An exploration of K9-assisted approaches as a component of Disaster Response

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Abstract: **Disaster response teams increasingly rely on trained dogs in Urban Search and Rescue (USAR) operations, particularly in South Africa, where disasters are frequent and diverse. This study examines the roles, training, deployment, and effectiveness of disaster dogs within South African search and rescue operations, aiming to address existing knowledge gaps and identify areas for further research.**

Key findings emphasize the critical role of canine units in enhancing South Africa's disaster response capabilities. They demonstrate the potential for international deployment through standardized training and classification but highlight the current lack of legislative mandates and national protocols for integrating canine units into disaster response frameworks. The study recommends that the National Disaster Management Centre (NDMC) and the South African Police Service (SAPS) lead efforts to establish and manage dedicated canine units at both provincial and national levels.

Despite the proven effectiveness of K9 Search and Rescue teams, challenges such as inadequate funding and training persist. Comparisons with international best practices reveal opportunities for improvement in South Africa's programs. The study concludes that K9 Search and Rescue is a vital asset to disaster response in South Africa, capable of improving search outcomes and response times. Recommendations include the development of enhanced training programs, increased funding, and further research into their long-term impact. Future studies should focus on creating standardized training protocols and bolstering governmental support to optimize the role of K9 units in disaster management.

Keywords: **K9 search and rescue, South Africa, disaster response, canine training.**

I. INTRODUCTION

This study addresses the critical need for incorporating canine units into South Africa's disaster management systems, particularly focusing on human-animal interactions (HAIs). Canine units offer invaluable contributions to urban search and rescue operations through their highly developed olfactory abilities, which allow them to locate survivors more quickly than human teams alone. By advocating for the formal integration of these units, the study aims to improve the overall effectiveness of disaster response, directly benefiting communities by reducing rescue times and increasing survival rates. It also highlights the importance of fostering public awareness and support for canine-assisted disaster response, which can strengthen community resilience during emergencies and disasters.

The research contributes to the scientific understanding of the role and potential of canine units in disaster response, particularly within the context of South Africa. By assessing the unique capabilities of canines in search and rescue operations and emphasizing the need for specialized training and health management of both dogs and handlers, the study sets a foundation for further empirical research in this field. It identifies a gap in the current legislative framework, specifically the lack of formal protocols for canine units under the Disaster Management Act (2002). Addressing this gap through standardized training and certification can lead to more data-driven assessments of canine effectiveness in various

disaster scenarios, contributing to global best practices and enriching the body of knowledge in disaster risk reduction strategies.

This research is crucial because it addresses a key deficiency in South Africa's disaster response infrastructure—namely, the lack of formal legislative and regulatory support for canine search and rescue units. While the 2017 certification of the South African Urban Search and Rescue Team marked progress, the study highlights that a comprehensive legislative framework is still missing. Such a framework would align South African practices with the international search and rescue advisory Group (INSARAG) guidelines and other international standards, ensuring that canine units are not only effective but also properly trained and deployed. The integration of these units has the potential to make disaster response efforts faster, more adaptable, and cost-effective, ultimately saving more lives and reducing the overall impact of disasters on affected communities. Therefore, the study makes a compelling case for the inclusion of canine units in national and provincial disaster management plans, filling a critical gap in the current system and offering a pathway toward a more robust and resilient disaster response strategy.

II. LITERATURE REVIEW

Disaster Risk Management involves using strategies and resources to reduce the impacts of hazards (UNISDR, 2009). Researchers like Cvetković (2023a, 2024) highlight the severe threats disasters pose to lives, property, and infrastructure, from natural hazard events like earthquakes and floods to human-made incidents such as industrial accidents (Cvetković *et al*., 2022).

Immediate response is critical once an event escalates into an emergency, as emphasized by Haddow *et al.* (2017). The initial hours are crucial for saving lives (Islam, 2023), with search and rescue teams using diverse methods to overcome challenges like adverse weather and limited resources (Ice *et al*., 2015). Despite obstacles, international efforts aim to improve response through training and technology (Cvetković & Miljković, 2024). The study of methods, including canine-assisted search and rescue, is key to building resilient communities.

2.1 Background and benefit of Canine Search and Rescue

Cvetković & Jovanović (2021) emphasize the importance of effective rescue operations to minimize disaster impact. Alvarez and Hunt (2005), Eaton-Stull *et al.* (2023), and Meyers (2014) advocate for canine units in disaster response due to their speed and precision in detecting survivors and hazards. According to Grandjean (2007), search and rescue (SAR) dogs are critical due to their superior detection skills, which allow them to locate survivors in inaccessible areas. Alvarez and Hunt (2005), Eaton-Stull *et al.* (2023), and Meyers (2014) advocate for canine units in disaster response due to their speed and precision in detecting survivors and hazards. That is to say that SAR dogs are vital for enhancing the success of rescue missions (Fischer *et al*., 2020). However, the key to this would be, according to Bryson *et al.* (2019), training both dogs and handlers for effective collaboration.

Despite international endorsements from FEMA and IRO, South Africa's disaster management lacks canine units, highlighting a need to align with global standards (FEMA, 1999, 2021; IRO, 2019). Morris (2007) argues that adopting these standards could enhance disaster response efficiency.

2.2 History of Canine in Disaster Response

Dogs have a long history in search and rescue, dating back to before World War I (Greatbach, 2015). In ancient Egypt, dogs served in military roles, carrying messages and locating injured soldiers, with their roles evolving during the World Wars and beyond (Gordan, 2018). Edwin Richardson, a pioneer of modern war dog training, highlighted their use for carrying messages and finding wounded soldiers during WWI. The use of search dogs continued in WWII, with the British training dogs to find people buried under rubble. Despite initial reluctance from the U.S.A, nearly 10,000 dogs served in WWII (Gordan, 2018). Furthermore, American doges as scouts, detecting enemies, and assisting in various rescue missions during the Korean and Vietnam Wars. Although dogs have been used for mountain rescues since the 1700s (Fenton, 1992), the first modern rescue in the United States was in 1969 when a German Shepherd located a buried skier (Gordan, 2018). According to Fenton (1992), modern SAR dogs are trained for diverse tasks like locating bombs, bodies, and lost persons.

The 1995 Oklahoma City bombing was a turning point, as therapy dogs were used to support trauma victims and responders (Tedeschi & Jenkins, 2019). During 9/11, about 500 therapy animal-handler teams provided comfort to those affected,

leading to the establishment of national standards for their deployment (Tedeschi & Jenkins, 2019). This history illustrates the longstanding recognition of the value of dogs in high-stress crisis situations.

2.3 The different roles of dogs in search and rescue response environments

Authors such as Fenton (1992), Gordan (2018), Greatbach (2015), and Tedeschi and Jenkins (2019) have highlighted the significant role of dogs throughout history in various capacities, especially in detection and search and rescue (SAR) operations. Beyond emergencies, dogs have also proven valuable in settings like schools, where they aid in lockdowns, and evacuations, as well as by providing emotional support (Bosque, 2023). Further, their roles have expanded to include airport security, law enforcement, and disease detection, with their ability to identify volatile organic compounds (VOCs) even used during the COVID-19 pandemic for detecting SARS-CoV-2 in human samples (Otto *et al.,* 2021).

In modern disaster response, dogs are classified into three main groups, namely tracking, air-scenting, and water search dogs (Milojević, 2023; Cvetković & Miljković, 2024). These specialized skills make SAR dogs essential in urban search and rescue missions, such as in structural collapses (AFAC, 2019; Gwaltney-Brant *et al.,* 2003). Notable deployments include the Oklahoma City bombing (1995), 9/11 attacks, and natural disasters like the Haiti Earthquake (2010) and the Japan Tsunami (2011), showcasing their unmatched ability to detect human scent (Gordan, 2018). However, the contributions of these dogs extend beyond physical search efforts as they also provide psychological support. They help lower stress levels and offer emotional comfort to disaster victims, as well as first responders (Gordan, 2018; Eaton-Stull, 2023). Thus, animal-assisted crisis response (AACR) teams, including therapy dogs, play a crucial role in multiple aspects. These historical and contemporary roles underscore the importance of dogs in enhancing disaster response, making them indispensable in preparedness and crisis management strategies.

2.4 Canine as a Search and Rescue Tool

Search and rescue (SAR) dogs, also referred to as "disaster dogs", play an essential role in locating survivors during disaster events, with unique capabilities that surpass other SAR techniques, particularly in identifying unconscious or deceased victims in areas inaccessible through conventional methods (Statheropoulos *et al*., 2015). Their remarkable sense of smell, with about 200 million olfactory receptors—20 to 40 times more than humans—enables them to detect faint and complex scents, making them invaluable in search operations, especially over large areas (Bäckström & Christoffersson, 2006; Morris, 2007).

These capabilities make SAR dogs effective in various environments, from urban settings with structural collapses to wilderness areas (INSARAG, 2006; Cvetković & Miljković, 2024). Trained to detect both living and deceased individuals, SAR dogs can identify scent trails and mark locations for faster rescue operations. Their efficiency is often supplemented by electronic search devices, and using two canine teams to verify findings enhances reliability despite challenges like humidity and heat (Wong & Robinson, 2004).

The practical applications of SAR dogs are well-documented across diverse disaster scenarios, including fires, explosions, hurricanes, earthquakes, and floods (Gwaltney-Brant *et al.,* 2003). Their training begins from a young age, progressing from basic obedience to real-life disaster simulations, preparing them for the complexities of actual rescue missions (Otto et al., 2019; Cvetković & Miljković, 2024).

2.5 Legislation and minimum standards guiding Canine utilization in Search and Rescue operations.

Establishing effective search and rescue (SAR) canine services requires adherence to global standards and legislation. In 2014, the Australian Government introduced a framework for accrediting volunteer SAR dogs, emphasizing alignment with state or territory emergency service standards (AFAC, 2019). SAR operations demand physical fitness and mental resilience from both dogs and handlers, as they work in challenging environments. Therefore, the South Australian Urban Search & Rescue Taskforce (SAUSARTF) mandates that canine handlers pass rigorous physical assessments and medical evaluations to ensure their suitability for these demanding roles (AFAC, 2019).

The selection of SAR dogs focuses on temperament, physical structure, and fitness, typically choosing candidates between 12 and 24 months old. Training and screening for both dogs and handlers include evaluations such as navigating rubble and confined spaces, performing ladder climbs, and managing stress (AFAC, 2019). INSARAG contributes to these efforts by establishing guidelines aimed at enhancing emergency preparedness and response (Okita & Shaw, 2020).

In the United States, dogs are certified for specialized roles, including live find, human remains recovery, and specific environments like wilderness, rubble, and water (Gordon, 2018). Certifications ensure that dogs are prepared for the unique challenges each setting presents. Beyond SAR, the standards for Animal-Assisted Crisis Response (AACR) in the U.S. require AACR teams to be affiliated with recognized therapy dog organizations and have experience working with diverse populations (Eaton-Stull *et al.,* 2010; Stewart *et al.,* 2016).

AACR dogs must possess traits such as friendliness, obedience, and the ability to remain calm in stressful situations (Chandler, 2012; Stewart *et al.,* 2016). Handlers are responsible for monitoring their dogs' well-being and recognizing signs of stress or fatigue (Lackey & Haberstock, 2019; Eaton-Stull, 2023). The development of effective SAR services hinges on following proper methods and maintaining high standards in both training and practice (Mommsen, 2022).

2.6 South African Acts and Legislation governing canine activities and challenges

Current South African legislation, such as the Animal Protection Act 71 of 1962 and the Private Security Industry Regulation Amendment Act 4 of 2016, focus primarily on security dogs rather than canine search and rescue (SAR) (South African Government, 2016). Developing effective SAR services in South Africa requires aligning with local qualification authorities and understanding relevant legislation, particularly the Disaster Management Act 57 of 2002, which emphasizes integrated disaster management strategies (Sithole, 2023). This alignment will help guide the industry's growth and integrate canine services into disaster response efforts (AFAC, 2019).

Current training programs, like those offered by the Genesis K9 Group, focus mainly on handler training rather than canine training, with levels dedicated to handling service and detection dogs. FEMA recommends training dogs to prevent aggressive behaviours, emphasizing the need for standardization in training (FEMA, 1999; FEMA, 2021). Proper training and a strong handler-dog relationship are critical, as environmental stressors can affect the accuracy of scent detection during search missions (Bäckström & Christoffersson, 2006).

Within the broader context of disaster response, the South African Police Service's Canine Search and Rescue Unit faces challenges like personnel shortages and insufficient financial resources (Moodley, 2022). These constraints, along with a lack of specialized resources such as helicopters, hinder the effectiveness of SAR operations (Moodley, 2022). Addressing these issues requires standardizing training protocols to enhance the reliability and efficiency of SAR operations (AFAC, 2019).

Globally, collaboration and adherence to international standards, such as those established by INSARAG, are crucial for enhancing disaster response (Okita & Shaw, 2020). Additionally, research highlights the physiological and psychological benefits of interactions with canines during crises, such as reduced stress and increased oxytocin release (Gordon, 2018; Donadon *et al.*, 2018). This emphasizes the value of incorporating trained canines into disaster response to bolster human resilience and well-being.

In summary, effective SAR services in South Africa hinge on understanding legislative frameworks, addressing resource challenges, and standardizing training protocols. By fostering integrated policies and aligning with international standards, South Africa can enhance its disaster management capabilities and ensure the efficient use of SAR dogs, ultimately improving outcomes during crises.

III.   RESEARCH METHODS AND DESIGN

This study adopts an exploratory qualitative approach, which Creswell *et al.* (2016:84) describes as being primarily inductive and operating within an interpretive framework. The rationale for this qualitative approach is to gain a deeper understanding of K9-assisted methods in disaster risk assessment, preparedness, and response. Data collection, as well as the results will be discussed further below.

3.1 Data Collection and Sampling

3.1.1 Data Collection

Data collection will be conducted through a qualitative, semi-structured online questionnaire, with follow-up interviews on digital platforms such as Teams and Zoom. This approach was chosen due to the geographical spread of respondents across the country, as well as time and financial constraints. Due to a physical injury limiting the interviewer's mobility, this approach was chosen to accommodate the interviewer's needs. It also allowed for better accommodation of any physical

limitations that participants might have. According to Creswell *et al.* (2016:93), semi-structured interviews involve specific open-ended questions, complemented by probing questions to seek further clarification. An interview guide will be developed based on insights from the literature review to ensure a focused and consistent approach during the interviews.

3.1.2 Sampling

Purposive sampling was employed to select interview candidates, meaning that the sample was based on the researcher's judgment to include elements that represent the most relevant characteristics of the population (De Vos *et al.*, 2011:232) Four respondents from South African Police Service (SAPS), Volunteer Emergency Services, Private Industry and USAR-SA who have knowledge and experience in the canine environment and disaster risk management field, were selected for participation in this study. They were asked to conceptualize the development of K9-assisted initiatives and their governance concerning disaster preparedness and response in South Africa, as well as other probing questions. Data collected through the semi-structured interview process were transcribed and analysed using thematic content analysis methods. This approach enables the researcher to uncover rich insights, understandings, and perspectives related to the case study, allowing for a nuanced exploration of complex phenomena and providing valuable insights for theory-building, practice, or policy development.

IV. RESULTS

From the data five main themes and ten sub-themes will be identified and will be presented here in the discussion of the results.

Themes	Sub-themes
1. Enhancing Disaster Response Efficiency: The Role of Canine Units in Provincial and National Preparedness and Contingency Planning.	The functions of canines within the Provincial and National Disaster Risk Preparedness and Response Contingency planning are important.
	The functions of canines within the Provincial and National Disaster Risk Preparedness and Response Contingency planning are not important.
2. International Classification and Deployment Potential of Canine Teams in Disaster Response: Pathways to Global Recognition	International classification or standardisation is important for potential deployment of canine teams in disaster response.
	It is not important for any type of classification or standardisation for canine teams to deploy nationally or internationally.
3. Legislative Frameworks and Standardization Protocols for Canine Search and Rescue in South Africa: Assessing Current Mandates and Gaps	Current legislative frameworks or standardization protocols for canine search and rescue, which assess mandates and address gaps, are not widely known or clearly defined.
	There are legislative frameworks and standardized protocols for canine search and rescue which assess mandates and gaps
4. Building Capacity: Strategies for Establishing Dedicated Canine Units in South Africa's National and Provincial Disaster Response Frameworks	What would be the recommended strategies for establishing dedicated canine units in South Africa's National and Provincial Disaster Response Frameworks?
	Have no idea or recommendations towards the establishment of a dedicated canine units in South Africa's National and Provincial Disaster Response Frameworks
5. Stakeholder Roles and Responsibilities in Implementing Canine Unit Initiatives for Disaster Response in South Africa	In my opinion as a respondent, I would state that stakeholder roles and responsibilities in implementing canine unit initiatives for Disaster Response in South Africa can be allocated.
	Have limited knowledge regarding any stakeholder, their roles or their responsibilities in implementing canine unit initiatives for Disaster Response in South Africa

4.1 What is the importance and function of including canine units within the Provincial and National Disaster Risk Preparedness and Response contingency planning.

4.1.1 Enhancing Disaster Response Efficiency: The Role of Canine Units in Provincial and National Preparedness and Contingency Planning.

• The functions of canines within the Provincial and National Disaster Risk Preparedness and Response Contingency planning are important.

In discussing the role of canine units in disaster response, the responses from various stakeholders reflect a strong consensus on their importance. SAPS perspective emphasized that "it is of utmost importance to include search and rescue dogs," highlighting the critical need for these units within disaster response frameworks. This view is shared from the Private/Volunteer EMS sector, who described K9s as "an imperative part of a disaster search and rescue operation," suggesting that their presence is not just beneficial but essential for effective response efforts.

Similarly, a representative from the Private Industry, stressed that "canine units are essential for enhancing search and rescue operations in South Africa." This perspective highlights the added value that canine units bring in terms of improving efficiency and effectiveness in rescue missions. USAR-SA, perspective further reinforced this sentiment by noting that "K9 units play a crucial role in the location of victims in a disaster response situation," pointing to their specific capabilities in locating individuals during critical situations. Together, these insights underline the widespread acknowledgment of the vital role that canine units play in strengthening South Africa's disaster response capabilities.

• The functions of canines within the Provincial and National Disaster Risk Preparedness and Response Contingency planning are not important.

When posed questions pertaining if functions of canine within the Provincial and National Disaster Risk Preparation and Response Contingency planning are important, all of the respondents agreed that it is important.

The data indicates that canine units are crucial in Provincial and National Disaster Risk Preparedness and Response Contingency planning. Literature supports this, highlighting that incorporating canine units can significantly enhance disaster response efforts (Alvarez & Hunt, 2005; Eaton-Stull *et al.,* 2023; Meyers, 2014; FEMA, 2012; FEMA, 2013; SDF, 2017; Weir & Buzhardt, 2023). Their effectiveness is well-documented, with proven abilities to locate survivors trapped under rubble, detect hazardous materials, and identify human remains in various emergencies. Canine units' enhanced speed and accuracy allow teams to cover large areas quickly and to precisely pinpoint the locations of survivors or hazards, thus reducing response times and increasing the likelihood of successful rescue operations. Additionally, their versatility and adaptability make them valuable assets in a wide range of disaster scenarios, including earthquakes, hurricanes, floods, and terrorist attacks.

4.2 What do you think is the possibility of such canine teams being classified by various international entities for deployment.

4.2.1 International Classification and Deployment Potential of Canine Teams in Disaster Response: Pathways to Global Recognition

• International classification or standardisation is important for potential deployment of canine teams in disaster response.

The discussion around the classification and standardization of canine units for international deployment revealed several key insights from the respondents. The perspective of SAPS, emphasized the need for standardization, stating that "for classification on an international or even national level, there should be a standardization of assessing the K9 as well as the handler." This highlights the importance of consistent criteria for evaluating both the dogs and their handlers to ensure they meet global standards.

Private/Volunteer EMS sector, noted that "K9s are currently recognized as essential to the search operation by FEMA in the USA and INSARAG among others." This indicates that there is already an established precedent for the international recognition of canine units, reinforcing the value of aligning South African units with such standards.

The Private Industry, viewed the potential for international classification as "quite feasible, given their proven effectiveness in search and rescue operations globally." This perspective suggests optimism about the ability of South African canine units to meet international benchmarks based on their track record of effectiveness.

Whereby, USAR-SA, underscored the necessity of these standards, stating that "a K9 team is a must for any internationally accredited team." This emphasizes the integral role that properly trained and classified canine units play in achieving recognition and readiness for international deployment. Together, these responses highlight the need for standardized training and assessment protocols to align South African canine units with global best practices and facilitate their participation in international disaster response efforts.

- It is not important for any type of classification or standardisation for canine teams to deploy nationally or internationally.

- From the view of the respondent, no one indicated that it is not important for any type of classification or standardisation for canine teams to deploy nationally or internationally.

This data highlights the need for standardization or classification of canine units to enhance their deployment potential in disaster response. Literature stresses the importance of national organs of State actively implementing pre-approved contingency plans for various hazard scenarios in collaboration with the National Disaster Management Centre (NDMC) and relevant stakeholders. These plans must be supported by national and departmental treasuries and decision-makers (The South African Government, 2023:33). Key stakeholders in disaster risk reduction, such as the Departments of Health (DOH), Human Settlements, Agriculture, Environment, Social Development, the South African National Defence Force (SANDF), and the South African Police Service (SAPS), should establish dedicated sections to improve disaster response and recovery efforts (The South African Government, 2023).

4.3 What are current legislative mandates and national standardization protocols regarding canine search and rescue within South Africa, if any legislation exists.

4.3.1 Legislative Frameworks and Standardization Protocols for Canine Search and Rescue in South Africa: Assessing Current Mandates and Gaps

- Current legislative frameworks or standardization protocols for canine search and rescue, which assess mandates and address gaps, are not widely known or clearly defined.

The discussion regarding the existence of legislative guidelines or standard operating procedures (SOPs) for search and rescue K9 units in South Africa revealed a consistent theme of uncertainty and gaps in knowledge among the respondents. Representing SAPS, the evaluation expressed a clear lack of awareness, stating, "No legislation guidelines regarding search and rescue K9 exist to my knowledge." This suggests a significant gap in official regulations from a governmental perspective.

Similarly, the Private/Volunteer EMS sector, highlighted the unregulated nature of this field, noting that "there are a number of NPOs and private citizens who are well-meaning but frankly are not properly trained or certified." This points to the challenges of ensuring uniform training standards without formal legislative frameworks.

Whereby, the Private Industry, admitted to having "no idea" about existing legislation, indicating a broader lack of knowledge within the sector regarding formal regulations or standards.

The perspective of USAR-SA, echoed this sentiment, stating, "I am currently not aware of any legislation that exists or SOPs regarding K9 units." This further reinforces the consensus among stakeholders that there is a notable absence of formal legislative guidance or standardized protocols for K9 units in disaster response within South Africa. The overall discussion underscores the need for a structured regulatory framework to guide the training, certification, and deployment of K9 units in search and rescue operations.

- There are legislative frameworks and standardized protocols for canine search and rescue which assess mandates and gaps.

From the view of the respondent no one indicated that it is not important for any type of classification or standardisation for canine teams to deploy nationally or internationally.

The data indicates a significant lack of legislative mandates and national standardization protocols for canine search and rescue in South Africa. Current literature shows that South African legislation and animal acts focus predominantly on security dogs for crime prevention rather than on canine search and rescue (South African Government, Animal Protection Act 71 of 1962; South African Government, Private Security Industry Regulation Amendment Act 4 of 2016; South African Government, Performing Animal Protection Amendment Act 4 of 2016). To advance this field and develop new curricula

in South Africa, it is essential to comply with South African qualification authorities to address these gaps and guide effective industry development.

Understanding local legislation, particularly related to disaster management, security, police, and military dog services, is crucial for establishing effective canine search and rescue services. A thorough comprehension of these regulations will enable more informed and effective recommendations regarding the roles of search and rescue dogs in disaster response efforts.

4.4 What do you think should be implemented to establish dedicated canine units within South Africa as a function on the national and provincial disaster response capacity.

4.4.1 Building Capacity: Strategies for Establishing Dedicated Canine Units in South Africa's National and Provincial Disaster Response Frameworks

- What would be the recommended strategies for establishing dedicated canine units in South Africa's National and Provincial Disaster Response Frameworks?

The discussion on strategies for establishing and integrating dedicated K9 units into South Africa's disaster response framework reveals various perspectives from the respondents, each emphasizing the importance of structured agreements, standardized training, and clear deployment protocols.

SAPS, perspectives highlight the need for formal agreements among key stakeholders, stating, "Between SAPS, Provincial and National disaster management, there must be an agreement for deployment from SAPS S&R K9... the Disaster Management Act should be proclaimed." This suggests a need for legislative backing and coordination among different levels of disaster management to ensure effective deployment of K9 units.

The Private/Volunteer EMS sector, focused on establishing clear training standards, asserting that "there should be a qualification in place for civilians and search and rescue professionals to achieve a clear minimum standard that is repeatable and reliable." This response underscores the importance of having standardized qualifications to maintain the quality and effectiveness of canine search and rescue operations.

From the perspective of the Private Industry, the focus is on training and protocol development, suggesting that stakeholders should "develop comprehensive training programs for both dogs and handlers based on internationally recognized standards" and "create clear protocols for the deployment of canine units in various disaster scenarios." This highlights the importance of aligning local training efforts with international best practices to enhance the effectiveness of the units.

USAR-SA, emphasized the need for specialized training, stating, "A fully functional K9 unit should be established based on specialized training for the handler as well as for the K9 to locate victims in disaster zones and remote areas." This view stresses the importance of targeted, advanced training programs to ensure that both handlers and dogs are equipped to perform effectively in diverse and challenging environments.

- Have no idea or recommendations towards the establishment of a dedicated canine units in South Africa's National and Provincial Disaster Response Frameworks.

From the view of the respondent no one indicated that they don't recommend any framework to establishment of a dedicated canine units in South Africa's National and Provincial Disaster Response.

The data highlights these responses suggest a comprehensive approach is needed, combining legislative support, standardized training, inter-agency agreements, and the development of clear protocols to enhance the role of K9 units in disaster response across South Africa to establish Dedicated Canine Units for National and Provincial Disaster Response in South Africa. Understanding the Disaster Management Act 57 of 2002 (DMA) is crucial, as it governs disaster management policies focused on prevention, preparedness, and response (Sithole, 2023).

Van Niekerk (2007) emphasizes the government's responsibility for citizen safety, noting that canine services are invaluable in disaster scenarios such as fires and earthquakes (Gwaltney-Brant *et al.,* 2003). Current challenges in the South African Police Service's Canine Search and Rescue Unit include personnel shortages and inadequate funding (Moodley, 2022). Additionally, standardized training is critical to improve operations, as current deficiencies impact effectiveness (Moodley, 2022). Training methods must be standardized to enhance operational efficiency and reliability (AFAC, 2019; FEMA, 1999).

4.5 By whom do you think these initiatives should be implemented and why.

- **4.5.1** Stakeholder Roles and Responsibilities in Implementing Canine Unit Initiatives for Disaster Response in South Africa.

- In my opinion as a respondent, I would state that stakeholder roles and responsibilities in implementing canine unit initiatives for Disaster Response in South Africa can be allocated.

The discussion on which entities should be responsible for implementing initiatives to establish dedicated K9 units in South Africa's disaster response system reveals differing opinions among respondents, reflecting the need for coordination across various sectors.

SAPS, perspectives emphasized the role of centralized leadership, stating, "This legislation should be implemented by national disaster management." This perspective suggests that a top-down approach, driven by national-level decision-makers, could ensure consistency and alignment across the country in the integration of K9 units.

In contrast, the Private/Volunteer EMS sector suggested a more diversified approach, indicating that "these initiatives should be implemented by QCTO and the private sector." This view implies that leveraging expertise from both training authorities like the Quality Council for Trades and Occupations (QCTO) and private entities could provide specialized training and resources for K9 units.

The Private Industry, advocated for a broad, collaborative effort, stating that "the initiatives to establish dedicated canine units within South Africa's national and provincial disaster response capacity should be implemented by a collaborative effort among various stakeholders, including government agencies, local municipalities, non-governmental organizations (NGOs), and private sector partners." This highlights the importance of a multi-stakeholder approach, emphasizing cooperation across different sectors to create a robust disaster response system.

USAR-SA, perspectives proposed a more regional focus, suggesting, "At this stage I think it should be implemented by the Gauteng provincial disaster centre as well as the national disaster centre." This perspective underscores the potential benefits of involving both provincial and national disaster centers to ensure localized coordination while maintaining alignment with national priorities.

Overall, the responses illustrate diverse viewpoints on the ideal leadership for implementing K9 initiatives, ranging from centralized national control to collaborative and regional approaches, each emphasizing different aspects of coordination and expertise needed for successful integration.

- Have limited knowledge regarding any stakeholder, their roles or their responsibilities in implementing canine unit initiatives for Disaster Response in South Africa.

From the view of the respondents, everyone showed some kind of knowledge component regarding the stakeholders, as well as their roles or their responsibilities in implementing canine unit initiatives for Disaster Response in South Africa.

The data indicates that all four respondents believe government involvement is crucial for implementing canine unit initiatives in disaster response in South Africa. National organs of State must actively engage in executing pre-approved contingency plans, collaborating with the National Disaster Management Centre (NDMC) and stakeholders, while ensuring robust support from relevant treasuries (The South African Government, 2023). Key stakeholders, including various government departments and agencies, should establish dedicated sections to enhance disaster risk reduction and response efforts (The South African Government, 2023).

Adherence to international guidelines for deploying volunteers is essential (The South African Government, 2023), and the NDMC's regulations will help standardize operations (The South African Government, 2023). Integrated policies are necessary for efficient disaster response, clarifying roles and funding arrangements (COGTA, 2023).

Canine units, or "Disaster Dogs" (Lit *et al.*, 2010), enhance search and rescue efforts due to their unique skills and training, contributing significantly to human safety. These teams have adapted to meet the challenges of post-disaster scenarios, categorized into sub-types like "crisis-response canines" (Eaton-Stull *et al.*, 2019) and Disease Detection Dogs (Otto *et al.*, 2021).

Research highlights the physiological benefits of human-dog interactions, such as lowering heart rates and regulating stress responses (Gordon, 2018; Donadon *et al.,* 2018). This underscores the vital role canine units play in improving resilience and well-being during crises.

V. DISCUSSION

The findings of this study, which are presented in the section above, will be discussed.

5.1 Enhancing Disaster Response Efficiency: The Role of Canine Units in Provincial and National Preparedness and Contingency Planning

It was stressed that "it is of utmost importance to include search and rescue dogs," highlighting the critical role of canine units in disaster response. K9s were described as "an imperative part of a disaster search and rescue operation," emphasizing their essential role in effective disaster response. Canine units were further noted as "essential for enhancing search and rescue operations in South Africa," underscoring their ability to improve efficiency. Additionally, K9 units were identified as playing a "crucial role in the location of victims in a disaster response situation," emphasizing their specific capabilities in locating individuals.

Supporting literature highlights the critical role of canine units in improving disaster response efforts. Studies indicate that these units can significantly boost efficiency by locating survivors, detecting hazardous materials, and identifying remains (Alvarez & Hunt, 2005; Eaton-Stull et al., 2023; FEMA, 2012). Their speed and accuracy allow for rapid coverage of large areas, reducing response times and increasing the likelihood of successful rescue outcomes.

The integration of canine units is widely viewed as crucial to disaster risk preparedness and response. Both the practical insights and literature emphasize the importance of these units in enhancing search and rescue efforts, suggesting their indispensable role in effective disaster response.

5.2 International Classification and Deployment Potential of Canine Teams in Disaster Response: Pathways to Global Recognition

The need for "standardization of assessing the K9 as well as the handler" for classification on national or international levels was emphasized. It was also pointed out that K9s "are currently recognized as essential" by entities such as FEMA and INSARAG, highlighting the importance of existing international standards. The feasibility of international classification for South African units was suggested, emphasizing that these units could align with global standards. Furthermore, it was stressed that "a K9 team is a must for any internationally accredited team," indicating the importance of standardization for international recognition.

Literature underscores the role of national disaster management agencies in implementing contingency plans and aligning with international standards (South African Government, 2023). Adhering to global protocols ensures readiness for international deployment, with proper training and assessment processes being critical (Weir & Buzhardt, 2023).

There is a strong consensus among practical insights and literature regarding the importance of international classification for K9 units. Standardized training and assessment protocols are necessary to align South African units with global standards, facilitating their participation in international disaster response efforts.

5.3 Legislative Frameworks and Standardization Protocols for Canine Search and Rescue in South Africa: Assessing Current Mandates and Gaps

It was noted that "no legislation guidelines regarding search and rescue K9 exist to my knowledge," pointing to a lack of formal regulations. Challenges were observed due to unregulated training, with mentions that some NPOs "are not properly trained or certified." A gap in knowledge about existing legislation was also highlighted. Additionally, it was noted that there is a lack of awareness of any legislation or SOPs concerning K9 units.

Literature reveals a similar lack of legislative frameworks specifically for canine search and rescue in South Africa, with existing laws more focused on security rather than disaster response (South African Government, Animal Protection Act 71 of 1962). The absence of clear regulations emphasizes the need for new policies and standardized training (Moodley, 2022; Van Niekerk, 2007).

The absence of legislative mandates and standardization protocols for canine search and rescue is a significant gap in South Africa. Structured regulations are needed to guide training and deployment, which could enhance the effectiveness of canine units in disaster response.

5.4 Building Capacity: Strategies for Establishing Dedicated Canine Units in South Africa's National and Provincial Disaster Response Frameworks

The need for agreements among key stakeholders and the importance of the "Disaster Management Act" were highlighted. Emphasis was placed on the need for standardized qualifications, noting that "there should be a qualification in place... that is repeatable and reliable." Recommendations were made for "comprehensive training programs" and "clear protocols for the deployment" of K9 units. Additionally, specialized training was advocated to ensure "a fully functional K9 unit."

The Disaster Management Act 57 of 2002 outlines the government's role in disaster preparedness (Sithole, 2023). Effective integration of K9 units requires clear training standards and legislative support, aligned with international best practices (AFAC, 2019; FEMA, 1999).

Establishing dedicated K9 units requires legislative backing, standardized training, and inter-agency coordination. The insights provided underscore the need for a comprehensive approach to ensure the effectiveness of these units within South Africa's disaster response framework.

5.5 Stakeholder Roles and Responsibilities in Implementing Canine Unit Initiatives for Disaster Response in South Africa

A centralized approach was advocated, suggesting that national disaster management should take the lead. Recommendations included the involvement of QCTO and the private sector for specialized training. Support was also expressed for a collaborative effort involving government agencies, NGOs, and private partners. Emphasis was placed on the role of both provincial and national disaster centers in implementation.

Literature emphasizes the necessity of collaboration among various stakeholders, including the National Disaster Management Centre (NDMC) and relevant government departments, to ensure effective disaster response planning (South African Government, 2023). Coordination between national and provincial levels is critical for robust disaster management (COGTA, 2023).

There is broad agreement on the importance of government involvement, with varying opinions on the extent of private sector participation. A multi-stakeholder approach is necessary, involving both national and provincial authorities alongside private and non-governmental partners to establish effective K9 units for disaster response.

VI. CONCLUSION

The evidence gathered from respondents underscore the critical importance of integrating canine units into South Africa's disaster risk preparedness and response frameworks. While there is a clear recognition of the effectiveness of these units in search and rescue operations, significant gaps remain in legislative support and standardized protocols. To address these gaps, respondents recommend strategic initiatives such as developing comprehensive training programs, establishing formal agreements between key agencies, and fostering collaboration among government, private sector, and community stakeholders. The integration of these canine units could ultimately enhance South Africa's ability to respond to disasters more effectively, aligning with international standards and practices.

This study highlights a significant gap in the integration of canine search and rescue units within South Africa's disaster risk management framework. Specifically, there is a lack of clear legislative and regulatory guidelines, standardized training programs, and national policies defining the role and deployment of these units. While the benefits of international classification and alignment with global standards are acknowledged, the necessary structures for achieving this alignment remain underdeveloped. Further research is recommended to address these gaps, as doing so is essential for enhancing the effectiveness, coordination, and international recognition of South Africa's disaster response capabilities.

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