

Master of Science in Public Health



**Awareness and Response towards Dog Bite
Mediated Human Rabies among Healthcare
Providers of Islamabad, Pakistan**

By

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*(Awareness and Response towards Dog Bite
Mediated Human Rabies among Healthcare
Providers of Islamabad, Pakistan)*

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Declaration

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I understand that plagiarism is the use or presentation of any work by others, whether published or not, and can include the work of other candidates. I also understand that any quotation from the published or unpublished works of other persons, including other candidates, must be clearly identified as such by being placed inside quotation marks and a full reference to their source must be provided in proper form.

This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgments.

I declare that this work has not been accepted in substance for any other degree, nor is it currently being submitted in candidature for any other degree.

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ABSTRACT

Background: Rabies is still a public health concern, particularly in developing countries. In the management of dog bites, immediate and initial assessment of the risk of rabies infection with appropriate interventions such as wound management and subsequent selection of prophylactic antibiotics is critical. Whenever a person is exposed to the rabies virus, it is always lethal unless postexposure prophylaxis (PEP) is given immediately.

Objectives: The objective of this research is to evaluate the awareness of dog bite mediated human rabies among healthcare professionals in Islamabad and their response to it, as well as the association between awareness and response and socio-demographic characteristics.

Methodology: In 2023, a cross-sectional survey with a focus on the healthcare professionals working in Islamabad, Pakistan, was conducted. The non-probability consecutive sampling technique was used to recruit a total of 305 professionals. To collect data, a structured questionnaire was given to every participant who gave their consent. The Chi-square test and binary logistic regression were employed to evaluate associations between factors for categorical variables.

Results: Of the HCPs, 63.3% were male, 66.2% of the professionals were medical doctors and 32.8% had undergone rabies refresher training. Of the HCPs 51.1% had sufficient awareness of rabies and 42.6% gave good response towards managing dog bite wounds. According to the results of the multivariate analysis, professionals who were in 41 to 50 years age group, work experience of ≤ 10 years and having higher qualification were significantly associated with sufficient awareness. For response having higher qualification and attending rabies trainings were statistically significant with (P-value<0.05).

Conclusion: Rabies exposures and fatalities are completely preventable when exposures are recognized and treated appropriately. All healthcare professionals must, therefore, have a thorough understanding of the most recent recommendations for the management of rabies. Healthcare professionals need the appropriate training and education programs in order to manage animal bites effectively. Also, they must be taught how to classify wounds and use rabies vaccines more effectively.

Keywords: Healthcare Providers, Neglected Tropical Diseases, Rabies, Dog bites, postexposure prophylaxis

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Chapter I:

Introduction

Rabies is deliberated as one of the earliest contagious diseases that affects all vertebrates. The cause of the disease is rhabdovirus which is generally spread to humans via bite of a rabid animal (Ahmed et al., 2020). Amid the time period of incubation, the virus multiplies at its point of entry in the body i.e., the muscle tissue. It then gradually travels towards the central nervous system (CNS) via the peripheral nervous system, eventually approaches the brain and persists to reproduce there, persuades pathological and chemical conversions and results in attitude variations. The virus then reaches to the salivary glands, allowing the infected mammal to transfer the virus prior to death from encephalitis (Hennenfent et al., 2018)

Rabies is a completely preventable zoonotic disease but once clinical signs develop its fatal. Bites or scratches of rabid dogs are the cause of approximately 99% of rabies cases in human. Every year thousands of individuals yet die due to rabies even though vaccines, medicines and technologies have long been at hand to avoid death from the disease. (*Rabies*, 2023.)

Fever, spasm and bizarre or unexplained paresthesia at the site of lesion are the early symptoms of rabies. Later on, the virus causes fatal inflammation of the brain and spinal cord when reaches the CNS. The incubation period of rabies is generally 2–3 months but can range from 1 week to 1 year. There are two types of rabies infections, one is furious rabies and the other is paralytic rabies, each of which exhibits unique symptoms. The symptoms of furious rabies include aggressive

behavior, hyperactivity, hydrophobia, and occasionally aerophobia. Cardio-respiratory arrest causes mortality a few days later. A little less dramatic and often lasting longer than the furious version, paralytic rabies accounts for 20% of all human cases. Beginning at the bite or scratch site, gradual muscular paralysis progresses until death due to coma occurs. The fact that this group of rabies infections is frequently misidentified causes the lethal illness to be underreported. (*Rabies*, 2023) (*WHO Expert Consultation on Rabies Third Report*, 2018)

To assess the risk of rabies the doctor needs to determine the type of exposure i.e., saliva exposure to broken skin or mucous membranes and animal involved which may need quarantining or testing the exposing animal. To decide whether post-exposure prophylaxis (PEP) is required, the people possibly exposed to a rabid animal should be instantly examined by a doctor so that the virus amplification could be slower down and stopped by providing PEP in a timely manner.(Birhane et al., 2017) (Geison, 2014.) According to the WHO guidelines on rabies PEP intensive washing with water and soap or detergent or with water alone of the bite wound; rabies vaccine administration; and penetration of rabies immunoglobulin into and around the wound are the three crucial features of treatment instantly after exposure to rabid animals (Tenzin et al., 2012).

In fact, people may not visit the hospital for treatment due to paucity of awareness about rabies or they may not get these lifesaving treatments either owing to the PEP treatment is extravagant or is not easily available specifically for the poor sections of society in most of the developing countries of the world (Hampson et al., 2008). Human and material supplies for basic wound care and rabies prevention are usually severely insufficient or absent in peripheral or village health centers where

majority of these patients are managed, at least primarily (*WHO Expert Consultation on Rabies Third Report, 2018*) Though, rapid, dynamic, comprehensive, sympathetic, culturally sensitive role can yet be played by the health care providers for the rabies case management even with severely insufficient equipment and drugs despite the fact that almost all patients will ultimately die (Tarantola et al., 2016.)

When the diagnosis is certain, case management should be directed at relief, with heavy sedation and refrain from intubation or life-support procedures (Hemachudha et al., 2013). In a pertinent health facility, sufficient hydration, sedation and nursing, ideally in a serene, draft free, silent room, with appropriate emotional and physical assistance, should be available for patients with confirmed rabies (Tarantola et al., 2016)(Daher et al., 2005).

After careful assessment, health care workers who are deemed to be at risk should be given PEP. They should also be reminded of the significance of following protective care guidelines and donning personal protective equipment (standard precautions, such as putting on gloves, glasses, and a mask in case a treatment produces splashes). Pre-exposure prophylaxis (PrEP) is an option that hospitals with a high patient volume for rabies may want to consider for any medical personnel who might be handling such patients. (*WHO Expert Consultation on Rabies Third Report, 2018*) .

Rabies continues to be a public health issue and is correlated with a fatality rate of almost 100% (Jeanpetit et al., 2014). Rabies is prevalent in over 150 countries worldwide and accounts for an approximate 8.6 billion USD of financial deficit and is responsible for more than 59,000 human fatalities per annum (from which 96% of the

affected individuals belong to Asia and Africa). In Southeast Asia the dominant source of transmission of rabies virus to humans are the bites and/or scratches from dogs, and are responsible for 95–99% of rabies cases (Rana et al., 2021). The South Asian Association for Regional Cooperation (SAARC) region, which consists of eight countries including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, is said to be responsible for roughly 45% of the world's human rabies burden (Khan et al., 2019). South Asian rabies endemic countries are divided into three groups based on disease burden, with Pakistan joining India and Bangladesh in the group of high burden countries (Chowdhury et al., 2015). In Sindh, Punjab, Khyber Pakhtunkhwa, and a few districts of Baluchistan (Jafferabad, Naseerabad, and Pishin), which are classified as high-risk areas for rabies by Pakistan's national rabies control program, 25 to 30 new cases of dog bites are admitted to hospitals every day (Yousaf et al., 2012) with an estimated 2000–5000 human cases each year, Pakistan also has one of the highest rates of human rabies in the world (Sultan & Khan, 2013). In Pakistan, the estimated prevalence of rabies is nine per million people in the city of Karachi alone (Nanayakkara et al., 2003).

Most of the fatalities are reported in Asia 59.6% followed by Africa 36.4%, and premature death was the cause of more than 99% of DALYs and 0.8% as a result of adverse events after nerve tissue vaccination. (*WHO Expert Consultation on Rabies Third Report*, 2018). In India the incidence density of human deaths related to rabies generally vary between 20–30 cases per million individuals per annum, in Bangladesh 14 cases per million individuals per annum and in Pakistan 7.0–9.8 cases per million individuals per annum (Ahmed et al., 2020). In Pakistan more than 50,000 cases of dog bite with almost 6000 mortalities are reported yearly which result in high

financial losses as rabies is endemic in the country. The huge strain of fatalities linked with rabies in majority of underdeveloped countries like Pakistan, anticipate the reality of ineffectual human and animal rabies prevention and control programs (*Organization WH: WHO Expert Consultation on Rabies: Second Report: World Health Organization; 2013. - Google Search, 2013.*)

In December 2015, the World Health Organization (WHO), the Food and Agriculture Organization (FAO), the World Organization for Animal Health (OIE) and the Global Alliance for Rabies Control (GARC) jointly congregated a global call for action to work against rabies. In return, to assist rabies endemic countries and in order to expedite their national rabies elimination programs intended to end human deaths from dog-mediated rabies by 2030, a global strategic framework has approved titled 'Zero by 30'. By integrated animal bite management and postexposure prophylaxis (PEP), scaling of mass dog vaccination, and community level educational rabies awareness programs, the rabies key stakeholders including human health, veterinary, and the local government as well as the extended community people will be able to manage the disease in efficient way(Acharya et al., 2021)(Acharya et al., 2020).

The accurate level of awareness and response to counter rabies and treat animal bites is important for care providers, both family members and health professionals (Mapatse et al., 2022). Actually, some of the rising aspects associated to the failure to control and prevent rabies are the gaps in awareness and response among healthcare providers regarding the disease (Ba et al., 2021). Collective research has shown that the awareness and response of practicing physicians related to rabies prophylaxis are inadequate, specifically in the treatment of suspected human rabies

cases (Moran et al., 2000). Awareness and response studies generate baseline data for planning, implementation, and evaluation of national diseases control programs and also can be used for organizing public health awareness campaigns (Espinoza-Gómez et al., 2002). Significant gaps in awareness and response related with rabies can be traced for its control and prevention through this baseline data (Matibag et al., 2007).

In order to improve the quality of life for its residents, any nation must provide high-quality healthcare services. In contrast, primary health care providers on primary health care units, which include medical doctors, nurses, and medical technicians, are the people's first point of contact in nations like Pakistan when they need assistance. More serious cases are then forwarded to secondary and tertiary care facilities for more specialized and intensive care.

Objectives:

- To assess the level of awareness and response to dog bite cases among HCPs for the prevention of human Rabies in Islamabad.
- To evaluate the factors associated with awareness and response towards dog bite mediated human Rabies among HCPs

CHAPTER II:

Literature Review

2.1: Context of the study

This study focuses on human rabies awareness and response in health care professionals who serve as the community's front-line health care providers, working effectively round the clock to ensure people's well-being and treatment. Even in the twenty-first century, the virus remains enzootic in many parts of the world, and human rabies remains one of the most serious and distressing diseases, as well as a significant threat to public health because when a person with rabies develops symptoms, the disease is almost always fatal (Fooks et al., 2017). Rabies exposures and fatalities are entirely avoidable if exposures are properly assessed and treated. So, it is critical for all healthcare professionals to understand current rabies management recommendations for both animals and humans (Hennenfent et al., 2018). Rabies is frequently regarded as a disease of poverty, ignorance, and, in some cases, misinformation (Warrell, 2016). The most significant aspect of this study is that it also addresses the awareness and response to dog bite mediated human rabies among health care providers in basic and rural health units that are easily accessible to the local community. The study's goal is to identify gaps in dog bite mediated human rabies awareness and response among health care workers at all three levels. The age of professionals, their education, their experience, gender, and the designation of the person available are all important considerations, but most importantly, training and capacity building of healthcare providers plays a vital role in raising individual awareness of any disease. The purpose of the study is to identify the factors that

contribute to gaps in health care professionals' awareness and response regarding dog bites that result in human rabies.

2.2: Operational Definitions

2.2.1: Awareness:

Awareness is described as being aware of something's existence or having a current comprehension of a situation or issue based on knowledge or experience (Abel et al., 2017). Each accurate response will be worth 1 point towards the assessment of awareness, while incorrect or partially correct responses will receive 0 points. A binary variable will be used to define awareness of rabies (sufficient vs. insufficient). When the 20-question sum was higher than the mean score, the HCPs were deemed to have sufficient awareness.

2.2.2: Response:

Every action or modification of a state caused by a stimulus is referred to as a response (*Response | Definition of Response by Medical Dictionary, 2023.*) Each correct response will be worth one point, while incorrect responses will receive zero points. A binary score will be created from this value (good vs. bad). The HCPs were considered to have given a good response when the 9-question sum was higher than the mean score.

2.2.3: Dog Bite Mediated Human Rabies:

Rabies is a virus-based disease that is lethal but preventable. If a person or pet is bitten or scratched by a rabid animal, it can spread to them. Dogs continue to carry the rabies virus in many countries, and dog bites constitute the primary cause of rabies-related deaths in humans worldwide. The CNS is infected by the rabies virus. The virus can create a disorder in the brain that will ultimately lead to death if the

right medical care is not given to a person following a possible rabies exposure. Pet vaccinations, avoiding contact with wildlife, and seeking medical attention immediately after probable exposures before symptoms appear can all help prevent rabies (*Rabies* | CDC, 2023.)

2.2.4: Dog Bite Wound Categorization:

Category-I: animal licks on intact skin when being touched or fed which means no exposure.

Category-II: unprotected skin nibbling, tiny scratches or abrasions without bleeding which means exposed.

Category-III: exposures from direct contact with dogs (extreme exposure), single or multiple transdermal bites or scratches, contamination of mucous membrane or broken skin with animal saliva (*Rabies Vaccines and Immunoglobulins: WHO Position April 2018.*)

2.3: Health system of Pakistan

In Pakistan, governmental and private sectors work together to providing healthcare. According to the constitution, the provincial government is primarily in charge of health care, with the exception of areas that are under federal administration. A three-tiered healthcare delivery system and a number of public health interventions

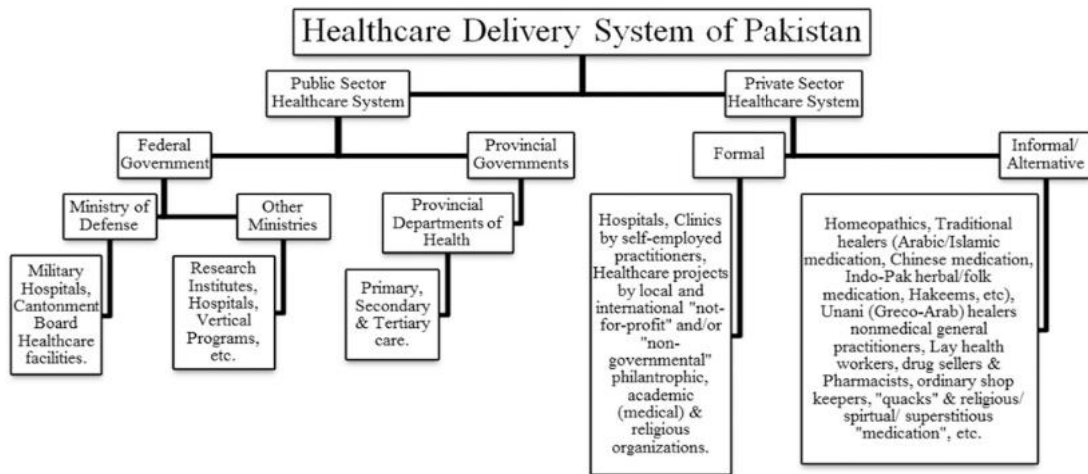


Figure 1: Health care delivery system of Pakistan (Javed et al., 2019)

are used by the public health care system to offer healthcare. Primary healthcare is provided by Basic Health Units (BHUs) and Rural Health Centers (RHCs), which are located at the first level. Secondary care is provided by Tehsil Headquarter Hospitals (THQs) and District Headquarter Hospitals (DHQs), which provide acute, ambulatory, and inpatient care, respectively. Tertiary care is provided by teaching hospitals. Because of the increasing population pressure on state health institutions, the private sector has been able to bridge the gap between expanding demand and inadequate public health facilities. A significant expansion in the number of private hospitals, clinics, and diagnostic labs has occurred, contributing to the country's health services (WHO EMRO | *Health Service Delivery | Programmes | Pakistan*, 2023.).

2.3.1: Primary Health Care:

Every health system that provides integrated, adaptable, accessible, high-quality, and equitable care is built on primary health care (PHC). Since PHC's importance has been recognized recently, both developed and developing economies have demonstrated a growing interest in primary care as a way to fulfil the goal of

providing universal health coverage. Primary care is the first level of care that patients typically receive when they have medical issues or requirements, and it takes a whole-of-society approach that includes health promotion, illness prevention, treatment, rehabilitation, and palliative care (*Primary Health Care*, 2023.).

2.3.2: Secondary Health Care:

Secondary health care refers to the treatment and assistance offered by doctors and other health professionals to patients who have been referred to them for specialized expert care, which is often provided in hospitals. Secondary care services are typically provided in a hospital or clinic, while some may be provided in the community. These could include scheduled procedures, specialist clinics like cardiology or renal clinics, or rehabilitation treatments like physiotherapy. Secondary healthcare specialists include psychiatrists, cardiologists, obstetricians, dermatologists, pediatricians, and gynecologists (*New World Encyclopedia. Health Care - Secondary Care - Google Search*, 2023.).

2.3.3: Tertiary Health Care:

Tertiary care is a level of health care above secondary care that has been defined as highly specialized medical care that is usually provided over an extended period of time and involves advanced and complex diagnostics, procedures, and treatments performed by medical specialists in cutting-edge facilities. Consultants in tertiary care facilities, as a result, have access to more specialized equipment and experience (*Levels of Healthcare - Physiopedia*, 2023.).

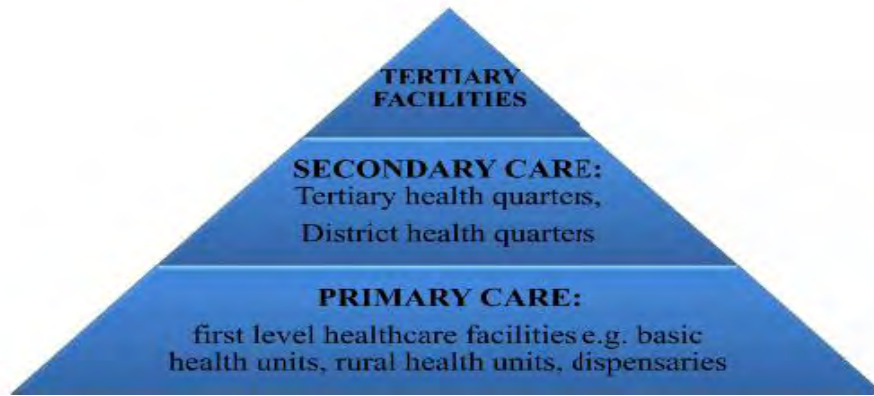


Figure2: Three tiers of health care delivery system of Pakistan

2.4: Health Care Professionals

The ideas and practices of evidence-based medicine and care are applied by health professionals to sustain human health. According to the requirements of the people they serve, health professionals investigate, identify, manage, and prevent human illness, injury, and other physical and mental disabilities. With the ultimate goal of satisfying the needs and expectations of individuals and populations in terms of health and enhancing population health outcomes, they offer advice on or implement preventive and therapeutic interventions as well as promote health (WHO, 2013).

2.4.1: Primary care professionals

A primary care provider (PCP) is a doctor who examines patients with common medical concerns. Most of the time, this person is a doctor. A PCP, on the other hand, could be a physician assistant or a nurse practitioner. PCPs are frequently involved in patient care for an extended period of time. As a result, it is critical to select someone with whom patient will get along well. In non-emergency conditions, a PCP is the initial health care provider. The primary care physician's job is to: provide preventative care and educate healthy lifestyle choices, identify and treat

common medical issues, assess the urgency of your medical problems and lead you to the appropriate place for that treatment, and make referrals to medical specialists as needed (*Choosing a Primary Care Provider: MedlinePlus Medical Encyclopedia*, 2023.).

2.4.2: Secondary care professionals

Secondary care providers (SCPs) are healthcare experts that do not usually have the patient's initial contact but have a higher level of experience in the medical issues that the patient requires treatment for. For example, a patient may seek general health care services from their primary care physician and then be referred to a specialist such as a rheumatologist, urologist, chiropractor, mental health services, clinical psychologist, cardiologist, physical therapist, or pain management expert (*What Is Primary vs Secondary Care? - South Pointe Healthcare*, 2023.).

2.4.3: Tertiary care professionals

In the medical field, tertiary care often refers to hospitalization, which calls for specialized tools and knowledge due to a serious or uncommon medical condition. For some patients, it represents the third point of contact after visits to a primary care physician and a secondary care specialist. Transferring a patient to a larger metropolitan medical facility or one that focuses on advanced or emergent care is occasionally necessary for tertiary care. At this level, tertiary care providers (TCPs) offer a variety of medical services, such as plastic surgery, burn therapy, cardiac surgery, neurosurgery, and cancer management (*What Are Primary, Secondary and Tertiary Levels of Care? | Indeed.Com*, 2023.).

2.5: World view on awareness and response towards dog bite mediated human rabies among healthcare providers

After a suspected bite, healthcare staff are the last line of defense in preventing rabies. Because the majority of those affected are young and active, appropriate treatment will assist to prevent avoidable deaths. Given the near 100% case fatality rate and the availability of preventive vaccines, the purpose of this study was to evaluate the awareness and response of frontline healthcare personnel in relation to the management of patients with dog bite wounds at public health facilities (Kenu et al., 2018). Since properly executed rabies control programs with a One Health approach have been proved to have a favorable influence on public health, it is recommended by earlier research that all professionals engaged have a thorough awareness of current rabies recommendations (Hennenfent et al., 2018).

From July 2014 to April 2015, a cross-sectional study, including 232 HCPs was carried out at 66 public health facilities in the Greater Accra Region of Ghana with the aim of examining frontline healthcare personnel' knowledge and practices regarding the management of patients with dog bite wounds. The findings revealed that 39.2% believed a dog bite to be the cause of rabies, whereas 57.8% correctly identified the rabies virus as its cause. Only 15.5% of people were aware of the rabies incubation period in dogs and the time frame needed to watch for symptoms. Approximately 42.2% of frontline service providers did not know how to administer RIG. The study underlines the importance of HCP capacity-building, such as training in the management of dog bites and associated probable rabies infection (Kenu et al., 2018).

In order to evaluate the knowledge, attitudes, and practices (KAP) of rabies among chosen HCPs, a cross-sectional study including 42 HCPs from eight healthcare facilities was carried out in the Massingir district of Mozambique in 2018. According to the study's findings, only 16.7% of HCPs had good understanding, whereas 33.3% practiced appropriately to treat the condition. The study highlighted the requirement for professionals to undergo training and refresher courses on pre- and post-exposure preventive methods of animal bite-mediated rabies (Mapatse et al., 2022).

In order to evaluate the KAP on rabies among human and animal health professionals, a cross-sectional study was carried out in the Kaffrine district of Senegal in 2021. Of the 95 HCPs who participated in the study, 35.8%, 26.3%, and 45.3% had adequate knowledge, positive attitudes, and good practices in relation to rabies. According to the findings, professionals who worked in cities were more likely to be familiar with rabies. When presented with an animal bite case, professionals who had a good attitude regarding rabies were more likely to have a good practice. The findings imply that in order to change the attitudes and behaviors of health professionals towards rabies, improving their knowledge of the disease is crucial (Ba et al., 2021).

In 2013, a KAP survey of 116 HCPs in Pétionville, Haiti was undertaken to better understand HCPs' perceptions of rabies. The majority of HCPs (98%) agreed that dogs were the primary reservoir for rabies. 73% of responders identified bites as a mode of rabies transmission, while 20% reported saliva exposure. Thirty-four percent of HCPs said they would wash a bitten site with soap and water, and 2.8% said rabies vaccination was part of their PEP. Less than 15% of HCPs had ever undergone rabies preventive training, and 77% had no idea where to get rabies vaccine for bite cases.

The study recommended that HCPs receive more rabies preventive training, and that distribution mechanisms for rabies vaccines be examined (Fenelon et al., 2017).

A survey was carried out in 2016 in three districts of Bangladesh to determine the level of KAP towards rabies among the general public, HCPs, and veterinary professionals. Only 65% of the 211 HCPs who participated in the survey believed that seeking medical advice and getting a post-exposure vaccine should be the first lines of treatment after coming into contact with animals. According to the WHO's classification of animal bites, 23% of HCPs lacked the knowledge, and 12% lacked the skills necessary to properly manage an animal bite. The study found that there has been a significant need for HCPs and VPs to receive appropriate training in order to effectively manage the incidence of animal bites in humans and animals (Rana et al., 2021).

Inadequate HCP awareness might lead to inaccurate PEP recommendations and a higher risk of harmful effects. An investigation was carried out in December 2016 to gauge the level of rabies knowledge among HCPs and veterinarians working in Washington, DC. In total 952 doctors and 125 veterinarians participated. Physicians were less likely than veterinarians to choose the appropriate vectors and clinical symptoms in animals. Doctors were more likely to choose the appropriate transmission paths. Only 49% of doctors correctly identified the PEP administration site and 39.4% correctly identified the PEP schedule. All HCPs should be aware of the most recent recommendations due to the lethal nature of rabies. As a link between human and animal HCPs, health departments can help to reduce the gaps (Hennenfent et al., 2018).

In 2013, 147 animal and human health practitioners participated in a cross-sectional study in Uganda's Mbale District to evaluate the KAP for rabies control. Only 44% of the respondents had adequate understanding about rabies, and minimal good practices were adopted by 50% of respondents. Knowing more about rabies enhanced respondents' likelihood of having a good attitude towards rabies management, and having a positive attitude increased respondents' likelihood of implementing proper management techniques. The study indicated that district leaders should conduct rabies refresher trainings on a regular basis to improve staff attitude and comprehension, as well as their rabies management procedures. To reduce the spread of the disease, the district should execute the One Health rabies control strategy (Monje et al., 2020).

In 2015, another cross-sectional survey with 270 HCPs was carried out in four health districts of Chad to determine the level of KAP. According to the findings, 87% of HCPs defined rabies as a disease transferred from dogs to humans. The dog (96.7%), cat (68.9%), and other animals (35%), were the principal reservoirs of rabies. HCPs thought the virus was spread through bites (99.3%) and scratches (50%). Prompt wound cleansing was indicated as a practice by 65.2% of responders. Based on collaboration between the human and veterinary health sectors, the study suggested continuous trainings to enable HCPs to acquire knowledge about the role of cats and the importance of scratching in the spread of rabies virus, the need for wound cleaning, and proper bite management (Mindekem et al., 2018).

In November 2018, a study was done to investigate rabies awareness and management among 73 HCPs in rural eastern Kenya. According to the findings, only 11% of HCPs delivered PEP intramuscularly. Fewer than a quarter of the HCPs were

aware of the WHO classification of bite wounds. For category I exposures, 18% of HCPs said they would administer PEP. Only one of six people who had a consultation for acute encephalitis thought rabies was a possibility. In order to help rabies elimination initiatives, the study recognized two essential needs: expanding access to PEP and using it properly, including conducting the proper risk assessments after bites. For effective rabies eradication in Africa, the study stressed upon the necessity for international and domestic funding plans that address these inadequacies in the human health sector (Chuchu et al., 2022).

To evaluate the KAP of general practitioners (GPs) as described in the literature from various countries published between July 2016 and February 2021 about dog bite management, a narrative review was conducted. According to the literature, a large number of GPs were ignorant of rabies' cause, agent of transmission, sites of attack, and incubation period. It is concerning because there was a glaring ignorance of rabies immunization. They were ignorant of the vaccines, the location where administered, the recommended vaccination schedule. Even though it is not recommended, many doctors opted to wrap the wound. The primary causes of this lack of understanding were a blatant ignorance of the WHO recommendations, a lack of interest for administering the rabies vaccine, and GPs' carelessness in periodically updating their expertise and learning about new and impending vaccines. Lack of public health resources and knowledge, restricted access to control, lack of vaccination testing facilities, and lack of rabies surveillance are the main causes of rabies mortality in various regions (Ul Hassan Shah Gillani et al., 2023).

In order to assess how familiar, the HCPs are with rabies prophylaxis, a study was carried out in 2014 at three distinct tertiary care teaching hospitals in Mangalore,

India, with the participation of 96 doctors. The majority of participants in the survey were aware of the proper intramuscular anti-rabies vaccine regimen for PEP, but fewer than half could tell the difference between the intramuscular and intradermal regimens. Only about half of the participants were aware of the benefits of administering anti-rabies serum locally. The study concluded that increasing clinical community competence on WHO-recommended rabies prophylaxis through recurring comprehensive medical education, workshops, and hands-on training is necessary for the successful implementation of rabies elimination strategy (Holla et al., 2017).

Another study was conducted in 2015 to evaluate the level of KAP related rabies prevention among 162 HCPs from district Dehradun of Uttarakhand, India. According to the findings, the majority of survey participants (60%) scored in the middle in terms of their understanding of disease and its prevention. Each participant was familiar with the disease's symptoms and method of transmission. The majority of individuals (83%) are unaware of PrEP and anti-rabies immunoglobulin (80%). Some HCPs lacked the necessary understanding to administer the full course of human and pet vaccinations. The study concluded that HCPs need to be made more aware of the need for rabies prevention and control so that their understanding may be improved and their positive attitudes can be turned into effective practices (Kishore et al., 2015).

Another study was undertaken in 2016 with the goal of assessing knowledge and practice about animal bite management among 386 resident doctors at Government Rajindra Hospital Patiala, Punjab. According to the findings, senior residents (SRs) and junior residents (JRs) from the government cadre had slightly superior knowledge and practices than fresh residents. Surprisingly, the majority of

experienced government doctors (63.7%) had average, 30% had low, and only 5% had a high knowledge and practice score. A similar pattern was observed in government cadre JRs. According to the research, the state health department and medical colleges should work together to launch reorientation initiatives and continued medical education (CME) about animal bite management (Malhotra et al., 2017).

In 2017, a study was conducted among 95 medical officers in the district of Solapur of Maharashtra, India, with the goal of examining KAP associated to animal bites spreading rabies. The findings show that none of them had rabies prophylaxis training. Participants had sufficient understanding of Category III, Category II, and Category I of the WHO classification of animal bites, with a knowledge rate of 69.5%, 47.4%, and 42.10% respectively. Only 4.21% of participants knew about PrEP, and only 29.47% of participants knew enough about the schedule for intradermal vaccinations. Almost 81% of people practiced immediate wound washing. The report recommended making an effort to highlight the significance of PEP management through regular reorientation sessions (Jidge et al., 2019)

Another study was undertaken in 2020 to analyze the KAP of rabies prophylaxis among medical officers of 30 anti-rabies vaccine (ARV) clinics in Mumbai, India. According to the research, all of the clinics were adequately equipped and manned. There was no scarcity of vaccination in any of the facilities. Patients were counselled in all ARV clinics, however there was a lack of patient education resources. Medical officers had good understanding of ARV dose, route of administration, site of immunization, and vaccination schedule. Immunoglobulin understanding was inadequate. The study advised that all ARV clinics be given with

adequate health education material on rabies prevention and anti-rabies prophylaxis for patient counselling (Pasi et al., 2021).

At the International Family Physicians Conference held at the Aga Khan University in Karachi, Pakistan, a survey was undertaken to evaluate family doctors' awareness on tetanus and rabies. According to the findings, out of 111 doctors, 65% were aware of the most recent recommendations for rabies vaccination, while 58% were aware of the proper PEP in the event of a suspected rabies case. The investigation came to the conclusion that there was a clear lack of understanding regarding tetanus and rabies. The insufficient training of medical schools on these significant diseases, lack of reading habits and the absence of government-sponsored programs for CME appear to be the causes of these knowledge gaps (SJ et al., 2014).

In 2017, 92 general practitioners (GPs) in district Malir of Karachi, Pakistan participated in a cross-sectional study to evaluate their understanding of and practices related to managing dog bites. According to the study, average knowledge scores changed considerably among experience groups, with less experienced practitioners having significantly greater average knowledge than seniors. However, none of the sociodemographic factors examined had an impact on the practice results. The study recommended that all stakeholders enhance GPs' current awareness and response related to dog bite management, with a particular emphasis on those who are not recent graduates and therefore require updated information (Jan et al., 2020).

In 2020, a mixed-method study was conducted with 102 HCPs in the district of Sargodha, Pakistan, with the goal of evaluating the awareness and response of HCPs from the perspective of One Health. Among HCPs, 31.8% correctly identified

the PEP protocol. HCPs had fair understanding of the pathogenesis, reservoir, route of transmission, and endemicity of rabies, but they lacked the necessary abilities for managing and treating animal bites. One Health approach acceptance was inversely correlated with clinical experience. HCPs must be reminded of the benefits of integrated systems like One Health and get CME in order to promote collaboration and close skill gaps in the face of zoonotic diseases (Shan et al., 2023).

Another study was done to analyze the level of awareness and response of emergency care workers in Peshawar's tertiary care hospitals in order to find areas for improvement in 2022. According to the report, only a small percentage of HCPs have worked in rabies management. Although very few HCPs were trained to control the disease, 91% of respondents were aware that the disease is transmitted by dogs. A significant number of respondents were ignorant that if a rabid dog attacks a person, there is a complete treatment; others were aware that cure is feasible using various control measures such as PEP and RIG. For Pakistan to effectively control and prevent the spread of rabies, it was proposed by the study that urgent investments be made in improving the country's health care system and rabies disease surveillance (*Ahmad, Adnan and Rasul, Shaista and Ullah, Mati and Ullah, Noor and Zeb, Asif and Khan, Imran and Ahmad, Zakir and Rehman, Atta Ur and Inayat, Fawad, Knowledge, Attitude and Practices of Health Care Professionals Regarding Rabies, from Peshawar Pakistan. Available at SSRN: - Google Search, 2023*)

2.6: Conceptual framework for study:

It is stated that understanding the severity of the disease, having the right information, and the right mindset are crucial for delivering an effective treatment. HCPs who ask for assistance are more likely to accurately understand patients'

requirements because without a good awareness of their own situation, they are unable to offer the proper assistance. The following conceptual framework can be used to measure HCPs' awareness of rabies and gauge their level of response.

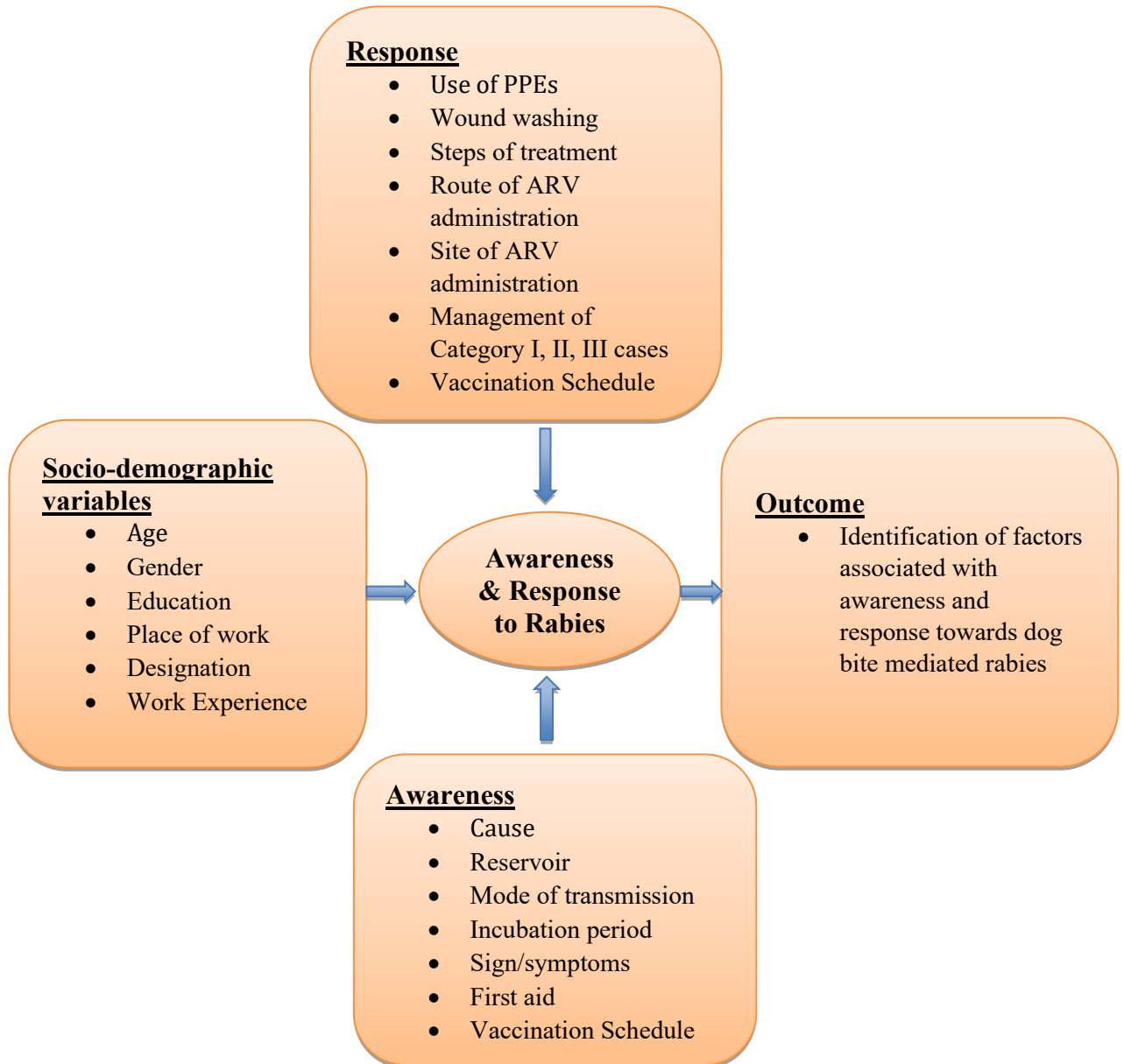


Figure 3: Conceptual framework

2.7: Rationale:

Rabies is a major zoonotic disease that takes 11th position in fatal contagious diseases globally. In Southeast Asia 99% of rabies in humans occurs due to dog bites/scratches with a fatality rate of almost 100%. Some of the rising aspects associated to the failure to control and prevent rabies are the gaps in awareness and response among HCPs. The accurate level of awareness and response to counter rabies and treat animal bites is important for high-risk groups i.e., care takers at home and the HCPs directly dealing with the cases. So, the purpose of this study is to evaluate HCP's awareness of and response towards dog bite-mediated human rabies, as they are also at risk of the disease. This study's findings will be helpful to identify significant gaps in awareness and response related with rabies for its control and prevention and also to plan future rabies control policies and trainings for HCPs. To the best of our knowledge, no detailed study has been organized to elaborate the factors associated with awareness and response of HCPs at all levels (primary, secondary and tertiary) with dog bite mediated human rabies.

CHAPTER III:

RESEARCH METHODOLOGY

3.1: Study Design

A cross sectional study was carried out in order to assess the level of awareness and response to dog bite cases among HCPs for the prevention of human Rabies in Islamabad.

3.2: Study setting

This study was carried out in Islamabad. Islamabad is divided in to five zones and further divided into 50 union councils (UCs) (*PERCENTAGE CHANGE REGISTERED VOTERS-ICT, 2023.*). The 19 health centers under the supervision of the health department Islamabad Capital Territory (ICT) are all located in rural parts of Islamabad (3 RHCs, 15 BHUs, and 1 Dispensary). In addition to the four public hospitals (Pakistan Institute of Medical Sciences (PIMS), Federal Government Services Hospital (Polyclinic), CDA Hospital, and Federal General Hospital (FGH), there are 64 dispensaries and health centers (*Islamabad Capital Territory Health Strategy 2019-23 MoNHSRC 2018.Pdf - Google Search, 2023.*)

3.3: Study population

The study population consisted of health care providers of primary/secondary/tertiary setting of public sector health facilities of Islamabad including

- Medical doctor
- Nurses

3.4: Eligibility criteria for the study population

3.4.1: Inclusion Criteria:

- A health professional qualified as a medical doctor or nurse
- Present and employed for at least two years in public healthcare settings in Islamabad
- Willing to participate in the study at the time of the survey.

3.4.2: Exclusion Criteria:

- All the staff except medical doctors and nurses working in public sector healthcare settings of Islamabad
- All the medical doctors and nurses working outside public sector healthcare settings of Islamabad
- Those not willing to participate in the study at the time of the survey will be excluded

3.5: Study Duration:

This study is completed in a period of six months from September 2022 to February 2023 started after IRB approval from department.

3.6: Sampling technique:

List of all public sector healthcare care facilities (BHUs, RHCs and dispensaries) and hospitals of Islamabad was obtained from District Health office (DHO) and District Health Information System 2 (DHIS-2). Then the study participants were selected through Non-Probability Consecutive sampling technique at the study settings.

Table 1: Figures of Islamabad

Figures of Islamabad	#
Number of Zones	5
Number of union councils	50
Total population	2006572
Number of BHUs	15
Number of RHCs	3
Dispensaries/ Health Centers	64
Number of Hospitals	4
Total number of doctors	2800
Total number of nurses	759

3.7: Sample size calculation

According to obtained information from DHO and existing literature, there are 3559 total registered health care professionals working in Islamabad, including doctors and nurses. We calculated the sample size with help of Epi Info version 7.2.5.0 (*Epi InfoTM | CDC, 2023.*)

- Margin of error at 5%
- Confidence level 95%
- Expected frequency 31.8%
- Population size 3559 so the calculated sample size was **305**.

3.8: Data Collection Procedure:

Pilot study: A pilot study with 20 participants was carried out to assess the validity of the questions and identify any revisions that would improve the questionnaire's quality. Before being disseminated, the questions underwent a thorough evaluation to ensure that their genuine intentions were conveyed.

Informed Consent: Consent was obtained from each participant after providing them with information about the study and their right to confidentiality and having the consent form signed. For participants, the tool was later translated from its original English language to Urdu. The questions are divided in three sections: the first has 12 socio-demographic questions, the second has 20 awareness questions, and the third has 9 response questions.

3.9: Data Collection Tool:

3.9.1 Socio-demographics:

The data collection tool was adapted from a study conducted in Senegal (Ba et al., 2021). Section A included socio-demographics which include questions such as place of work, gender, age, type of health facility, education level, job title, years in service and area of residence and previous trainings regarding animal bite wound/rabies management.

3.9.2: Awareness:

Twenty items were included in the questionnaire to gauge HCPs' awareness about rabies. In this study, it was crucial to approach rabies holistically—from the source of infection to management. The following were the questions regarding rabies awareness: knowledge of the disease's cause, major reservoirs, mode of transmission,

categories of people most at risk, period of canine contagiousness, incubation period, signs/symptoms in humans, preventive measures, first aid given to a patient who has been bitten/scratched by a suspected rabid animal, prevention of rabies after an animal bite, and vaccination programs.

3.9.3: Response:

There are nine questions in the response section of the questionnaire: "Wash the wound(s) quickly with soap and water, a detergent, and then rinse thoroughly with pure water for at least 15 minutes," "Prevent tetanus," "Assess the Risk of Rabies Infection," "Categorize the Case," "Start PEP If Necessary," and "Notify by Filling Out a Declaration Form."

The researcher visited the healthcare facilities to find volunteers and conducted each face-to-face interviews to gather data. Through the pre-testing tools, scanning, and real-time monitoring the data collection process, data quality control was ensured.

3.9.4: Plan of Analysis:

Before importing the data into SPSS version 22, Excel was used to manage the data. Data were collected via a paper questionnaire; therefore, it was carefully stored. To assess how HCPs reacted to each independent variable and the two dependent variables, descriptive and inferential statistics were used to examine the results. For descriptive analysis, the qualitative variables were described using frequencies and percentages, while the quantitative variables were described using the mean and its standard deviation.

According to the conditions of applicability, bivariate analyses utilizing the Chi2 test and Fisher's exact test were carried out for the inferential component. With an alpha risk of 5%, these tests were employed to look for pairwise associations. The comparisons made were as follows:

- Awareness as dependent variable and socio-demographic characteristics as independent variable.
- Response as dependent variable and socio-demographic characteristics plus awareness as independent variable

Binary logistic regression was used to account for confounding variables. Our models took into account every variable that was employed in the bivariate analysis. The Hosmer-Lemeshow test (Hosmer & Lemeshow, 2005) was used to gauge how well the model fit the data. The model likely fit the data well and the factors obtained were significant predictors of the degree of rabies awareness reported in the study if the p-value from the goodness of fit test was greater than 0.05. The adjusted odds ratios (AOR) and their respective confidence intervals (CI) were calculated using this multivariate analysis.

3.9.5: Ethical Consideration:

Every ethical requirement was fulfilled. The Al-Shifa Eye Trust's ethical review board (ERB) gave its approval before the full procedure started. The scope and objective of the study were explained to the participants at each stage after the researcher was introduced during data collection. They were made aware that participation was optional, and that only those who expressed an interest were recruited. They gave their permission by signing the consent form, and the

questionnaires were then filled out. They received assurances that their responses would remain anonymous and that they would only be used for research.

CHAPTER IV:

RESULTS

4.1: Descriptive results

4.1.1: Socio-Demographic Characteristics

A total of 305 participants with a 100% response rate were included in this study. Of the health professionals who participated in the survey, 63.3% were male. Urban residents made up 60% of the sample, and the majority of respondents 83.9% were less than the age of 40. The professionals had been in service on average for 6.3 ± 5.1 years and 74.8% were in service for less than ten years. In addition, 66.2% of the professionals were medical doctors, 54.8% were working in a tertiary care facility and 32.8% had undergone rabies refresher training (**Table:2**).

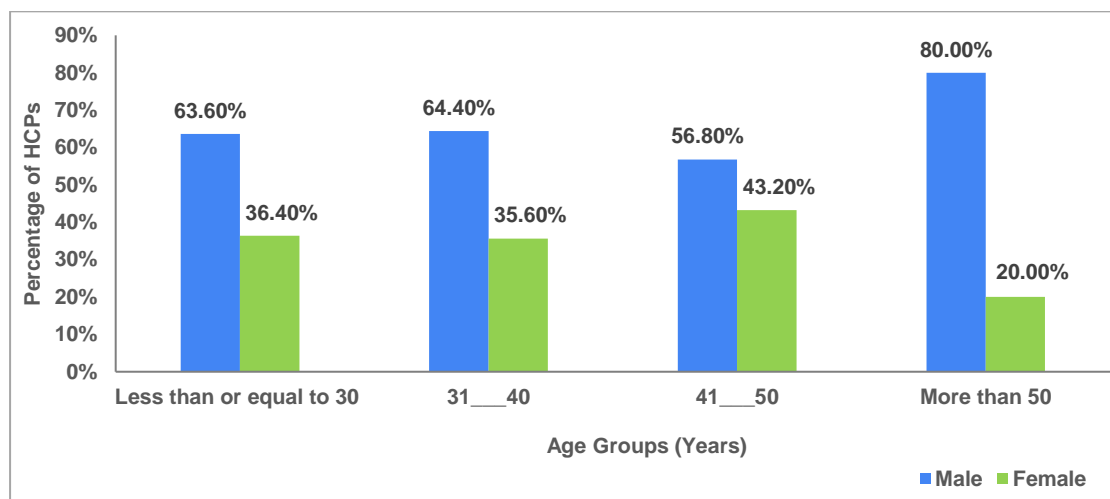


Figure 4: Gender wise age group distribution of health care workers

There were more than 80% of the male health professionals in the age group of more than 50 years and the maximum 42.2% of the female health professionals were in 41 to 50 years of age group (**Figure 4**).

Among HCPs who did not receive any training or refresher course on animal bite mediated human rabies, 67.10% had less than ten years of work experience and 59.7% had more than 10 years of work experience (**Figure 5**).

Table 2 Distribution of health professionals by socio-demographic characteristics (n = 305)

Characteristics	Frequency	Percentage
Gender:		
Male	193	63.3%
Female	112	36.7%
Age Groups		
Less than or equal to 30 years	107	35.1%
31__40	149	48.9%
41__50	44	14.4%
More than 50	5	1.6%
Residence:		
Urban	183	60.0%
Rural	122	40.0%
Profession		
Doctor	202	66.2%
Nurse	103	33.8%
Job Status:		
Regular	241	79.0%
Contractual	62	20.3%
Daily Wages	2	0.7%
Type of Health Facility:		
Primary Care	49	16.1%
Secondary Care	89	29.2%
Tertiary Care	167	54.8%
Year in Service		
≤10 Years	228	74.8%
>10 Years	77	25.2%
Post-graduation:		
Yes	174	57.0%
No	131	43.0%
Work Area:		
Urban	286	93.8%
Rural	19	6.2%
Previously Attended Rabies Training or Refresher Courses		
Yes	100	32.8%
No	205	67.2%

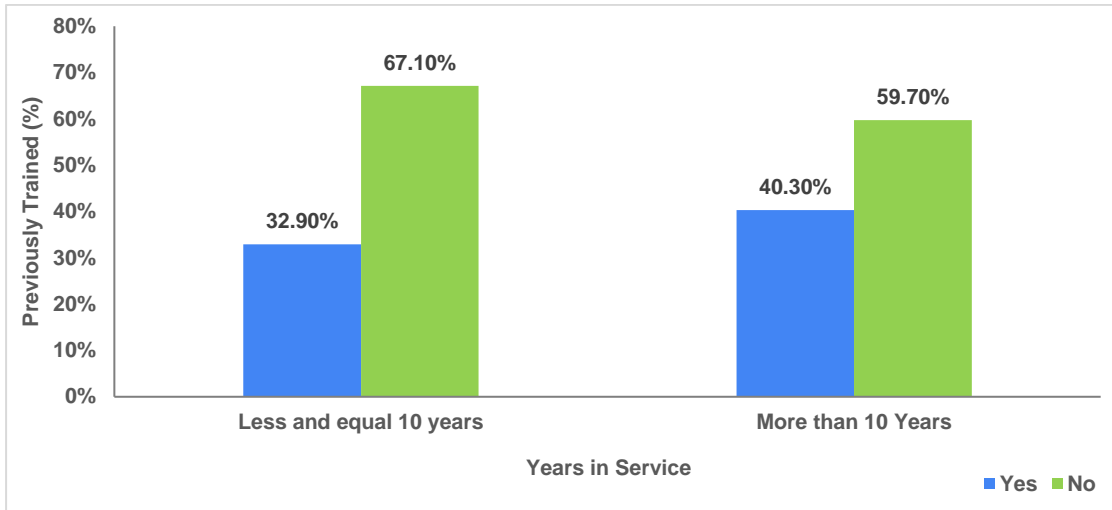


Figure 5: Distribution of health professionals according to years in service and previously attended rabies training

Out of the total, 67.8% of the doctors were in the age group 31 to 40 years and majority of the nurses 40% were more than 50 years old (Figure 6).

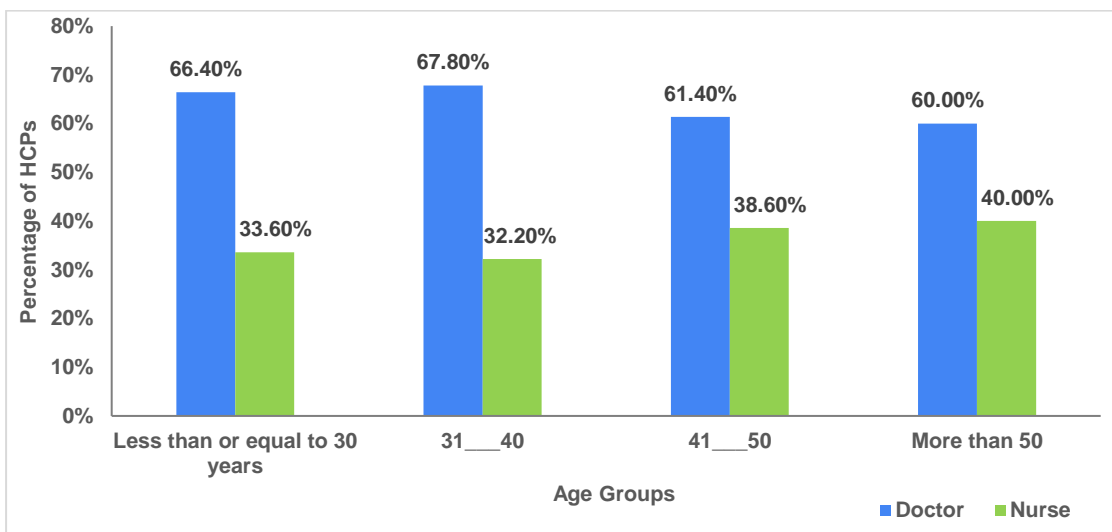


Figure 6: Distribution of healthcare providers according to age and profession

4.1.2: Awareness

According to the study, 7.5% of professionals were well-aware about rabies. The rest of the professionals were unsure if they were aware of the virus.

Professionals had a good understanding of the pathogen that causes rabies, the species affected by rabies, the routes of transmission of rabies, and the first assistance offered to patients following a bite from a suspected rabid animal, with proportions exceeding 70%. Professionals, on the other hand, had limited awareness of the groups of individuals most vulnerable to rabies and the vaccination regimen for animals and humans against rabies (**Table:3**).

The average score of the professionals' awareness of rabies was 7.40 ± 2.39 . The score ranged from 1 to 15. The average awareness score among medical doctors was 7.59 ± 2.38 ranged from 2 to 15, while among nurses it was 7.02 ± 2.38 ranged from 1 to 14. Professionals with sufficient rabies awareness made up 51.1% of the study's participants.

Table:3 Distribution of HCPs according to rabies knowledge characteristics

Characteristics	Frequency	Percentage
1. Do you know about Rabies?		
Yes	23	7.5%
No	282	92.5%
2. What type of pathogen causes Rabies?		
Virus	264	86.6%
Bacteria	18	5.9%
Mushroom	8	2.6%
Pests	6	2.0%
Don't know	9	3.0%
3. What are the main reservoirs of Rabies?		
Many wild and domestic canids and other mammals	194	63.6%
All animals	62	20.3%
Only domestic canines	15	4.9%
Only wild canids	13	4.3%
Don't know	21	6.9%
4. What species does Rabies affect?		
All mammals	180	59.0%
Humans only	46	15.1%
Dogs only	66	21.6%

Other	8	2.6%
Don't know	5	1.6%
5. How is Rabies transmitted? (Multiple choices)		
Bite from an infected animal	257	84.3%
Scratch of an infected animal	64	21.0%
Contact with the animal's skin	31	10.2%
Licking on a wound by an infected animal	80	26.2%
Don't know	7	2.3%
6. Which Groups of people are most prone to animal bites?		
Children	102	33.4%
Young people	29	9.5%
Adults	16	5.2%
All groups	156	51.1%
Don't know	2	0.7%
7. What is the incubation period for Rabies in animals?		
1 to 3 days	122	40.0%
10 days to 2 months or more	90	29.5%
25 days to 150 days or more (5 months)	62	20.3%
Other	8	2.6%
Don't know	23	7.5%
8. List the signs of Rabies in animals? (Multiple Choices)		
Change in behavior by hiding in dark corners	178	58.4%
Aggressiveness with a loss of distrust for humans	146	47.9%
Profuse salivation	110	36.1%
Tendency to convulse	81	26.6%
Paralysis	36	11.8%
Other	10	3.3%
9. How long is Rabies contagious in dogs?		
3–7 days	147	48.2%
One month	33	10.8%
One year	52	17.0%
Other	11	3.6%
Don't know	62	20.3%
10. What Is the Incubation Period for Rabies in Humans?		
2–3 months	154	50.5%
3–4 days	59	19.3%
7–9 days	44	14.4%
Other	14	4.6%
Don't know	34	11.1%

11. List the signs of Rabies in humans? (Multiple Choices)		
Fever	152	49.8%
Pain or tingling	106	34.8%
Headache; Dizziness	79	25.9%
Nausea; Vomiting	60	19.7%
Paresthesia	49	16.1%
Delusions	64	21.0%
Convulsions	101	33.1%
Anxiety	81	26.6%
Hydrophobia	106	34.8%
Aerophobia	70	23.0%
Paralysis	54	17.7%
12. What are the ways to prevent Rabies? (Multiple Choices)		
Vaccination of pets against rabies	236	77.4%
Raising community awareness about rabies	156	51.1%
Active surveillance of rabies in animals	102	33.4%
Detention and 15 days clinical observation for any healthy-looking dog or cat known to have bitten a person	92	30.2%
Immediately submit intact heads of presumed rabid animals packed in ice to a laboratory	59	19.3%
Immediately put down unvaccinated dogs or cats bitten by a known rabid animal	65	21.3%
Don't know	10	3.3%
13. What is the first aid given to a patient after a bite/scratch from a suspected rabid animal?		
Immediate and thorough cleansing of the wound with soap and water, followed by ethanol or iodine	248	81.3%
Suturing the wound	18	5.9%
Categorize the wound then manage accordingly	27	8.9%
Don't know	12	3.9%
14. Touching or feeding animals, licks on intact skin		
CAT-I	173	56.7%
CAT-II	38	12.5%
CAT-III	25	8.2%
Don't know	69	22.6%
15. Nibbling of uncovered skin, minor scratches/abrasions without bleeding		
CAT-I	116	38.0%
CAT-II	88	28.9%
CAT-III	37	12.1%
Don't know	64	21.0%

16. Single transdermal bites or scratches, licks on broken skin		
CAT-I	102	33.4%
CAT-II	69	22.6%
CAT-III	85	27.9%
Don't know	49	16.1%
17. Multiple transdermal bites or scratches, licks on broken skin		
CAT-I	90	29.5%
CAT-II	58	19.0%
CAT-III	96	31.5%
Don't know	61	20.0%
18. Contamination of mucous membranes on broken skin with saliva		
CAT-I	108	35.4%
CAT-II	44	14.4%
CAT-III	80	26.2%
Don't know	73	23.9%
19. What is the vaccination regime/schedule for pets against Rabies?		
Once a year	125	41.0%
Once every 2- or 3-years	66	21.6%
Once in a lifetime	63	20.7%
Don't know	51	16.7%
20. What is the vaccination schedule for humans against Rabies?		
Once a year	67	22.0%
Vaccinate high-risk groups	96	31.5%
Once every 2 years	26	8.5%
Once in a lifetime	35	11.5%
Other	27	8.9%
Don't know	54	17.7%

4.1.3: Response

According to the study, 44.3% of professionals were using appropriate PPEs while managing a case of rabies. Professionals had a good response regarding wound washing and steps of management of a dog bite case, the management of category III dog bite case and the reporting of animal bite cases to concerns, with proportions

exceeding 50%. Professionals, on the other hand, had poor response regarding category I and II dog bite case (**Table:4**).

The average score of the professionals' response towards dog bite mediated human rabies was 5.20 ± 1.64 . The score ranged from 1 to 9. The average response score among medical doctors was 5.18 ± 1.73 ranged from 1 to 9, while among nurses it was 5.24 ± 1.44 ranged from 1 to 9. Professionals with good animal bite response made up 42.6% of the study's participants.

Table:4 Distribution of HCPs according to rabies response characteristics

Characteristics	Frequency	Percentage
1. What PPEs do you use during managing the case of dog bite?		
Gloves	121	39.7%
Gloves, gown, face mask	135	44.3%
Gloves & face mask	33	10.8%
None	16	5.2%
2. How do you wash the wound of dog bite?		
Washing wound with soapy water	86	28.2%
Washing wound with soapy water and antiseptic	153	50.2%
Applying antiseptic only	31	10.2%
Wound suturing	5	1.6%
None	16	5.2%
Don't know	14	4.6%
3. Which steps of management do you keep in mind while treating a dog bite case?		
Wash the wound(s) quickly with soap or detergent and water then rinse thoroughly with clean water for at least 15 min	185	60.7%
Disinfect by applying an antiseptic solution (70°C alcohol or Polyvidone iodine)	52	17.0%
Preventing tetanus	25	8.2%
Assessing the risk of rabies infection	8	2.6%
Categorize the type of bite	11	3.6%
Start post-exposure prophylaxis if appropriate and according to the chosen protocol recommended by WHO	15	4.9%
None	3	1.0%
Don't know	6	2.0%

4. How do you manage a category-I dog bite case?		
Wound management and vaccination	134	43.9%
Wound management, vaccination and Rabies Immunoglobulin	111	36.4%
None	35	11.5%
Don't know	25	8.2%
5. How do you manage a category-II dog bite case?		
Wound management and vaccination	116	38.0%
Wound management, vaccination and Rabies Immunoglobulin	139	45.6%
None	17	5.6%
Don't know	33	10.8%
6. How do you manage a category-III dog bite case?		
Wound management and vaccination	63	20.7%
Wound management, vaccination and Rabies Immunoglobulin	175	57.4%
None	28	9.2%
Don't know	39	12.8%
7. How do you administer anti rabies vaccination?		
Intramuscular	179	58.7%
Intradermal	93	30.5%
Intravascular	33	10.8%
8. Where do you administer anti rabies vaccination?		
Deltoid	158	51.8%
Thigh	36	11.8%
Gluteus maximus	69	22.6%
Abdomen	35	11.5%
None	7	2.3%
9. Do you report the bite, scratch, lick or any other aggression by a suspected animal to any concerns?		
Yes	210	68.9%
No	95	31.1%

4.2: Bivariate Analysis

4.2.1: Awareness

The proportion of medical doctors out of professionals surveyed in the study, who had sufficient knowledge about rabies was 55.4%, while the proportion was

42.7% among nurses. Level of awareness and profession of the participants were significantly associated with (P-value < 0.05) The proportion of professionals with less than or equal to 10 years of service and who had sufficient awareness about rabies was 44.7%. This proportion was 70.1% among professionals with experience of more than 10 years. Level of awareness and experience of HCPs were significantly associated with (P-value < 0.001). The proportion of HCPs who were post-graduates and had sufficient awareness about rabies was 58.6%, while this was 41.2% for those who were not post-graduates. Higher education and awareness level were associated with (P-value < 0.05). Similarly, there was association among level of awareness and those who previously attended rabies trainings or refresher courses i.e., (P-value < 0.05). HCPs who previously attended rabies trainings and had sufficient awareness were 43% while the proportion was 55.1% among those who did not receive any training regarding animal bite management or rabies **(Table:5)**.

4.2.2: Response

The proportion of professionals with post-graduate qualification who gave good response in dealing with animal bites was 47.70%. This proportion was 35.9% among professionals without post-graduate qualification. Post-graduate qualification and response level were significantly associated with (P-value < 0.05). HCPs who previously attended rabies trainings and gave good response were 29.2% while the proportion was 49.7% among those who did not receive any training regarding animal bite management or rabies. There was association among level of response and those who previously attended rabies trainings or refresher courses i.e., (P-value < 0.05). **(Table:6)**.

Table:5 Distribution of professionals according to their awareness about rabies and socio-demographic characteristics

Characteristics	Sufficient Awareness	Insufficient Awareness	P-value
Gender:			
Male	91 (47.2%)	102 (52.8%)	0.067
Female	65 (58%)	47 (42%)	
Age Groups			
Less than or equal to 30 years	59 (55.1%)	48 (44.9%)	0.186
31 ___ 40	78 (52.3%)	71 (47.7%)	
41 ___ 50	16 (36.4%)	28 (63.6%)	
More than 50	3 (60%)	2 (40%)	
Residence:			
Urban	95 (51.9%)	88 (48.1%)	0.743
Rural	61 (50%)	61 (50%)	
Profession			
Doctor	112 (55.4%)	90 (44.6%)	0.035*
Nurse	44 (42.7%)	59 (57.3%)	
Job Status:			
Regular	123 (51%)	118 (49%)	0.226
Contractual	33 (53.2%)	29 (46.8%)	
Daily Wages	0 (0%)	2 (100%)	
Type of Health Facility:			
Primary Care	22 (44.9%)	27 (55.1%)	0.581
Secondary Care	45 (50.6%)	44 (49.4%)	
Tertiary Care	89 (53.3%)	78 (46.7%)	
Year in Service			
≤10 Years	102 (44.7%)	126 (55.3%)	<0.001*
>10 Years	54 (70.1%)	23 (29.9%)	
Post-graduation:			
Yes	102 (58.6%)	72 (41.4%)	0.003*
No	54 (41.2%)	77 (58.8%)	
Work Area:			
Urban	147 (51.4%)	139 (52.6%)	0.734
Rural	9 (47.4%)	10 (48.6%)	
Previously Attended Rabies Training or Refresher Courses			
Yes	43 (43%)	57 (57%)	0.047*
No	113 (55.1%)	92 (44.9%)	

*P-value < 0.05 i.e., there is significant association

Table:6 Distribution of professionals according to their response towards rabies and socio-demographic characteristics

Characteristics	Good Response	Poor Response	P-value
Gender:			
Male	79 (40.9%)	114 (59.1%)	0.433
Female	51 (45.5%)	61 (54.5%)	
Age Groups			
Less than or equal to 30 years	42 (39.30%)	65 (60.70%)	0.683
31 ___ 40	67 (45%)	82 (55%)	
41 ___ 50	18 (40.9%)	26 (59.1%)	
More than 50	3 (60%)	2 (40%)	
Residence:			
Urban	80 (43.70%)	103 (56.30%)	0.636
Rural	50 (41%)	72 (59%)	
Profession			
Doctor	84 (41.60%)	118 (58.40%)	0.433
Nurse	46 (44.70%)	57 (55.3%)	
Job Status:			
Regular	101 (41.90%)	140 (58.10%)	0.258
Contractual	29 (46.80%)	33 (53.2%)	
Daily Wages	0 (0%)	2 (100%)	
Type of Health Facility:			
Primary Care	19 (38.8%)	30 (61.2%)	0.662
Secondary Care	36 (40.4%)	53 (59.6%)	
Tertiary Care	75 (44.9%)	92 (55.1%)	
Year in Service			
≤10 Years	92 (40.40%)	136 (59.60%)	0.167
>10 Years	38 (49.40%)	39 (50.60%)	
Post-graduation:			
Yes	83 (47.70%)	91 (52.30%)	0.039*
No	47 (35.90%)	84 (64.10%)	
Work Area:			
Urban	121 (42.3%)	165 (57.7%)	0.666
Rural	9 (47.4%)	10 (52.6%)	
Previously Attended Rabies Training or Refresher Courses			
Yes	31 (29.20%)	75 (70.80%)	0.001*
No	99 (49.70%)	100 (50.30%)	
Awareness			
Sufficient	68 (43.60%)	88 (56.40%)	0.727
Insufficient	62 (41.60%)	87 (58.40%)	

*P-value < 0.05 i.e., there is significant association

4.3: Multivariate Analysis

4.3.1: Awareness

The goal was to demonstrate sufficient rabies awareness when confronted with a bite from a suspected rabid animal by displaying the elements related in a consistent manner. The Hosmer-Lemeshow tests (P-value = 0.295) revealed that the model was a good fit. According to the results of the multivariate analysis, professionals who were in 41 to 50 years age group (AOR = 0.180; 95% CI = [0.068–0.476]) were less likely to have sufficient awareness about rabies than the professionals in less and equal to 30 years age group. Similarly, the professionals who were in service for less than or equal to 10 years (AOR = 0.220; 95% CI = [0.106–0.457]) were less likely to have sufficient awareness about rabies than the professionals in service for more than 10 years. The healthcare professionals who were post-graduates (AOR = 2.265; 95% CI = [1.310–3.915]) were more likely to have sufficient awareness about rabies than the professionals who were not post-graduates (**Table:7**).

4.3.2: Response

The goal was to highlight the factors linked with an effective rabies response when faced with a bite from a suspected rabid animal in a consistent method. The Hosmer-Lemeshow tests (P-value = 0.369) revealed that the model was a good fit. The results of the multivariate analysis showed that the HCPs who were post-graduates (AOR = 1.795; 95% CI = [1.042–3.093]) were more likely to respond good in front of a dog bite case than the professionals who were not post-graduates. The HCPs who previously attended rabies trainings or refresher courses (AOR = 0.357;

95% CI = [0.203–0.630]) were less likely to respond good in front of a dog bite case than the professionals who did not receive any training (**Table:8**).

Table:7 Results of the multivariate analysis for awareness

Characteristics	AOR	95% CI	P-value
Gender:			
Male	1.00		
Female	1.233	(0.716, 2.122)	0.45
Age Groups			
Less than or equal to 30 years	1.00		
31 ___ 40	0.624	(0.354, 1.098)	0.102
41 ___ 50	0.18	(0.068, 0.476)	0.001*
More than 50	0.348	(0.043, 2.808)	0.322
Residence:			
Rural	1.00		
Urban	0.916	(0.526, 1.595)	0.756
Profession			
Doctor	1.00		
Nurse	0.661	(0.389, 1.122)	0.125
Job Status:			
Regular	1.00		
Contractual	1.444	(0.748, 2.788)	0.274
Daily Wages	0	(0, -)	0.999
Type of Health Facility:			
Tertiary Care	1.00		
Primary Care	0.711	(0.296, 1.709)	0.446
Secondary Care	1.188	(0.659, 2.143)	0.566
Year in Service			
>10 Years	1.00		
≤10 Years	0.22	(0.106, 0.457)	<0.001*
Post-graduation:			
No	1.00		
Yes	2.265	(1.310, 3.915)	0.003*
Work Area:			
Rural	1.00		
Urban	0.974	(0.266, 3.568)	0.969
Previously Attended Rabies Training or Refresher Courses			
No	1.00		
Yes	0.788	(0.454, 1.370)	0.399

*P-value < 0.05 i.e., there is significant association

Table:8 Results of the multivariate analysis for response

Characteristics	AOR	95% CI	P-value
Gender:			
Male	1.00		
Female	1.221	(0.714, 2.088)	0.467
Age Groups			
Less than or equal to 30 years	1.00		
31__40	1.228	(0.695, 2.169)	0.479
41__50	1.035	(0.427, 2.504)	0.94
More than 50	2.808	(0.368, 21.399)	0.319
Residence:			
Rural	1.00		
Urban	0.885	(0.512, 1.529)	0.661
Profession			
Doctor	1.00		
Nurse	1.053	(0.624, 1.777)	0.845
Job Status:			
Regular	1.00		
Contractual	1.482	(0.771, 2.851)	0.238
Daily Wages	0	(0, -)	0.999
Type of Health Facility:			
Tertiary Care	1.00		
Primary Care	0.856	(0.357, 2.054)	0.728
Secondary Care	0.829	(0.467, 1.471)	0.521
Year in Service			
>10 Years	1.00		
≤10 Years	0.76	(0.396, 1.460)	0.411
Post-graduation:			
No	1.00		
Yes	1.795	(1.042, 3.093)	0.035*
Work Area:			
Rural	1.00		
Urban	1.022	(0.274, 3.810)	0.974
Previously Attended Rabies Training or Refresher Courses			
No	1.00		
Yes	0.357	(0.203, 0.630)	<0.001*
Awareness			
Insufficient	1.00		
Sufficient	0.839	(0.503, 1.401)	0.503

*P-value < 0.05 i.e., there is significant association

CHAPTER V:

DISCUSSION

The current global rabies elimination strategy motto is "United against rabies" partnership through the One Health approach. This study evaluates rabies awareness and response among one of the main rabies stakeholders as part of the One Health strategy contributing to the rabies elimination program (Rana et al., 2021). Our study aims to investigate frontline service providers' awareness and responsiveness to the management of patients with dog bite wounds at public healthcare facilities in Islamabad, Pakistan.

According to the study's findings, more than half of the health professionals interviewed (51.1%) had sufficient awareness of rabies, despite limitations in some areas, this result is similar to those observed in surveys conducted in Vietnam and the United States, which demonstrated moderate and high awareness levels among human health professionals, respectively (Nguyen et al., 2016) (Jeanpetit et al., 2014). In contrast, research in Uganda, Turkey, Chad, and Senegal revealed that more than half of health personnel lacked rabies awareness (Monje et al., 2020)(Niang et al., 2020)(Koruk et al., 2011)(Mbaipago et al., 2020). These findings could be explained by a deficiency of continuous medical education (CME) and ongoing rabies training for HCPs in Islamabad, or even the entire country. In reality, only 32.8% of professionals had previously participated in a rabies refresher course or workshop. This is a smaller number, which should promote the development of training programs for these health professionals. Health practitioners were usually aware of the rabies risk, although their knowledge of wound categorization and vaccination regime/schedule frequently needs to be updated. (Hennenfent et al., 2018). According

to our survey, only 28.9% and 56.7% of participants had the proper awareness of categories II and I, respectively, but on average 28.53% of participants had proper awareness of categories III. The findings of this study, however, contradict with those of a study conducted in India, where 65.5% of participants correctly identified category III. Correct information concerning categories II and I was known by 47.4% and 42.1%, respectively (Jidge et al., 2019).

The rabies virus was recognized as the cause of rabies by nearly 86.6% of frontline healthcare professionals. This is in line with past findings from research on interns' awareness of rabies at the Geetanjali Medical College in Rajasthan, India, and by Nayak RK et al. in 2011 in Belgaum, India (Mishra & Solanki, 2015) (Nayak et al., 2013). Compared to a study by Jasleen, Padda AS et al. conducted at Amritsar Medical College, where only 11% were aware that it wasn't just the dog that was the infection's reservoir, only 4.3% of the participants in our study realized it (Singh et al., 2013). In line with a study conducted in India, 84.3% of participants in this study were aware of the rabies transmission method (Mishra & Solanki, 2015). This study discovered that more than half of the service providers were unaware of how long a suspected rabid dog should be held and observed in order to determine the rabies incubation period in dogs. Remarkably, the majority of healthcare professionals lacked experience, which may have contributed to their lack of awareness on dog bite management. It might be argued that a significant factor in this is that these providers don't receive ongoing professional development. To address the awareness gaps, ongoing development efforts are required, such as training and retraining of healthcare service providers in the management of dog bites and rabies prophylaxis (Kenu et al., 2018). In our study, almost 50% of participants correctly identified the

incubation period for rabies in humans. This result was comparable to the 51.7% finding of a study carried out in Karachi, Pakistan (Hassan Shah et al., 2009).

Of those surveyed, 81.3% agreed that dog bite wounds should be treated right away by washing the bite sites with soap, antiseptic, and water. This is in accordance with the WHO guidelines for treating rabies wounds. This percentage was lower than that discovered in comparable investigations conducted in Senegal in 2021 and India in 2014, which are 89% and 96.8% respectively (Mishra & Solanki, 2015) (Ba et al., 2021). The similar percentage of participants in a different study carried out in the western Maharashtra District of India practiced wound cleansing immediately (Jidge et al., 2019). Yet, our study found that HCPs cleaned the bite wound with soap and water since that appeared to be the most logical course of action. According to some reports, washing a dog bite wound with soap and water can cut the virus load and mortality by as much as 50%. (Warrell, 2003) (KAPLAN et al., 1962). Just 30.5% of participants in our study used the intradermal (ID) schedule, compared to 58.7% who used the intramuscular (IM) schedule, which is close to research done in western India, where the proportions were 55.8% and 45.3%, respectively (Jidge et al., 2019). The cost of treating rabies exposure in regions of Africa or Asia where the daily average per person income is as low as \$1 can be disastrous. In Asia, rabies PEP typically costs 49 dollars (*Rabies*, 2023-b) Due to its cost effectiveness compared to IM schedule, ID regimen is advised. Patients are put at danger when almost half of doctors choose the wrong anatomic site of administration for the vaccine since doing so can sometimes result in PEP failure because giving the vaccine to a high-fat area has been demonstrated to slow absorption (Hennenfent et al., 2018). About 31.1% of service providers had never reported about dog bites or possible rabies cases. In

comparison, a survey carried out in Ghana found that the number was 88%. (Kenu et al., 2018).

Our study showed that the level of rabies awareness is significantly positively influenced by prior training, post-graduate education, and service experience. Therefore, in order to affect HCPs' responses to canine bite-mediated human rabies, our results imply that rabies awareness needs to be increased among this group of professionals. According to the findings of the multivariate analysis, HCPs with more than ten years of experience were more likely than those with less experience to possess sufficient awareness about rabies. This outcome was different from what was seen in Senegal (Ba et al., 2021). According to the findings of our study, health practitioners with post-graduate degrees were 2.265 times more likely than those without such degrees to be sufficiently aware about rabies (Monje et al., 2020) This is because the HCPs are engaged in research activities during specialization.

Fewer than half of health professionals (42.6%) had sufficient experience in handling a suspected animal bite, which is comparable to the findings of studies conducted in Senegal and Uganda, where the respective percentages were 45.3% and 50%. The WHO advises administering rabies immunoglobulin as needed and starting post-exposure prophylaxis right away with thorough wound cleaning, local therapy, and administration of a series of doses of a powerful and effective standard rabies vaccine (Acharya et al., 2021). The potential of post-exposure prophylaxis to stop the spread of the rabies virus to the nerves makes it crucial (Mindekem et al., 2018).

Our study showed that prior training and post-graduate education significantly increase the level of responsiveness to human rabies caused by dog bites. According to the findings of multivariate analysis, HCPs with post-graduate degrees were 1.795 times more likely than those without such degrees to respond well to animal bites

(Rana et al., 2021). This is because as HCPs specialize, they receive training on how to handle these cases more effectively. The findings of our study also suggest that health professionals who had taken refresher courses or trainings about dog bites that cause human rabies were less likely to respond positively than those who had not. Our results differed from those in Uganda, where the AOR was 6.17 (Monje et al., 2020). This may be because the trainings did not follow the most recent WHO recommendations for wound categorization and PEP, and they may have needed refreshers or CME.

Strengths:

Our study has a number of strengths. One of these is the tool for collecting data, which we pilot tested to support the study, that we adapted from international studies for assessing awareness and responsiveness towards dog bite mediated human rabies. This study was successful in determining how health care practitioners at all three levels responded to dog bite-mediated human rabies in relation to their socio-demographic factors. All of Islamabad's public healthcare facilities are included in the study. Both the rural and urban areas of Islamabad are covered by our data. In Islamabad, this is the first research of its kind. The findings of this study could be applied to implement rabies training programs in Islamabad and other regions with high exposure levels to enhance rabies control and management of dog bites. The outcomes will be used as indicators to improve current policies and procedures.

Limitations:

Having insufficient resources was the first restriction. The findings of this study, which were limited to Islamabad, cannot be applied to the entire country. The

research is totally quantitative. In this investigation, non-probability consecutive sampling was adopted because there were not enough resources and a sample frame was not available. With an emphasis on healthcare, this study examined healthcare service providers. The veterinary component wasn't investigated. According to the One Health theory, investigations must consider both components in order to build a comprehensive picture and choose the most effective interventions.

Conclusion:

In this study, the majority of front-line health professionals at hospital emergency points were aware with the causes of rabies and the primary treatments for dog bites. This study showed that front-line healthcare service providers had gaps in awareness and handled dog bites ineffectively. Several vaccine-preventable deaths may have resulted from the documented shortcomings in the management of dog bites. When exposures are identified and handled properly, rabies exposures and fatalities are entirely avoidable. This makes it essential for all healthcare practitioners to have a fundamental knowledge of the most recent guidelines for the management of rabies. Health departments can be very important in making sure that healthcare professionals are aware of the most recent rabies guidelines and that the correct management standards are being followed. To achieve good animal bite management, healthcare providers require proper training and education programs. They should also be educated on wound classification and how to utilize rabies vaccines more effectively.

Recommendation:

The following must be put into practice in order to adequately address the reported gaps in the care of dog bites and rabies prevention:

- To enhance the skills and procedures of frontline staff in the care of animal bites and the prevention of rabies, health and veterinary services must unite their efforts. This is significant because, if the first line of defense (among animals) fails, health is the second line of defense against rabies in people.
- We urge the health department to put greater effort into educating and training service providers.
- These training initiatives ought to be assessed, and if successful, expanded.
- Qualitative research may also be required to thoroughly examine responsiveness of healthcare providers and comprehend the results.
- Community and the veterinary components of “One Health approach” must be considered along with human health in order to build a comprehensive picture and choose the most effective interventions

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Annexure A – Data Collection Tool

Questionnaire

Socio-demographic profile

- 1) Name of the participant: _____
- 2) Name of the health facility: _____
1. Type of health facility:
 - a) Primary Care
 - b) Secondary Care
 - c) Tertiary Care
- 3) Age of the respondent:
 - a) Less than or equal to 30 years
 - b) 31 ___ 40
 - c) 41 ___ 50
 - d) More than 50
- 4) Gender:
 - a) Male
 - b) Female
- 5) Residence:
 - a) Urban
 - b) Rural
- 6) Designation: _____
- 7) Job status:
 - a) Regular
 - b) Contractual
 - c) Daily Wages
- 8) Number of years in service as a doctor/Nurse: _____
- 9) Qualification:
 - d) MBBS
 - e) BS Nursing
- 10) Post-graduation:
 - a) Yes
 - b) No
- 11) Work area:
 - a) Urban
 - b) Rural
- 12) Previously attended dog bite/ rabies management training or refresher courses:

- a) Yes
- b) No

Awareness

- 1) Do you know about Rabies?
 - c) Yes
 - d) No
- 2) What type of pathogen causes Rabies?
 - a) Virus
 - b) Bacteria
 - c) Mushroom
 - d) Pests
 - e) Don't know
- 3) What are the main reservoirs of Rabies?
 - a) Many wild and domestic canids and other mammals
 - b) All animals
 - c) Only domestic canines
 - d) Only wild canids
 - e) Don't know
- 4) What species does Rabies affect?
 - a) All mammals
 - b) Humans only
 - c) Dogs only
 - d) Other
 - e) Don't know
- 5) How is Rabies transmitted? (Multiple choices)
 - a) Bite from an infected animal
 - b) Scratch of an infected animal
 - c) Contact with the animal's skin
 - d) Licking on a wound by an infected animal
 - e) Don't know
- 6) Which Groups of people are most prone to animal bites?
 - a) Children
 - b) Young people
 - c) Adults
 - d) All groups
 - e) Don't know
- 7) What is the incubation period for Rabies in animals?
 - a) 1 to 3 days
 - b) 10 days to 2 months or more
 - c) 25 days to 150 days or more (5 months)

- d) Other
 - e) Don't know
- 8) List the signs of Rabies in animals? (Multiple Choices)
- a) Change in behavior by hiding in dark corners
 - b) Aggressiveness with a loss of distrust for humans
 - c) Profuse salivation
 - d) Tendency to convulse
 - e) Paralysis
 - f) Other
- 9) How long is Rabies contagious in dogs?
- a) 3–7 days
 - b) One month
 - c) One year
 - d) Other
 - e) Don't know
- 10) What Is the Incubation Period for Rabies in Humans?
- a) 2–3 months
 - b) 3–4 days
 - c) 9 days to 7 years
 - d) Other
 - e) Don't know
- 11) List the signs of Rabies in humans? (Multiple Choices)
- a) Fever
 - b) Pain or tingling
 - c) Headache; Dizziness
 - d) Nausea; Vomiting
 - e) Paresthesia
 - f) Delusions
 - g) Convulsions
 - h) Anxiety
 - i) Hydrophobia
 - j) Aerophobia
 - k) Paralysis
- 12) What are the ways to prevent Rabies? (Multiple Choices)
- a) Vaccination of pets against rabies
 - b) Raising community awareness about rabies
 - c) Active surveillance of rabies in animals
 - d) Detention and 15 days clinical observation for any healthy-looking dog or cat known to have bitten a person
 - e) Immediately submit intact heads of presumed rabid animals packed in ice to a laboratory

- f) Immediately put down unvaccinated dogs or cats bitten by a known rabid animal
 - g) Don't know
- 13) What is the first aid given to a patient after a bite/scratch from a suspected rabid animal?
- a) Immediate and thorough cleansing of the wound with soap and water, followed by ethanol or iodine
 - b) Suturing the wound
 - c) Categorize the wound then manage accordingly
 - d) Don't know

Regarding wound categorization

- 14) Touching or feeding animals, licks on intact skin
- a) CAT-I
 - b) CAT-II
 - c) CAT-III
 - d) Don't know
- 15) Nibbling of uncovered skin, minor scratches/abrasions without bleeding
- a) CAT-I
 - b) CAT-II
 - c) CAT-III
 - d) Don't know
- 16) Single transdermal bites or scratches, licks on broken skin
- a) CAT-I
 - b) CAT-II
 - c) CAT-III
 - d) Don't know
- 17) Multiple transdermal bites or scratches, licks on broken skin
- a) CAT-I
 - b) CAT-II
 - c) CAT-III
 - d) Don't know
- 18) Contamination of mucous membranes on broken skin with saliva
- a) CAT-I
 - b) CAT-II
 - c) CAT-III
 - d) Don't know
- 19) What is the vaccination regime/schedule for pets against Rabies?
- a) Once a year
 - b) Once every 2- or 3-years
 - c) Once in a lifetime
 - d) Don't know

20) What is the vaccination schedule for humans against Rabies?

- a) Once a year
- b) Vaccinate high-risk groups
- c) Once every 2 years
- d) Once in a lifetime
- e) Other
- f) Don't know

Response

- 1) What PPEs do you use during managing the case of dog bite?
 - a) Gloves
 - b) Gloves, gown, face mask
 - c) Gloves & face mask
 - d) None
- 2) How do you wash the wound of dog bite?
 - a) Washing wound with soapy water
 - b) Washing wound with soapy water and antiseptic
 - c) Applying antiseptic only
 - d) Wound suturing
 - e) None
 - f) Don't know
- 3) Which steps of management do you keep in mind while treating a dog bite case?
 - a) Wash the wound(s) quickly with soap or detergent and water then rinse thoroughly with clean water for at least 15 min
 - b) Disinfect by applying an antiseptic solution (70°C alcohol or Polyvidone iodine)
 - c) Preventing tetanus
 - d) Assessing the risk of rabies infection
 - e) Categorize the type of bite
 - f) Start post-exposure prophylaxis if appropriate and according to the chosen protocol recommended by WHO
 - g) None
 - h) Don't know
- 4) How do you manage a category-I dog bite case?
 - a) Wound management and vaccination
 - b) Wound management, vaccination and Rabies Immunoglobulin
 - c) None
 - d) Don't know
- 5) How do you manage a category-II dog bite case?
 - a) Wound management and vaccination
 - b) Wound management, vaccination and Rabies Immunoglobulin
 - c) None
 - d) Don't know
- 6) How do you manage a category-III dog bite case?
 - a) Wound management and vaccination
 - b) Wound management, vaccination and Rabies Immunoglobulin

- c) None
 - d) Don't know
- 7) How do you administer anti rabies vaccination?
- a) Intramuscular
 - b) Intradermal
 - c) Intravascular
- 8) Where do you administer anti rabies vaccination?
- a) Deltoid
 - b) Thigh
 - c) Gluteus maximus
 - d) Abdomen
 - e) None
- 9) Do you report the bite, scratch, lick or any other aggression by a suspected animal to any concerns?
- a) Yes
 - b) No

Annexure B-Consent Form

TITLE OF STUDY: Awareness and response to dog bite mediated human Rabies among healthcare providers of Islamabad, Pakistan

RESEARCHER: Sana Habib Abbasi

MSPH Student, Al Shifa School of Public Health, Rawalpindi

PURPOSE: The purpose of this research is to assess the level of awareness and response to dog bite cases among HCPs for the prevention of human Rabies in Islamabad. This study will point out the factors associated with awareness and response to dog bite mediated human Rabies among HCPs.

PROCEDURE: A questionnaire having three parts sociodemographic, awareness and response with Urdu translation will be administered to collect the data from participants.

TIME REQUIRED: It is anticipated that it will take approximately 15 to 20 minutes of your time to complete the questionnaire.

VOLUNTARY PARTICIPATION: Participation in this study is voluntary. You have the right to not open or complete the survey.

CONFIDENTIALITY: Data from the surveys will be completely anonymous and reported in aggregate form. Your name will not be collected at any time. After data collection, the interview and demographic responses will be password-protected. Once submitted the researcher will not be able to withdraw responses due to anonymity and de-identified data.

RISKS: The research survey poses minimal risk to participants. There are no anticipated risks in this study.

BENEFITS: There are no direct benefits associated with participation in this study.

PAYMENT: You will receive no payment for participating in the study.

RIGHT TO WITHDRAW FROM THE STUDY: You have the right to withdraw from the study at any time before submitting the survey without penalty.

If you have questions about the study, please contact: Sana Habib Abbasi (sana.abbasi20@yahoo.com) Contact # 03345488514

CONSENT: I have read and understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I

am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Name of Participant _____

Signature of Participant _____

Date _____

Gantt Chart

Task	Sep 2022- Feb 2023																											
	Sep				Oct				Nov				Dec				Jan				Feb							
	Week																											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Approval and Permission	█	█	█	█																								
Literature Review					█	█	█	█	█	█	█	█																
Questionnaire Development					█	█	█	█																				
Data Collection and analysis									█	█	█	█																
Write up													█	█	█	█												
Thesis Finalization and printing																	█	█	█	█								
Presentation and approvals																					█	█	█	█				

Budget

	Transport	Printing	Stationary
Survey tool		15,000	
Data collection	20,000		10,000
Data analysis		5000	
Write up		10,000	5000
Total	20,000	30,000	15,000
Grand Total	Rs. 65,000		

Annexure C- Institutional Review Board Letter



**AL-SHIFA SCHOOL OF PUBLIC HEALTH
PAKISTAN INSTITUTE OF OPHTHALMOLOGY
AL-SHIFA TRUST, RAWALPINDI**

MSPH-IRB/14-24
27th Sep, 2022

TO WHOM IT MAY CONCERN

This is to certify that **Sana Habib Abbasi** D/O **Habib Ur Rehman Abbasi** is a student of Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PIO, Al-Shifa Trust Rawalpindi. He/she has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-i-Azam University, Islamabad. His/her research topic which has already been approved by the Institutional Review Board (IRB) is **“Awareness and response to dog bite mediated human rabies among healthcare providers of Islamabad, Pakistan”**.

Please provide his/her necessary help and support in completion of the research project. Thank you.

Sincerely,

Dr. Ayesha Babar Kawish
Head

Al-Shifa School of Public Health, PIO
Al-Shifa Trust, Rawalpindi