate) to 61 years with a median of 19.6 years. The majority of respondents were Small Animal only (56%) or Mixed Animal mainly Small Animal (34%) (Figure 1).

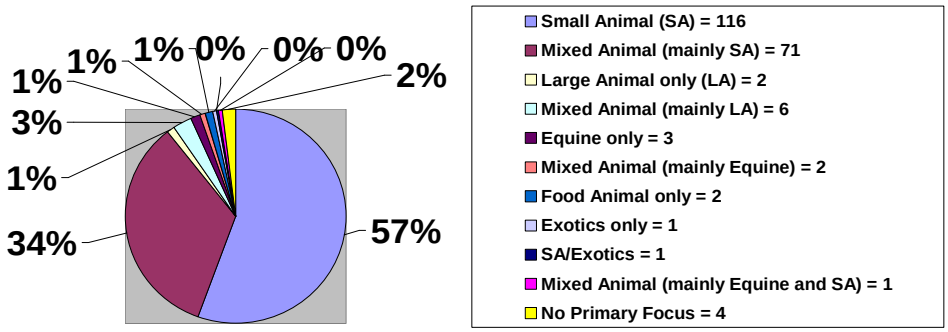

Figure 1 Primary Focus of Mississippi Private Veterinary Practitioners 2010

Residential county responses were distributed into respective Mississippi Emergency Management Districts. Response rate percentages for each district were calculated by using the district's response number and the total number of veterinarians reported by the Mississippi Board of Veterinary Medicine in that district. The respondents' mean calculated average of all districts was 31%. This calculated value coincides with the overall response rate to the survey of 33.6%.

Table 2 Mississippi Emergency Management Agency District Response Rates

MEMA District	Response (#)	Total (#)	Percentage
1	24	68	**35%**
2	20	81	**25%**
3	11	30	**37%**
4	16	79	**20%**
5	50	176	**28%**
6	14	46	**30%**
7	15	39	**38%**
8	22	75	**29%**
9	42	111	**38%**
All	**209**	**705**	**100%**

Notes: Mississippi Emergency Management Agency Districts (Appendices D and H)

Of the organized veterinary medical entities, 82.8% respondents belong to the Mississippi Veterinary Medical Association (173/209) and 84.2% respondents belong to the American Veterinary Medical Association (176/209). Other organization involvement includes the Mississippi Animal Response Team (7.2%; 15/209), the Humane Society of the United States(HSUS) (3.3%; 7/209), the American Red Cross (2.4%; 5/209), the National Animal Health Emergency Response Corps (2.0%; 4/209), a Community Emergency Response Team (1.4%; 3/209), and Volunteers in Preparedness Registry (1.0%; 2/209). Other organization with disaster response capability membership includes the American Association of Equine Practitioners, the Memphis/Shelby County Veterinary Medical Association, the South Mississippi Veterinary Medical Association, Gulf Coast Search'n'Rescue, and volunteer fire departments.

Of the respondents, 20.6% (43/209) indicated that they have had formal training with 9.6% having received Incident Command System training (20/209), 4.8% having received HAZMAT training (10/209), and 1 participant having received unidentified FEMA training. Other formal trainings included the BP Deepwater Horizon module, a

Foreign Animal Disease and Bioterrorism Course, Large Animal rescue training, USDA courses, Homeland Security training, and fire department training. All individuals who had received trainings did indicate membership in a disaster response organization. There was no difference in likelihood of formal training between females and males (p=0.98). There was no difference in the likelihood of formal training based on the number of years out of veterinary school (p= 0.58). Of the respondents, 21.5% indicated they have had hands-on training (45/209) with the majority at 14.3% in Human First Aid (30/209). An analysis comparing the coastal MEMA district 9 (which includes Jackson, Harrison, Hancock, George, Stone, and Pearl River counties) to the other districts indicated that there was no significance of having had formal training in regards to living in this area (p= 0.88). Furthermore, a similar analysis was performed on MEMA district 5 (which includes Hinds, Warren, Madison, and Rankin counties) to the other districts. This area contained approximately 24% of the respondents and houses the state capital. The analysis showed there was also no significance having had formal training in regards to living in this area (p= 0.61).

Of the respondents, 67.0% were “interested in disaster training” (140/209) with 40.2% (84/209) desiring some type of online training, 36.4% (76/209) desiring hands-on training, and 28.2% (59/209) desiring lecture-based training. Of the training topics to be covered, the majority at 59.3% desired Small Animal oriented training (124/209) with interest in all other areas: 31.6% Large Animal (66/209), 18.7% HAZMAT (39/209), 18.7% Human First Aid (39/209), 17.7% Exotic (37/209), 13.9% Personal Protection Equipment (29/209), and 12.0% Weapons of Mass Destruction (25/209). There was no significant difference in large animal training interest between males and females (p=

0.65). Females are 2.57 times more likely to desire small animal training than males (p= 0.002).

Of the respondents, 64.6% (135/209) were aware of additional trainings offered by disaster organizations. Trainings offered by the Mississippi Veterinary Medical Association were the most common at 46.9% (98/209) with the Mississippi Board of Animal Health next at 35.4% (74/209). (Figure 2) There was a significant negative association between the number of years since a veterinarian's graduation year and interest in training (OR= 0.951, 95% CI= 0.9284, 0.9742, p< 0.05). This awareness does not indicate the level or frequency of the trainings offered, but rather indicates the survey recipient's knowledge of available trainings.

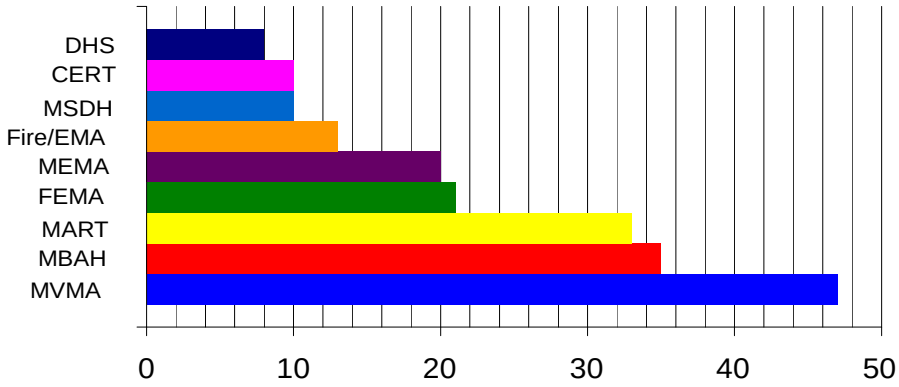

Figure 2 Practitioner Disaster Training Awareness Percentages

In an analysis of private veterinary practitioner's primary focus, those in primarily small animal practice are 5.05 times more likely to have a personal plan (p <0.05) and 5.87 times more likely to have a veterinary clinic plan (p<0.05) than those in primarily large animal practice. Because of the low number of respondents with certain primary foci, the respondents were grouped based on primarily small animal practice and primarily large animal practice for comparison.

In an analysis of personal disaster experience, those who have experienced a disaster are 5.11 times more likely to have a personal disaster plan than those who haven't experienced a disaster ($p < 0.05$). Of the participants, 59.8% (125/209) indicated they had some form of personal disaster plan; the most common personal plan is preparation for a tornado at 49.8% (104/209). The data indicates that the majority of actual personal disaster plans are "unwritten" with the lowest comparison value being hurricanes at 94% (79 "unwritten" out of 84 total with a hurricane plan). Of those with a personal plan, an analysis comparing living in the previously mentioned MEMA district 9 (coastal counties) showed that those veterinarians are 3.62 times more likely (95% CI= 1.54, 8.72) to have a personal plan than those who live in other counties ($p < 0.05$). A similar analysis was performed using MEMA district 5 and showed no significant difference of veterinarians having personal disaster plans than those in other districts. ($p=0.52$). A comparison of the various primary focuses in relation to having a personal or a veterinary clinic disaster plan could not be performed due to the low numbers of respondents indicating a large animal focus.

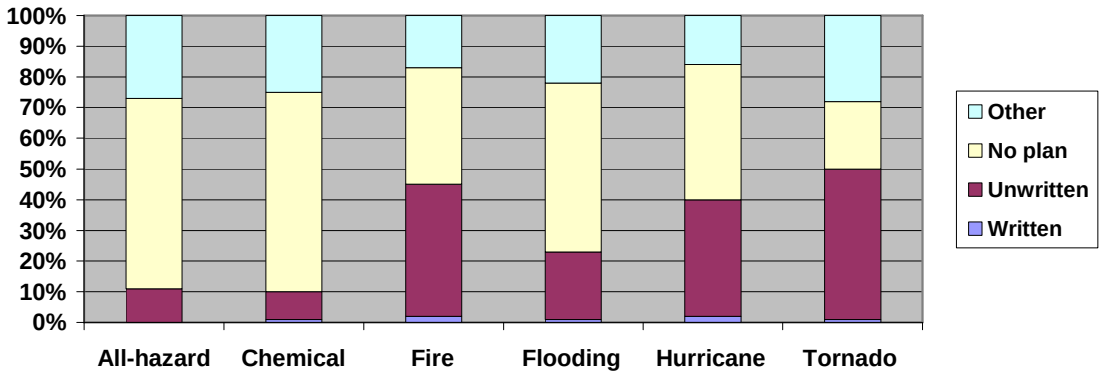

Figure 3 Type of Personal Disaster Plan Kept by Private Practice Veterinarians

Those who have experienced a disaster are 4.89 times more likely to have a veterinary clinic plan than those who haven't experienced a disaster ($p< 0.05$). The most common veterinary clinic plan is for a fire at 43.1% (90/209). An analysis was performed comparing the MEMA district 9 to the rest of the state and showed that those veterinarians practicing in this region are 3.09 times more likely (95% CI= 1.35, 7.21) to have a clinic plan than those in the other MEMA districts ($p< 0.05$). A similar analysis was performed comparing MEMA district 5 to the rest of the state and showed that those veterinarians practicing in this region are 0.43 times more likely (95% CI= 0.21, 0.86) to have a clinic plan than those in the other MEMA districts ($p< 0.05$). In comparing those with both personal and veterinary clinic plans, those with a personal disaster plan are 11.95 times (95% CI= 5.84, 24.74) more likely to have a veterinary clinic plan than those who don't have a personal disaster plan ($p< 0.05$).

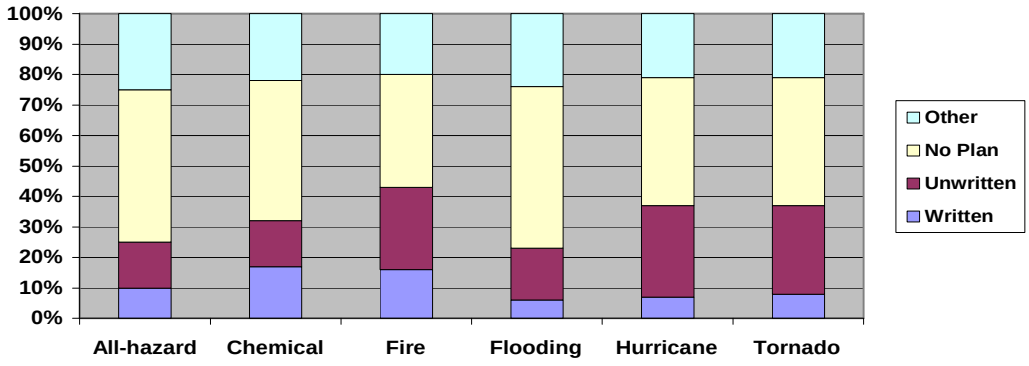

Figure 4 Type of Veterinary Clinic Disaster Plan Kept by Private Practice Veterinarians

There was no significance difference between those that have experience a disaster and those that haven't experienced a disaster in regards to obtaining formal

training (p= 0.08). However, those who have experienced a disaster are 2.2 times more likely (95% CI= 1.17, 4.13) to be interested in training than those who haven't experienced a disaster (p=0.008).

The most common disaster event listed was hurricanes at 45.9% (96/209) with Hurricane Katrina being the most commonly named storm at 34.4% (72/209). Tornadoes at 8.6% (18/209) and flooding at 5.7% (12/209) were also commonly listed. Although fire is reported as the most common disaster event in veterinary clinics, only one participant reported experiencing this type of event.

Of the participants, 10.0% (21/209) knew to contact an emergency management agency whereas the majority of participants cited the state veterinarian/Board of Animal Health was who to contact 83.2% (174/209) following a disaster involving animals. In terms of disaster preparedness, 8.5% (18/209) of the participants provided their clients with disaster education materials, and 16.7% (35/209) of them have an agreement with another practice, a "sister" practice, to care for animals in case of an emergency. These agreements include boarding at 13.9% (29/209), animal care at 14.8% (31/209), and employee support at 6.2% (13/209).

Respondents were asked to rate in their opinion the responsibility of the following disaster-related organizations in respect to providing training for veterinarians with 1 being least responsible, 5 being most responsible, and the option of "not familiar" if unfamiliar with that organization. A few respondents indicated that they did not have the authority or the knowledge to do such a rating.

Table 3 Practitioner's Rating of Disaster-related Organization's Training Responsbility

Responsible Party	Average	5	4	3	2	1	Not familiar	Other
Individual practice	2.6	18	19	40	46	40	13	33
MSU-CVM	3.6	47	40	60	18	7	12	25
MART	4.1	67	28	27	5	6	52	24
CERT	3.4	27	18	30	11	11	82	30
MBAH	4.0	64	61	40	4	4	13	23
MVMA	3.9	59	56	44	4	10	12	24
Fire/EMA	2.8	26	21	44	28	34	25	31
MEMA	3.5	43	37	40	15	15	31	27
FEMA	3.4	43	29	47	19	20	25	26
DHS	3.0	34	23	37	29	33	24	29

Note: Rating based on 5 being the most responsible to 1 being least responsible with the option of "not familiar" if unfamiliar with that organization

Upon assessment, 39.2% (82/209) of the respondents were not familiar with CERT (County Emergency ResponseTeam) and an average of 13% (27/209) of the respondents did not rate any organization. Of the organizations listed, 31% of respondents believe that MART (Mississippi Animal Response Team) and the MBAH (Mississippi Board of Animal Health) should be the most responsible for training veterinarians for disasters. Approximately 19% believe that individual practices are the least responsible for training.

CHAPTER IV

DISCUSSION

The purpose of this study was to describe the disaster preparedness of licensed veterinarians in the state of Mississippi who are active private practitioners. The study was designed to assess their current disaster preparedness status and compare them throughout the state. Information regarding veterinary clinics and what plans they have may be biased due to potential for multiple doctors within one practice to respond to the survey based on the survey being individual-based not clinic- based. Also, some veterinarians indicated a lack of knowledge about plans potentially due to miscommunication among practice members. It would be difficult to solve this problem due to the job mobility of the veterinary profession. An easier way to alter this bias would be to include "clinic name" in the demographic information since the definition of "written", "unwritten", and "no plan" can vary between doctors within a practice. Also, "clinic ownership" could be included in demographic information because those who own the practice are invested in the practice and are more likely to be aware of disaster response plans. However, by a practitioner indicating what clinic they were associated with or clinic ownership, there would be limited confidentiality to the survey results. Most plans are "unwritten" likely due to the ease of this method as well as time constraints to actually write a plan down. The "unwritten" plans can vary in definition between respondents and therefore bias the results. Those with written plans, particularly written clinic plans, may have legal ground in cases of civil suit.

With a 33.6% response rate, this survey proved to be a useful tool in assessing the licensed veterinarians' in Mississippi disaster preparedness. All veterinarians who practice in the state are to be licensed and registered with the Mississippi Board of Veterinary Medicine. For all veterinary colleges indicated, the respondent percentage was similar to the veterinary school percentage data obtained from the Mississippi Board of Veterinary Medicine suggesting that the survey was representative of the target population and gives the study external validity. The result that 57.9% of respondents having graduated from the state's veterinary college matches with the veterinary college's traditional acceptance of 50% in-state students. MSU-CVM was established in 1974 by the Mississippi Legislature (MSU-CVM 2010). Before this time, students traditionally attended Auburn University's veterinary school. Of the 59 graduates of Auburn University, 33 (55.9%) of them graduated before 1975 explaining Auburn as the second most common veterinary school to graduate from. The veterinary school graduation distribution was almost identical to the Mississippi Board of Veterinary Medicine data particularly in regards to graduation numbers from Mississippi State University, Louisiana State University, Texas A&M University, University of Tennessee, Oklahoma State University, and Ross University. Auburn University was slightly over represented in the survey along with skewed numbers for graduation from the University of Illinois, the University of Missouri, and Tuskegee University. These latter three can be attributed to the low number of both respondents indicating these universities and the low number reported by the Board. The Board did not report any veterinarian graduating from St. Matthew's University, but this respondent could be included in the Board's reporting four veterinarians that had not indicated veterinary school of graduation. Although the response rate comparison appears to be congruent, our survey distribution list was

obtained from the Mississippi Board of Veterinary Medicine who may not have all those who are practicing in the state registered in their database. Also, it has been proposed there is a correlation between survey response to disaster organization involvement in that those who are more likely to participate in organizational involvement are more likely to respond to surveys.

The mean calculated average of overall response rate (33.6%) and the average mean for each individual County Emergency Management District (31%) are approximately equal allowing assumption that values are evenly representative across the districts. Overrepresentation was avoided by grouping participants by their residential county rather than the counties they practice in. A few participants indicated practice in more than one county whereas all participants indicated only one residential county. The slight difference in response rate percentages is could be due to the fact that the total number of veterinarians in each district includes licensed veterinarians who could be in private or public practice.

It was proposed that those who have experienced a disaster personally and those who live in the state's coastal counties are more likely to have both professional/veterinary and personal disaster plans. The most common reported personal disaster experience was a hurricane. This is likely due to geographic positioning consistent with hurricane exposure and the devastating impact a hurricane can have on a region. The most notable hurricane exposure was Hurricane Katrina in 2005 which affected approximately 90% of the state. Those with disaster experience were shown to be 11.95 times more likely to have both a personal plan and a veterinary clinic plan to prepare for another disaster. Veterinarians, like anyone else, want to protect their families both directly at home and indirectly at work. While hurricane was the most common

reported disaster experience, tornado was the most common of indicated personal plans. Tornadoes being the most common personal plan is potentially due to the weather frequency of tornadoes geographically with 45 occurring state-wide just last year ("2009 MS Tornado Count"). Not surprisingly, fire is the most common reported disaster in veterinary clinics (Adcock 2006) and is also the most common clinic plan in our survey.

Those in MEMA district 9 are significantly more likely to have a veterinary clinic and personal plan while those in MEMA district 5 are more likely to have a veterinary clinic plan. District 9 includes the coastal counties of Mississippi are more likely to have a plan due to the intensity associated with disaster exposure such as a hurricane, the most commonly reported disaster experience. MEMA district 5 contains the state capital as well as houses the majority of state disaster-related organization offices; the likelihood of veterinarians having a clinic plan in this district is consistent with this fact since they likely are more readily exposed to organizational advertising, contact through meetings, and more perceived resources. The low response numbers of large animal practitioners affected the ability to analyze if "primary focus" influenced having a personal or veterinary disaster plan. This can be attributed to the mobile nature of large animal medicine away from the clinic where the survey was sent.

Overall, only 20.6% of respondents have received formal training of any type. This percentage should be much higher considering Mississippi's geographic location in hurricane tracking, exposure to floods and tornadoes, and proximity to the New Madric fault line's potential for earthquakes. It was also proposed that those who have experienced a disaster personally and those who live in the state's coastal counties are more likely to have formal training and be interested in training. All those individuals who indicated they had obtained formal training belong to a disaster-related organization.

This is likely due to the training requirement of many disaster-related organizations. One example is that Incident Command System (ICS) training is a requirement for MART membership as well as participation in other state and federal response activities. There did not appear to be a difference in persons having obtained formal training in gender, MEMA district, or personal disaster experience. All three of these values are surprising based on the trend in veterinary medicine of the increasing numbers of females entering the profession and the higher potential of hurricane damage in the lower coastal counties. With such a low percentage of individuals with formal training, it is clear that there is a lack of communication, opportunity, or time for veterinarians to receive formal disaster training. Also, if an individual is more likely to have a personal plan because they experienced a disaster, it would make sense for them to also acquire training.

Those who have experienced a disaster are 2.2 times more likely to be interested in training suggesting the desire for training, but perhaps veterinarians do not know how to acquire it. This study indicated that those who have been out of veterinary school longer are not as interested in training. Devastating disasters like Hurricane Katrina and the September 11, 2001 terrorist attacks have likely increased interest in training as well to be better prepared for the next time. Potentially because of time constraints, the majority of respondents interested in training indicated they prefer online disaster training the most at 40.2%. One reason for this may be online modules allow veterinarians to complete them in their own time and they wouldn't necessarily have to take off work. Such modules do exist such as the Federal Emergency Management Agency Animals in Disaster modules, but these may not be adequately advertised to veterinarians as indicated by only one respondent having taken them.

The interest in small animal training (59.3%) may be consistent with 55.5% of the respondents having a Small Animal only primary practice focus. Although females are 2.57 times more likely to desire small animal focused disaster training than males, only 50.9% (59/116) of those indicating small animal as their primary focus are female. By tradition, the newer graduates are female with current veterinary classes having 76 % females (AAVMC 2010). It would be more likely that females would be more interested in training based on this shifting percentage in attendance. Therefore, the higher likelihood of females being interested in small animal focused disaster training is more consistent with the increase of newer graduates being female. It was proposed that more recent veterinary graduates would be more interested in training with the increased awareness for disaster preparation and the inclusion of disaster preparedness in the veterinary curriculum in the past few years. This assumption was affirmed due to the fact the longer the time period a veterinarian has been out of school showed a decrease in the interest in training. While the phrasing for the "interest in disaster training" questions was as descriptive as possible at the time of survey construction, it is noted that in future questioning the distinction between actual interest as opposed to willingness be examined. A veterinarian may be interested in acquiring training but may not be willing to actively obtain this training.

Of the respondents, 55.5% have a primary focus of small animal medicine which is actually lower than the national average of 67.5% reported by the AVMA's annual Market Research Statistics (AVMA "U.S. Veterinary Positions" 2010). The AVMA terms "small animal only" as "companion animal exclusive". Mississippi is traditionally a rural state with opportunities to practice mixed animal and large animal medicine which could account for the decrease from the national trend. Also, MSU-CVM has a traditional

mixed animal curriculum with equal exposure to small animal and large animal topics. The increased likelihood of those in primarily small animal practice having a veterinary clinic plan can be attributed to the fact that small animal practitioners traditionally practice in their clinic where clients come to them whereas large animal practitioners travel to their clients therefore less likely to focus on a clinic plan. Though large animal practitioners and small animal practitioners are equally exposed should a disaster occur, small animal practitioners were the majority of our respondents which could skew our results in their favor.

Over 80% of respondents belong to the AVMA or MVMA. Although there are AVMA National Market statistics showing the distribution of AVMA membership among both species category and employment type, there is no direct calculated percentage of AVMA membership among all licensed veterinarians throughout the nation. A best calculated average by employment type shows a 91% (79,432 out of 87,119) AVMA membership although slight overlap of employment type may exist, this national average is higher than the survey average. (AVMA Membership (U.S. and territories)- 2009). Although the national average is higher, the over 80% membership by the respondents could be higher than membership to other organizations due to traditional influence of both the MVMA and AVMA. AVMA membership allows veterinarians opportunities to be involved in governmental decisions about the profession, to keep up to date on current research and pharmaceutical findings through their website and through their bimonthly scientific journal, The Journal of the American Veterinary Medical Association, and to utilize benefits such as health and liability insurance membership at discounted rates. MVMA membership allows veterinarians opportunities to become locally involved in state government decisions about the profession. In order for a

veterinarian to perform private practice in a state, he or she must meet the state board's requirements for renewal, which in Mississippi includes 15 CE credit hours per year. The MVMA also offers conferences where earning up to 25 continuing education (CE) credit hours can occur. By being a member of the MVMA and getting a discounted rate for conference attendance, a Mississippi licensed practitioner can receive all his or her credit hours in one MVMA conference.

Only 10% of respondents knew that their local emergency management agency was the point of contact to report damage and loss to obtain information about what to do during an event. 39.2% of respondents were not familiar with county emergency response teams. One reason that veterinarians could be unaware of these who to contact may be because of the lack of communication and inclusion of veterinarians during emergency management agency planning in the past. The 83.2% choice of "state veterinarian/Board of Animal Health" may be because this agency/individual is the point of contact for reportable animal diseases and legal matters regarding animals and distributes newsletters to both veterinarians and veterinary volunteers. Also, respondents felt that MART and the MBAH were most responsible for training individuals reaffirming the point of contact statistic. In regards to the rating of the disaster-related organizations and training of veterinarians, some respondents did not believe they had the authority or the knowledge to rate such organizations. This may be due to the variety of organizations available and the varying exposure to them. One suggestion to bridge this information gap is to invite disaster-related organization representatives to current veterinary conferences or hold special continuing education meetings such as workshops with multiple agencies.

It is difficult to analyze disaster preparedness of clinics in regards to educational materials and agreements with other practices other than simply to note the low numbers

of those who indicate that they even have them. While information is provided at conferences, the actual disaster preparedness materials need to be better advertised to veterinarians. As an incentive to survey response, our study included AVMA Emergency Preparedness and Response CD-Rom distribution to those who returned the survey. Similar attempts can be made by other organizations to get disaster preparedness materials out to private practitioners.

Not all counties were represented in survey response, so analysis based on MEMA district includes visual assessment of representation of the state veterinarian distribution. Counties were analyzed based on county of residence not count of practice to avoid duplicity in results since each respondent only claimed one county of residence as opposed to multiple counties of practice in some cases. It should also be noted that surveys were sent to active private practitioners in the state of Mississippi. Public practice individuals, such as those in government and academia were filtered both before survey distribution and before analysis of results. Many of these individuals are publicly licensed and are more likely to be involved with response to a disaster and are therefore more likely to have obtained formal disaster training. These individuals also are more likely to have disaster plans for both work and home due to this training. Overall, those who have experienced disasters and those who live in MEMA district 9 are more likely to have both personal disaster plans and veterinary clinic disaster plans. Also, though a low percentage of private veterinary practitioners indicated having had formal disaster training, a large majority are interested in disaster training.

CHAPTER V

CONCLUSION

This study's purpose was to survey the disaster preparedness of Mississippi veterinary licensed practitioners. The veterinary demographics of the study correlate with those of the Mississippi Board of Veterinary Medicine giving external validity to the study. This study found that while a low percentage of private veterinary practitioners have obtained formal disaster training, a large majority are interested in obtaining such training. Disaster experience not only plays a part in desiring training but also in having a disaster plan whether personal or professional. Even though our study showed increased preparedness associated with MEMA District 9 counties and disaster experience, the potential for a disaster is the same for everyone in a local region so all veterinarians should be prepared. A working relationship with county and community emergency management officials is imperative to personally prepare or to help others. When many veterinarians in Mississippi do not know to contact their local emergency management agency for preparation and during a disaster, the relationship is obviously lacking.

With previous inclusion of livestock in agricultural plans as well as the PETS ACT passage in 2006, animals are important no matter whether they are used for production, service, or companionship. It is unacceptable not to include them in preparations and response. While Mississippi is one of nineteen states with an active state animal response team which increases its training opportunities regularly, many veterinarians do not take advantage of these opportunities. Veterinarians are the first line

of defense in disaster preparedness for animals with enormous potential to save animal lives.

Each year, disasters occur throughout the country with many of them unforeseen in location, type, and damage. While there are resources available for veterinarians, many veterinarians do not begin to prepare for a potential disaster until after personally experiencing one. Many non-referenced publications and articles exist discussing the need for both veterinarians involvement in response, training opportunities, and necessity in community preparation, but few studies actually quantify these different variables. Furthermore, training opportunities exist for veterinarians. While these opportunities have increased in the last ten years with detrimental hurricane damage and increased bioterrorism awareness, a barrier seems to exist in communication both from emergency management to the veterinarian and the veterinarian to the client.

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APPENDIX A

COVER LETTER TO MAIL SURVEY

Mississippi State University

College of Veterinary Medicine

August 23, 2010

Dear Doctor:

We are requesting your assistance in assessing private veterinary practitioner disaster preparedness in Mississippi. Fires, flooding, tornadoes, chemical/toxic spills, and hurricanes are all examples of disaster situations, whether natural or man-made events. Since all disasters have local effects, as a veterinarian, you are exposed to these disasters routinely. With this survey, we hope to determine what disasters veterinarians are exposed to and how they respond to such disasters. This will also allow us to understand the needs of the veterinary community and further implement desired training opportunities to better prepare for disaster situations.

Please take 5 minutes to fill out the attached survey. By answering this survey, you are giving us permission to use the information in our analysis. Individual answers will remain confidential and will not be linked to an identifiable clinic; however, the data collectively will be summarized and presented as part of a DVM Master's thesis project to evaluate veterinarians' experiences in disasters and their needs in terms of disaster preparedness. Your participation is voluntary, and there is no penalty in refusal or discontinuation at anytime during the survey.

Upon receiving your completed survey, a complimentary *AVMA Emergency Preparedness and Response CD-ROM* will be mailed to you. This CD-ROM provides valuable information for you as a private practitioner in disaster situations. You will also be enrolled in a raffle for Veterinary Disaster Response, a new innovative comprehensive textbook encompassing all aspects of animal disaster response from training to planning to recovery.

Please respond by September 23, 2010. You may return this survey by email, fax or USPS in the postage-paid envelope provided.

Feel free to contact us if you have any questions or comments. We appreciate your time.

Sincerely,

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Figure 5 Cover Letter to Mail Survey

APPENDIX B

MAIL SURVEY

2010 MSU CVM Disaster Preparedness Survey

Doctorate of Veterinary Medicine/Veterinary Medical Doctorate:

School of graduation: _____Year of graduation: _____
List all states currently licensed to practice veterinary medicine: _____
County of veterinary practice: _____ County of residence (if different): _____
Gender: □ Male □ Female

Practice Experience:

□ *Currently* working in private veterinary practice*** □ *Currently* not working in private practice

Total number of years in ***private*** veterinary practice in Mississippi: _____
****Private practice is defined as practicing veterinary medicine in a non-government sponsored facility such as a clinic or privately-owned hospital.*

Please check the primary focus of your veterinary practice position(check only one):

□ Large Animal
□ Food Animal only
□ Equine only
□ Mixed Animal (mainly Equine)
□ Mixed Animal (mainly Small Animal)
□ Mixed Animal (mainly Large Animal)
□ Small Animal
□ Exotics only

How many veterinarians (including yourself) are currently practicing at your clinic? _____

I am a member of the following response organizations (check all that apply):

□ MART (Mississippi Animal Response Team)
□ CERT (Community Animal Response Team)
□ NVRT (National Veterinary Response Team)
□ VMAT (Veterinary Medical Assistance Teams)
□ USDA NAHERC (National Animal Health Emergenc Reserve Corp)
□ MVMA (Mississippi Veterinary Medical Assn.)
□ AVMA (American Veterinary Medical Assn.)
□ The American Red Cross
□ HSUS (Humane Society of the United States)
□ Mississippi State Department of Health VIPR (Volunteers in Preparedness Registry)
□ Other: _____

Current Disaster Training Experience:

Have you had any *formal* disaster response training? □ Yes □ No *if yes, please check all that apply*:

On-line disaster training:
- □ Incident Command System (ICS) *please list levels*: _____
- □ HazMat (Hazardous Materials) Awareness
- □ FEMA Animals in Disasters courses
- □ Other: _____

Hands-on or In-person training (organized session led by accredited organization or individual):
- □ Large animal
- □ Small animal
- □ HazMat/Decontamination
- □ WMD (Weapons of Mass Destruction)
- □ PPE (Personal Protective Equipment)
- □ Exotic/Zoo or Wildlife
- □ Human First Aid/CPR
- □ Other: _____

Figure 6 Mail Survey

Survey Number _____

Are you *interested* in disaster response training? □ Yes □ No

If yes, check type of training you are interested in:

□ On-line modules
□ Lecture based
□ Hands-on or in person training
□ Other: _____

If yes, check type of training you are interested in:

□ Large animal
□ Small animal
□ HazMat/Decontamination
□ Exotic/Zoo or Wildlife
□ WMD (Weapons of Mass Destruction)
□ PPE (Personal Protective Equipment)
□ Human First Aid/CPR
□ Other: _____

Do you have a PERSONAL or FAMILY disaster response plan for the following?

Event	*Written Plan (√)*	*Unwritten Plan(√)*	*No Plan (√)*	*How often is it practiced? (please circle the one that best describes your personal/family plan)*
All Hazards				Weekly Monthly Yearly Rarely Never
Chemical/Toxic				Weekly Monthly Yearly Rarely Never
Fires				Weekly Monthly Yearly Rarely Never
Flooding				Weekly Monthly Yearly Rarely Never
Hurricanes				Weekly Monthly Yearly Rarely Never
Tornadoes				Weekly Monthly Yearly Rarely Never

Have you/your family personally experienced a disaster event? □ Yes □ No

If *yes*, briefly describe type of event: _____

If *yes*, did this event influence your interest in disaster training? □ Yes □ No

Do you have a VETERINARY CLINIC disaster response plan for the following?

Event	*Written Plan (√)*	*Unwritten Plan(√)*	*No Plan (√)*	*How often is it practiced? (please circle the one that best describes your clinic plan)*
All Hazards				Weekly Monthly Yearly Rarely Never
Chemical/Toxic				Weekly Monthly Yearly Rarely Never
Fires				Weekly Monthly Yearly Rarely Never
Flooding				Weekly Monthly Yearly Rarely Never
Hurricanes				Weekly Monthly Yearly Rarely Never
Tornadoes				Weekly Monthly Yearly Rarely Never

Who would you contact in the case of an animal disaster?

□ The State Veterinarian/Board of Animal Health
□ The Emergency Management Agency
□ The Mississippi Department of Agriculture
□ The MSU College of Veterinary Medicine
□ The Mississippi Animal Response Team
□ Other: _____

Do you have disaster educational materials available for clients? □ Yes □ No

If *yes*, what type (*check all that apply*)?

□ Brochure
□ Postcard or newsletter
□ Book
□ Flyer
□ Other: _____

If *yes*, how are these materials available (*check all that apply*)?

□ Upon request
□ In exam rooms
□ In lobby/waiting room
□ At check-out
□ Clinic website
□ Other: _____

Figure 7 Mail Survey (cont'd)

Survey Number _____

Does your practice have any agreements with other veterinary practices in your area to assist with coverage in the event of a disaster or emergency situation? □ Yes □ No

If yes, does this cover:

□ boarding facilities □ animal care □ employee support

□ Other: _____

Are you aware of local/state/national disaster involvement through the following organizations? ***Check all that you are familiar with:***

□ The MART (Mississippi Animal Response Team) Summit and training offerings
□ CERT (Community Emergency Response Team) training
□ The Mississippi Board of Animal Health sponsored trainings
□ Mississippi State Department of Health sponsored trainings
□ The Mississippi Veterinary Medical Association continuing education courses
□ Fire Department or local Emergency Management Agency (EMA) training
□ MEMA (Mississippi Emergency Management Agency) training
□ FEMA (Federal Emergency Management Agency) online training
□ DHS (Department of Homeland Security) training exercises
□ Other: _____

In your opinion, please rate the following organizations with regards to their responsibilities in providing disaster preparedness training for veterinarians: where 1=not responsible at all 5=very responsible

Individual veterinary practices	1 2 3 4 5	□ not familiar with this organization
The MSU College of Veterinary Medicine	1 2 3 4 5	□ not familiar with this organization
The MART (Mississippi Animal Response Team)	1 2 3 4 5	□ not familiar with this organization
CERT (Community Emergency Response Teams)	1 2 3 4 5	□ not familiar with this organization
The Mississippi Board of Animal Health	1 2 3 4 5	□ not familiar with this organization
The Mississippi Veterinary Medical Association	1 2 3 4 5	□ not familiar with this organization
Local or State Fire Department or EMA	1 2 3 4 5	□ not familiar with this organization
MEMA (Mississippi Emergency Management Agency)	1 2 3 4 5	□ not familiar with this organization
FEMA (Federal Emergency Management Agency)	1 2 3 4 5	□ not familiar with this organization
DHS (Department of Homeland Security)	1 2 3 4 5	□ not familiar with this organization

May we contact you regarding any further information from this survey? □ Yes □ No

Would you like a copy of the survey results mailed to you? □ Yes □ No

Thank you for your time and consideration.

If you would like the AVMA Disaster Response CD-Rom, survey results, and to be entered into the textbook raffle, please leave your contact information below. Again, your survey responses will not be linked to individual clinics in the data analysis.

Name: _____

Address: _____

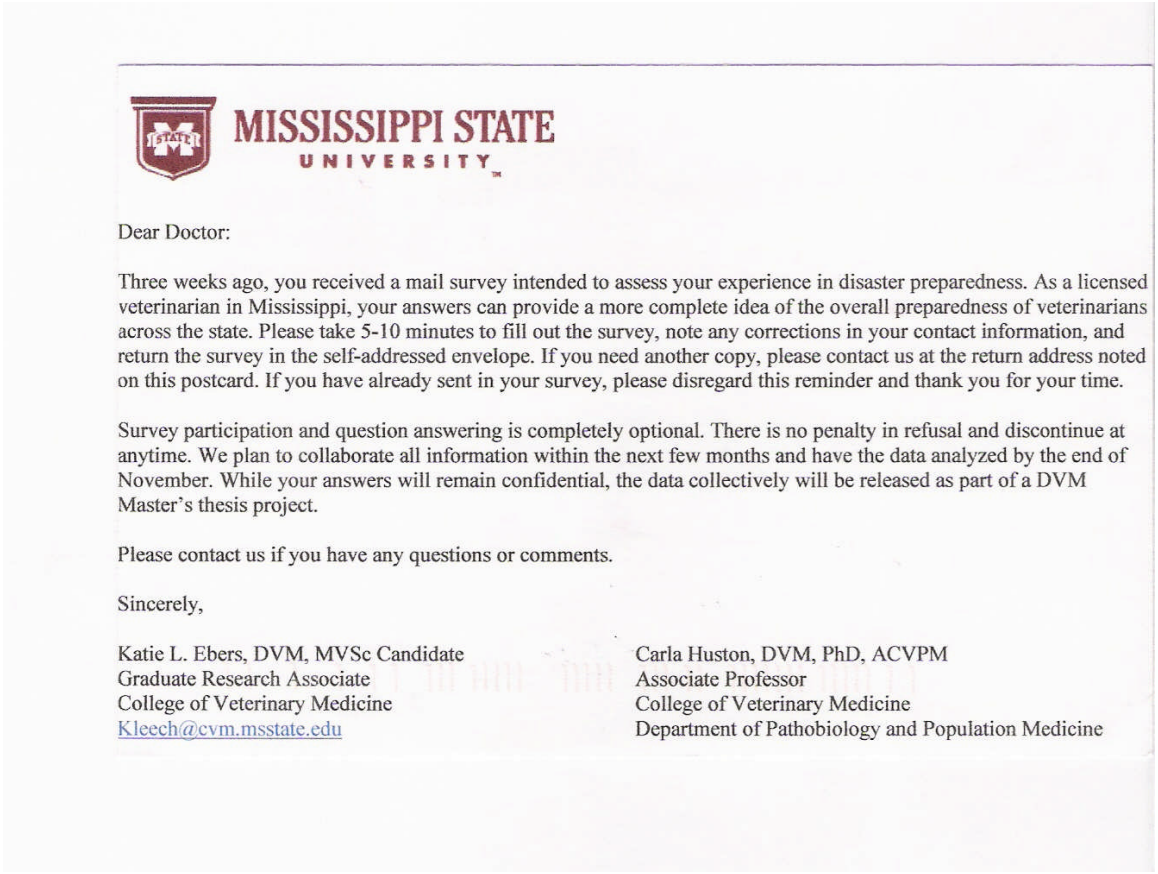
_____

_____

Figure 8 Mail Survey (cont'd)

APPENDIX C

REMINDER POSTCARD



MISSISSIPPI STATE UNIVERSITY

Dear Doctor:

Three weeks ago, you received a mail survey intended to assess your experience in disaster preparedness. As a licensed veterinarian in Mississippi, your answers can provide a more complete idea of the overall preparedness of veterinarians across the state. Please take 5-10 minutes to fill out the survey, note any corrections in your contact information, and return the survey in the self-addressed envelope. If you need another copy, please contact us at the return address noted on this postcard. If you have already sent in your survey, please disregard this reminder and thank you for your time.

Survey participation and question answering is completely optional. There is no penalty in refusal and discontinue at anytime. We plan to collaborate all information within the next few months and have the data analyzed by the end of November. While your answers will remain confidential, the data collectively will be released as part of a DVM Master's thesis project.

Please contact us if you have any questions or comments.

Sincerely,

Katie L. Ebers, DVM, MVSc Candidate
Graduate Research Associate
College of Veterinary Medicine
Kleech@cvm.msstate.edu

Carla Huston, DVM, PhD, ACVPM
Associate Professor
College of Veterinary Medicine
Department of Pathobiology and Population Medicine

Figure 9 Reminder Postcard

APPENDIX D

MISSISSIPPI EMERGENCY MANAGEMENT AGENCY DISTRICTS (MEMA)

Table 4 Mississippi Emergency Management Agency Districts (MEMA)

District	Counties
1	Coahoma, Desoto, Grenada, Panola, Quitman, Tallahatchie, Tate, Tunica, Yalobusha
2	Alcorn, Benton, Itawamba, Lafayette, Lee, Marshall, Pontotoc, Prentiss, Tippah, Tishomingo, Union
3	Attala, Bolivar, Carroll, Holmes, Humphreys, Leflore, Montgomery, Sunflower, Washington
4	Calhoun, Chickasaw, Choctaw, Clay, Lowndes, Monroe, Noxubee, Oktibbeha, Webster, Winston
5	Claiborne, Copiah, Hinds, Issaquena, Madison, Rankin, Sharkey, Simpson, Warren, Yazoo
6	Clarke, Jasper, Kemper, Lauderdale, Leake, Neshoba, Newton, Scott, Smith
7	Adams, Amite, Franklin, Jefferson, Lawrence, Lincoln, Pike, Walthall, Wilkinson
8	Covington, Forrest, Greene, Jefferson Davis, Jones, Lamar, Marion, Perry, Wayne
9	George, Hancock, Harrison, Jackson, Pearl River, Stone

Note: Legend key for remaining Appendices

APPENDIX E

MISSISSIPPI MAP OF SURVEY RESPONDENTS BASED ON MEMA DISTRICT

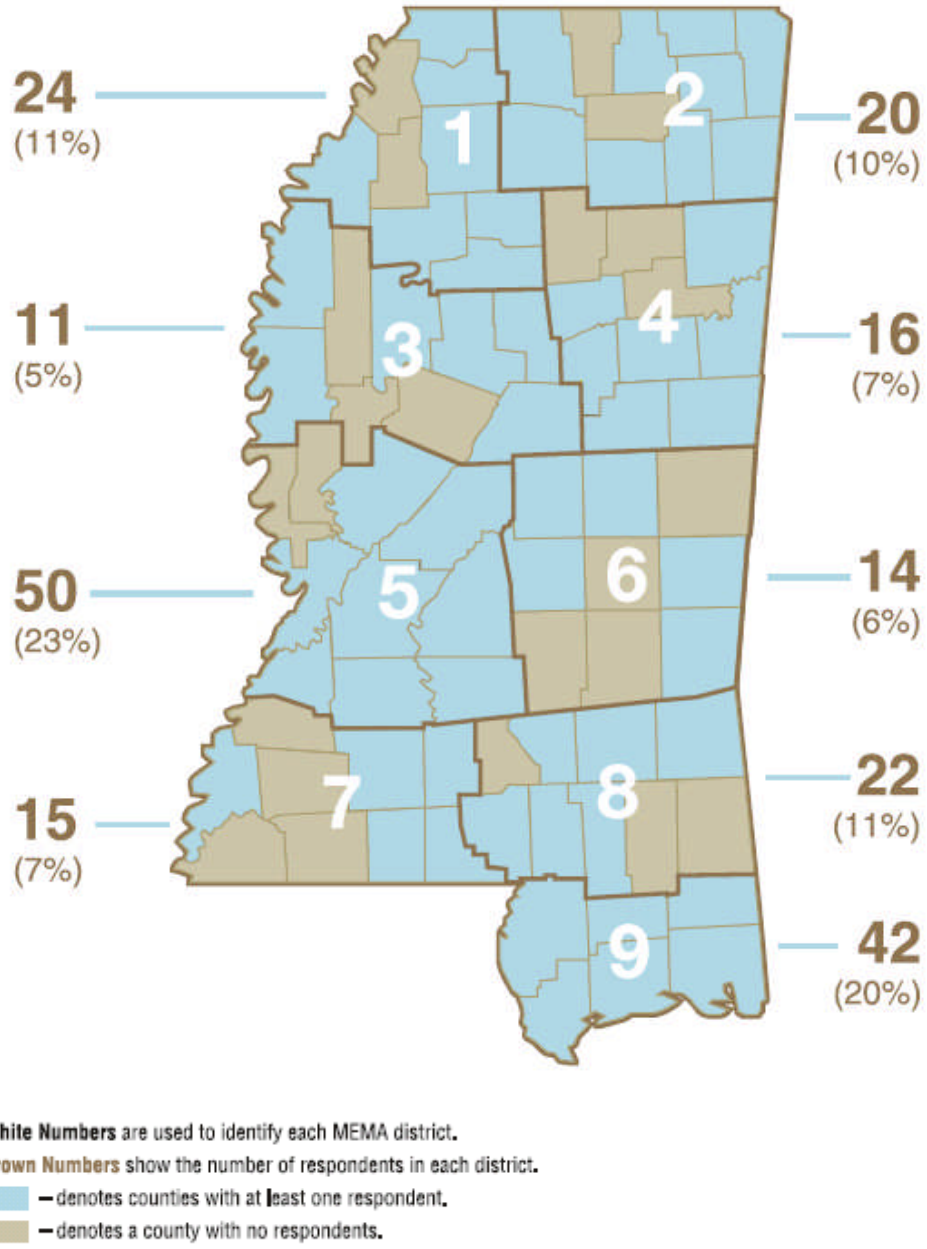


Figure 10 Mississippi Map of Survey Respondents Based on MEMA District

Note: 209 total respondents (4 did not designate county)

APPENDIX F

MISSISSIPPI MAP OF SURVEY RESPONDENTS WHO HAVE RECEIVED FORMAL DISASTER TRAINING BASED ON MEMA DISTRICT

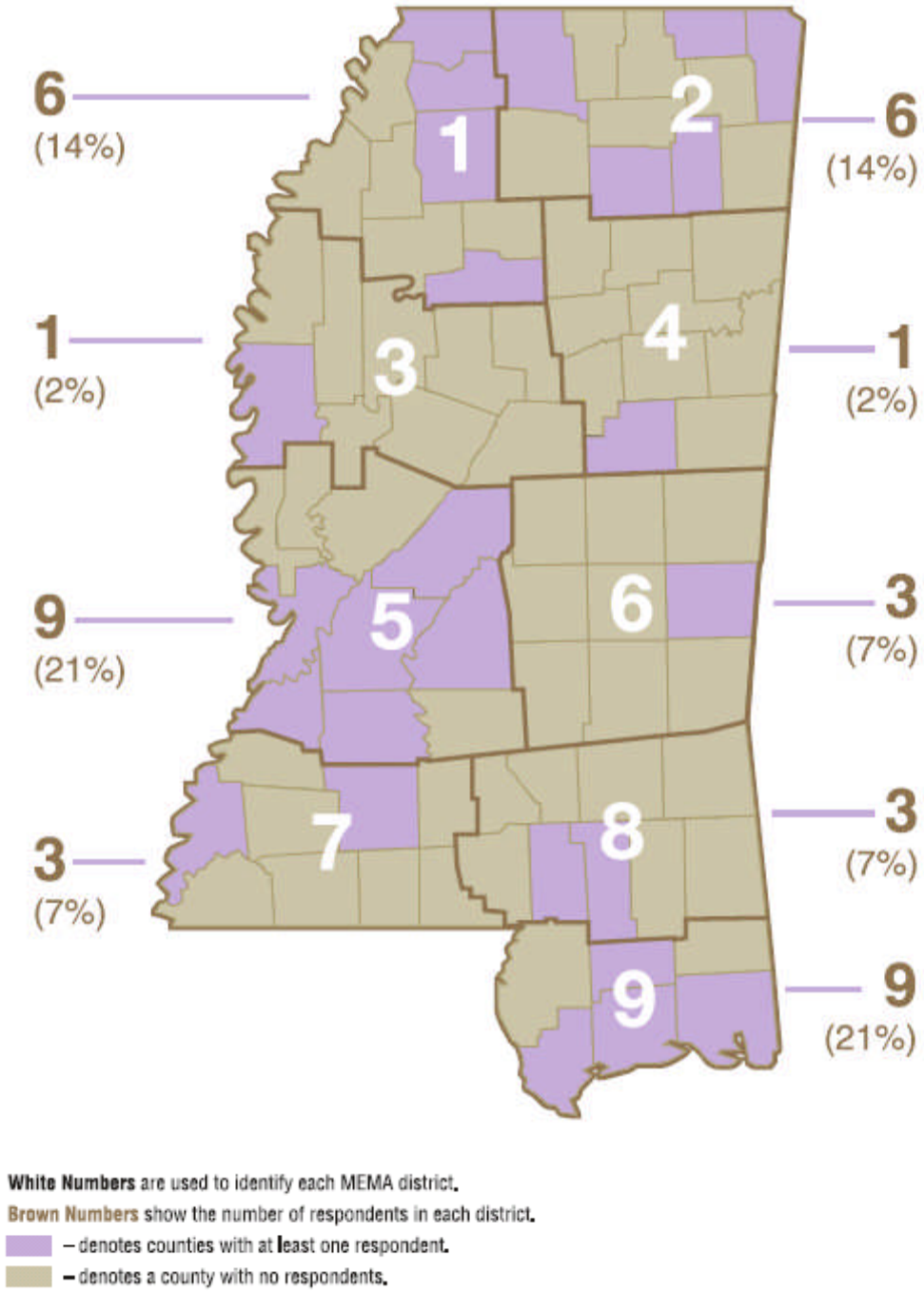


Figure 11 Mississippi Map of Respondents Who Have Received Formal Disaster Training Based on MEMA District

Note: 43 total respondents (2 did not designate county)

APPENDIX G

MISSISSIPPI MAP OF SURVEY RESPONDENTS WITH A PERSONAL DISASTER PLAN BASED ON MEMA DISTRICT

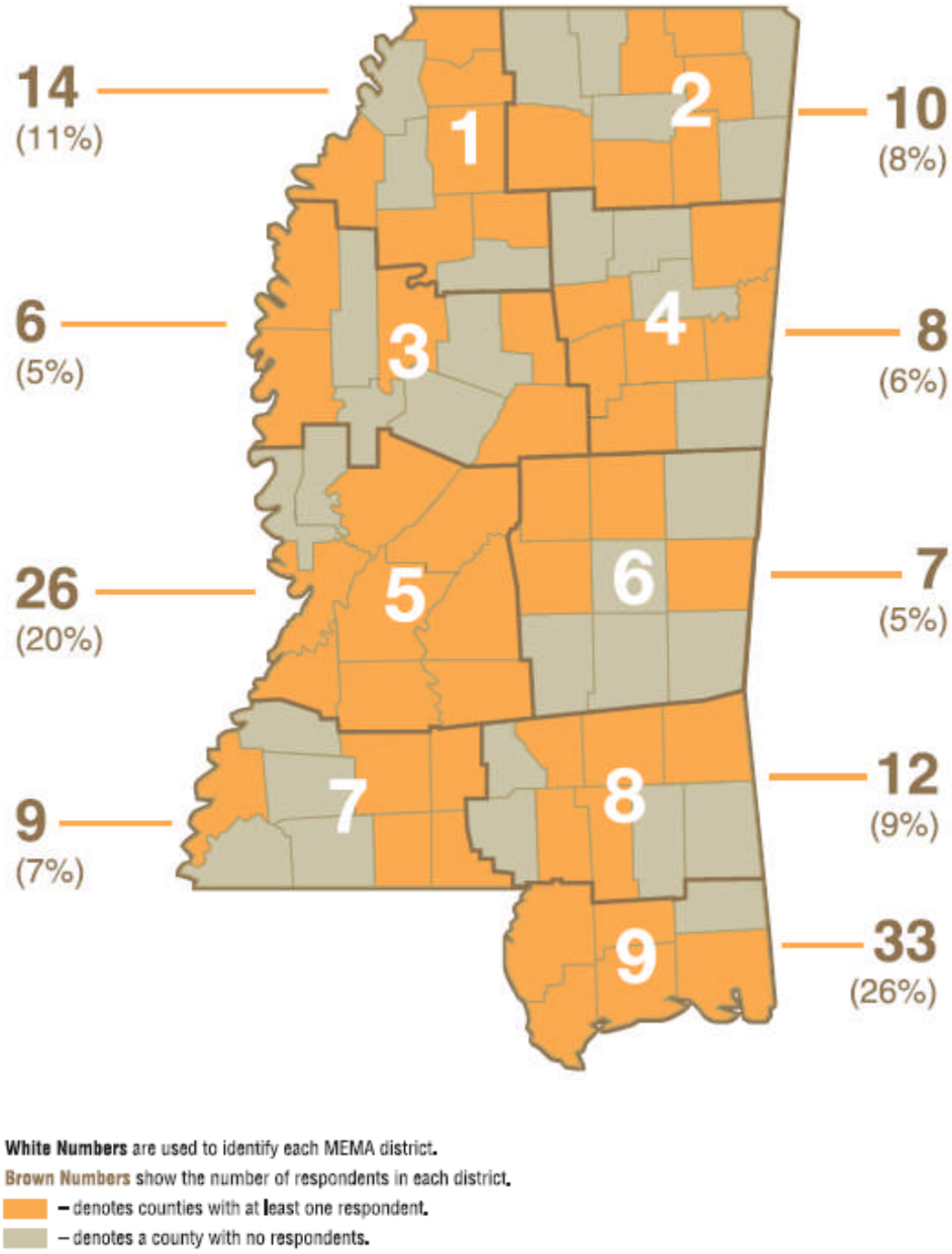


Figure 12 Mississippi Map of Survey Respondents With A Personal Disaster Plan Based on MEMA District

Note: 128 total respondents (3 did not designate county)

APPENDIX H

MISSISSIPPI MAP OF SURVEY RESPONDENTS WITH A VETERINARY CLINIC DISASTER PLAN BASED ON MEMA DISTRICT

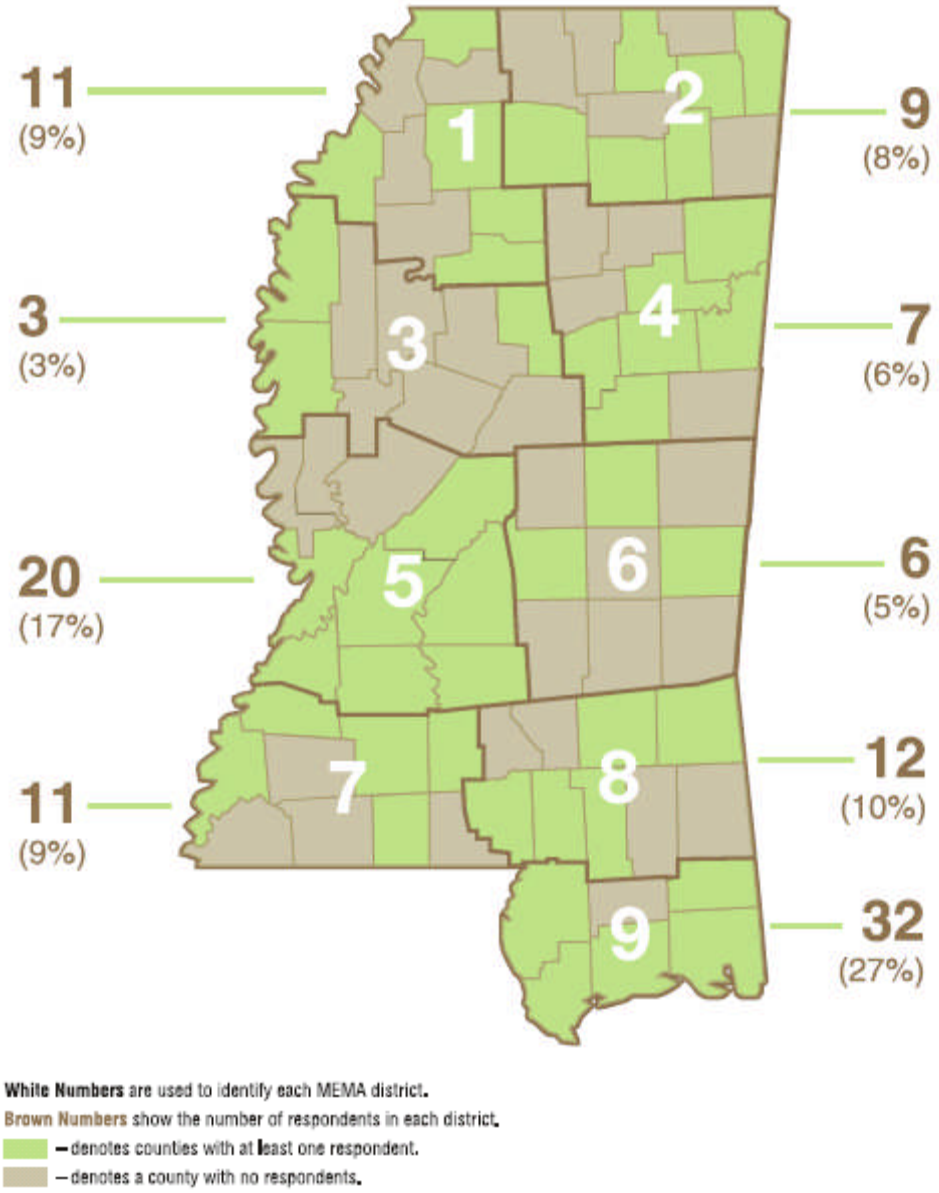


Figure 13 Mississippi Map of Survey Respondents With a Veterinary Clinic Disaster Plan Based on MEMA District

Note: 117 total respondents (5 did not designate county)

APPENDIX I

MISSISSIPPI MAP OF LICENSED VETERINARY PRACTITIONERS IN THE STATE BASED ON MEMA DISTRICT

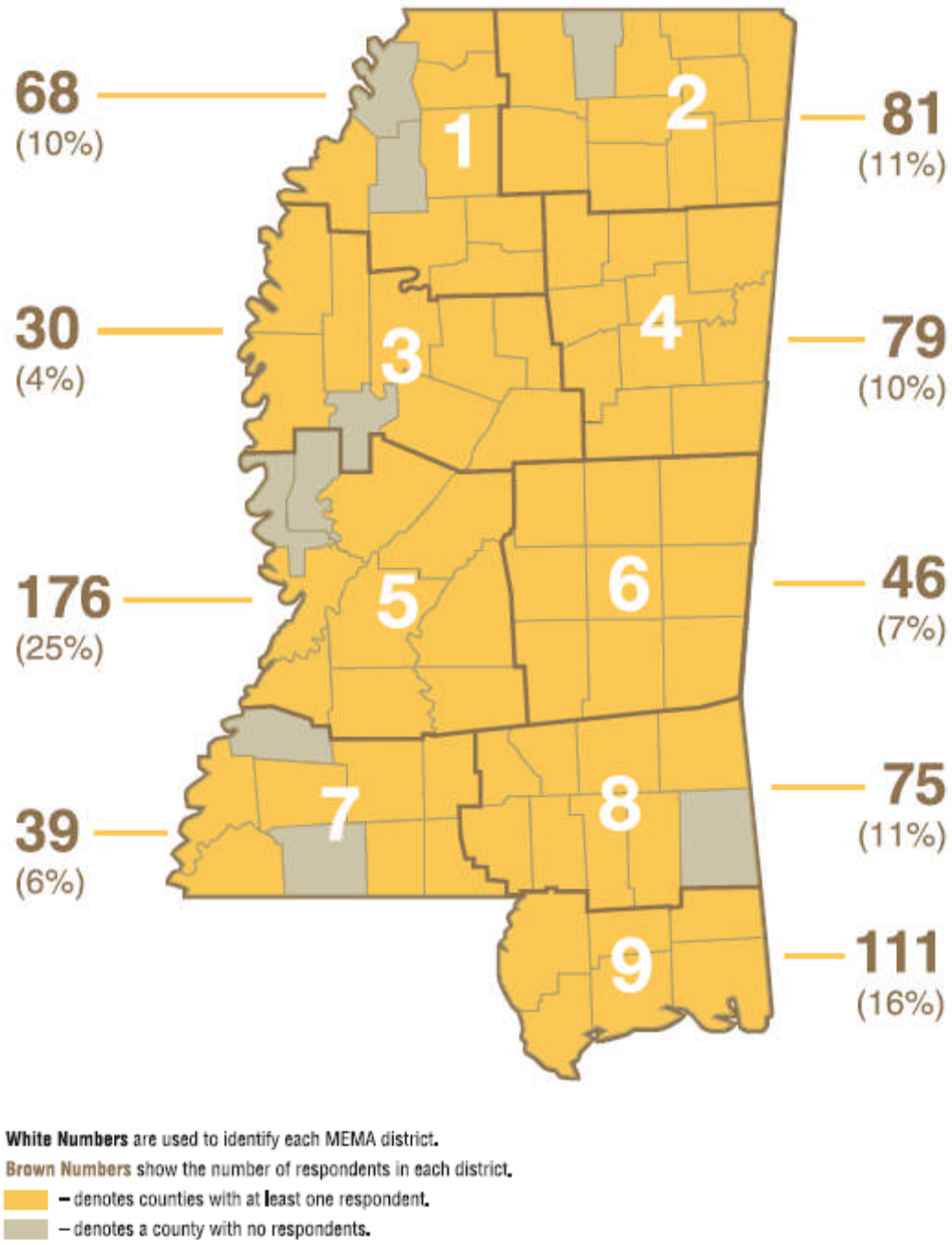


Figure 14 Mississippi Map of Licensed Veterinary Practitioners in the State Based on MEMA District

Note: 705 total (county designation obtained from the Mississippi Board of Veterinary Medicine