# A Clinic-Based Survey to Investigate Epidemiological Profile of Clinical Diseases and Surgical Conditions in Cats and Dogs of Karachi, Pakistan

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## Abstract

**Introduction:** Rising pet ownership in urban Pakistan contrasts with limited data on companion animal health. This cross-sectional study established the first comprehensive description of hospital-based occurrence of clinical diseases and surgical conditions in pet cats and dogs presented at a major veterinary facility in Karachi, Pakistan's largest metropolitan center.

**Material and Methods:** The study was conducted at Pet Village Animal Hospital, Karachi. A total of 1,925 animals (897 cats, 1,028 dogs) were included, comprising 685 feline and 695 canine clinical cases, and 211 feline and 333 canine surgical procedures. Diagnoses were confirmed via standardized clinical, laboratory, and imaging methods

**Results:** In cats, the most frequent clinical diseases were enteritis (16.4%), endoparasitism (14.3%), allergic dermatitis (10.8%), and feline upper respiratory tract disease (10.7%). In dogs, enteritis (20.6%), parasitic infestation (14.0%), canine parvovirus (13.5%), ehrlichiosis (5.9%), and babesiosis

(2.4%) predominated. Elective sterilization procedures (spaying/neutering) comprised most surgical cases, with higher frequencies in adults and local breeds. Young animals (kittens <3 months, puppies <6 months) showed the highest disease susceptibility. Female cats and male dogs exhibited greater clinical disease occurrence.

**Conclusion:** The results show that there is a significant burden of preventable infections in clinic-attending pets in Karachi, along with increasing demand for surgical services. The findings underscore the importance of implementing standardized preventive care, zoonotic education and a wider surveillance system within the One Health approach for better animal welfare and public health in Karachi and other cities in Pakistan.

**Keywords:** Canine, Cross-sectional study, Hospital-based occurrence, Feline, Surgical cases.

## 1. Introduction

Pet companionship, especially cats and dogs, is a part of urban living in all parts of the world, which leads to emotional well-being, social connection, and a better quality of life of those who own pets [1-2]. The practice of keeping companion animals in the form of cats and dogs has increased significantly within the past few years in Pakistan, particularly in large urban areas like Karachi, Lahore, Islamabad and Peshawar, which are also known as developing countries. These shifts in society are reflected in this trend, including an increased awareness of pets as family members, an increase in disposable income and urbanization [3]. While there is no national census, it is estimated that 48% of Pakistani households have pets, with ~5 million cats and ~3 million dogs in the country [4-6] which has led to a growing demand for veterinary care and concerns about public health.

Regardless of this increase in the ownership of pets, there is limited systematic data in the health profile of the companion animals in Pakistan. The clinical signs of disease in cats and dogs are very numerous and encompass infectious, parasitic, metabolic, traumatic and congenital disease, the majority of which will be surgically treated [7]. The burden of the disease among these groups of people is affected by several issues such as vaccination status, prevalence of vectors, environmental factors and accessibility to veterinary care services [8]. Furthermore, pets can be reservoirs of zoonotic pathogens which could pose health risks to the population, and this is why it is important to closely monitor diseases and control them [9]. The size of the companion animal population in Pakistan contributes to the potential for these zoonotic routes and epidemiological knowledge is not only a veterinary issue but also an important component of the public health infrastructure. Despite the rapid urbanization in Pakistan, comprehensive epidemiological data on the prevalence of parvovirus and pyometra in urban companion animals is limited as reported in similar South Asian studies [10-12].

This paper was thus aimed at examining the hospital-based occurrence frequencies of common clinical conditions and surgical cases in cats and dogs that were presented to one of the most reputable private veterinary clinics in Karachi, Pakistan a city that represents one of the largest and most varied groups of companion animals in the country. Through patient data analysis based on species, sex, age, and breed, the study will set a foundation on an epidemiological profile that can be used in the future to enhance veterinary care delivery, improved disease prevention approaches, comparative studies with regional information, and ultimately add to the body of knowledge on companion animal health in South Asia and contribute to the development of evidence-based veterinary public health policies for urban pet populations in Karachi.

## 2. Material and Methods

### 2.1. Study design and data collection

A cross-sectional study was conducted to investigate the hospital-based occurrence of clinical diseases and surgical cases in cats and dogs. Data regarding species, age, sex, breed, clinical signs, and surgical history were recorded using a structured questionnaire administered to pet owners or attendants.

### 2.2. Study area, period, and population

The study was carried out at Pet Village Animal Hospital, a private veterinary clinic located in DHA Phase 6, Karachi (24.7951° N, 67.0494° E), Pakistan's largest metropolitan area and economic hub, located on the coast of the Arabian Sea. The clinic also has a heterogeneous urban pet population due to patients in all parts of Karachi. Collection of data was done within the period of January 2025 and August 2025.


**Figure 1.** Map of Pakistan highlighting Karachi, Sindh province (red star), where the study was conducted

A total of 1,925 animals were included in the study, comprising 897 cats and 1,028 dogs. Among cats, 685 (76.4%) presented with clinical diseases and 211 (23.6%) with surgical conditions. Among dogs, 695 (67.6%) had clinical diseases and 333 (32.4%) underwent surgical procedures.

Age was stratified into the following categories for cats: <3 months, 3 months–1 year, and >1 year. For dogs, age groups were defined as: <6 months, 6 months–1 year, and >1 year. Breeds were classified as Imported, Local, and Crossbreed for cats, and German Shepherd, Labrador, and Local for dogs.

### 2.3. Clinical and diagnostic protocol for disease confirmation

Viral infections were confirmed using commercial rapid test kits (ICT, China; SNAP, Idexx, USA). FIP was diagnosed using effusion characteristics, Rivalta test, and serum albumin:globulin ratio <0.8. Parasites were identified via fecal flotation, direct smears, Giemsa-stained blood smears, and skin scrapings. Urinary/renal diseases were confirmed by urinalysis, biochemistry, and ultrasound; radiography assessed orthopedic/thoracic conditions. Cytology and CBC supported neoplastic/inflammatory diagnoses. Detailed species-specific criteria are provided in Supplementary Table S1.

### 2.4. Statistical analysis

Data analysis was done with SPSS 26.0. Occurrence was determined at the hospital level overall and by species, sex, age and breed and is expressed as frequencies and percentages. The occurrence of disease between groups was compared using Pearson's chi-square test. A p value of $< 0.05$ was considered statistically significant. The analyses were conducted separately for cats and dogs.

## 3. Results

### 3.1. Overall prevalence of major disease categories and surgical procedures

During the study period, 1,925 animals (897 cats, 1,028 dogs) were examined. Among cats, enteritis (16.4%) was the most frequent clinical disease, while diabetes mellitus (0.7%) was least common (Figure 2). In dogs, enteritis (20.6%) was most frequent, whereas hip dysplasia (1.3%) was least reported (Figure 3). Regarding surgical interventions, neutering (28.9%) was the most common procedure in cats and hernia repair (1.4%) the least (Table 1). In dogs, spaying (28.5%) predominated and enucleation (0.9%) was the rarest (Table 2). Detailed diagnostic criteria are presented in Supplementary Table S1.

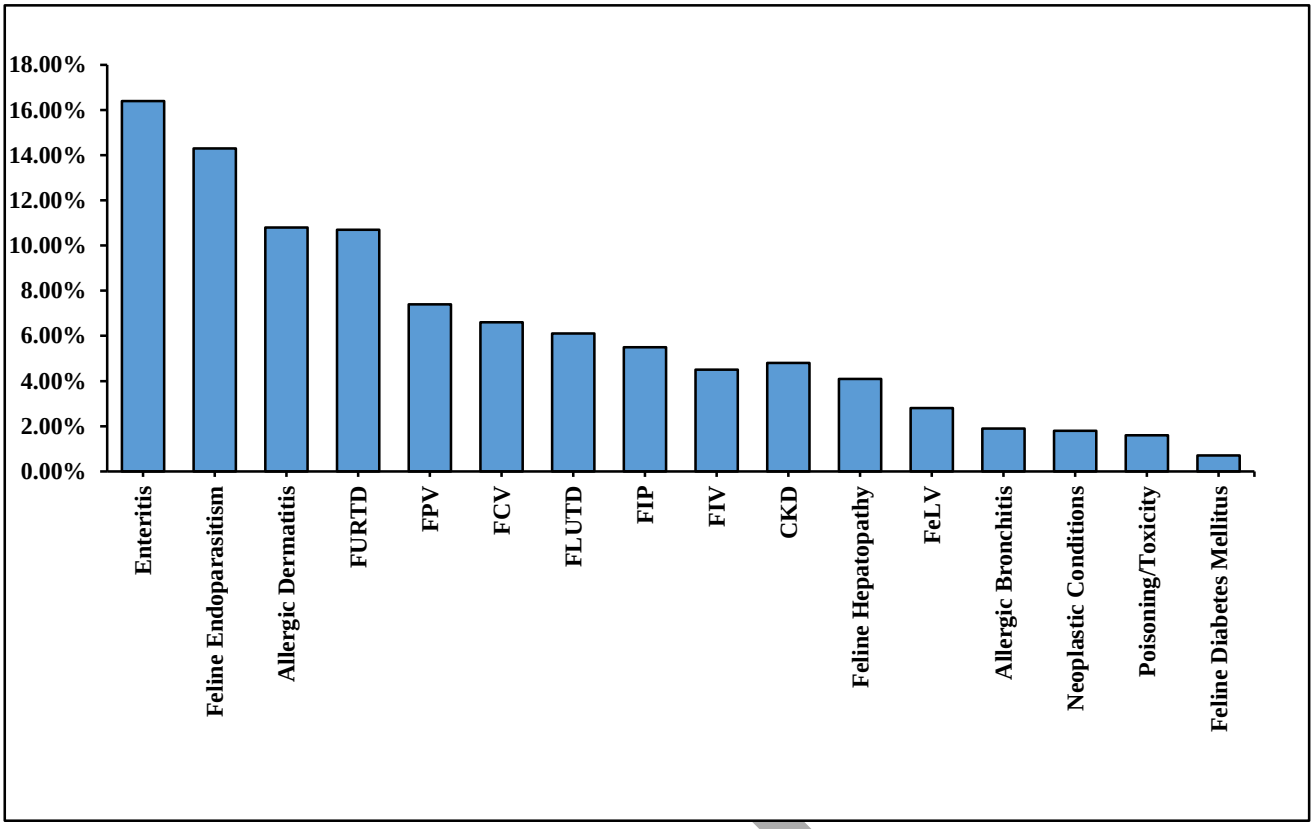


**Figure 2.** Hospital-based occurrence (%) of the most common clinical diseases diagnosed in cats

**Table 1:** Prevalence of surgical cases in cats in relation to sex, age and breed

| Surgical Cases | Overall Occurrence (n=211) | Sex-wise prevalence (%) | | Age-wise prevalence (%) | | | Breed-wise prevalence (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Male (n=99) | Female (n=112) | <3 M (n=13) | 3 M to 1 Y (n=52) | >1 Year (n=146) | Imported (n=99) | Local (n=55) | Cross breed (n=57) |
| **Neutering** | 61 (28.9%) | 61 (61.6%) | NA | 0 | 14 (26.9%) | 47 (32.2%) | 31 (31.3%) | 14 (25.5%) | 16 (28.1%) |
| **Spaying** | 48 (22.7%) | NA | 48 (42.9%) | 0 | 11 (21.2%) | 37 (25.3%) | 18 (18.2%) | 11 (20.0%) | 19 (33.3%) |
| **Soft Tissue Surgery** | 35 (16.6%) | 12 (12.1%) | 23 (20.5%) | 7 (53.8%) | 11 (21.2%) | 17 (11.6%) | 8 (8.1%) | 21 (38.2%) | 6 (10.5%) |
| **Urolithiasis** | 21 (10.0%) | 21 (21.2%) | 0 | 3 (23.1%) | 5 (9.6%) | 13 (8.9%) | 16 (16.2%) | 0 | 5 (8.8%) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Pyometra** | 18 (8.5%) | NA | 18 (16.1 %) | 0 | 2 (3.8%) | 16 (11.0 %) | 11 (11.1%) | 1 (1.8%) | 6 (10.5 %) |
| **Cesarean Section** | 14 (6.6%) | NA | 14 (12.5 %) | 0 | 3 (5.8%) | 11 (7.5%) | 9 (9.1%) | 0 | 5 (8.8%) |
| **Fracture Management** | 7 (3.3%) | 2 (2.0%) | 5 (4.5%) | 0 | 5 (9.6%) | 2 (1.4%) | 3 (3.0%) | 4 (7.3%) | 0 |
| **Enucleation** | 4 (1.9%) | 3 (3.0%) | 1 (0.9%) | 3 (23.1 %) | 0 | 1 (0.7%) | 0 | 4 (7.3%) | 0 |
| **Hernia** | 3 (1.4%) | 0 | 3 (2.7%) | 0 | 1 (1.9%) | 2 (1.4%) | 3 (3.0%) | 0 | 0 |

NA = not applicable (procedure anatomically impossible). 0 = zero cases observed (possible but none occurred). Percentages: within sex (male n=99, female n=112); within age (<3m n=13, 3m–1y n=52, >1y n=146); within breed (imported n=99, local n=55, cross n=57). Overall % from total surgical cases (n=211).

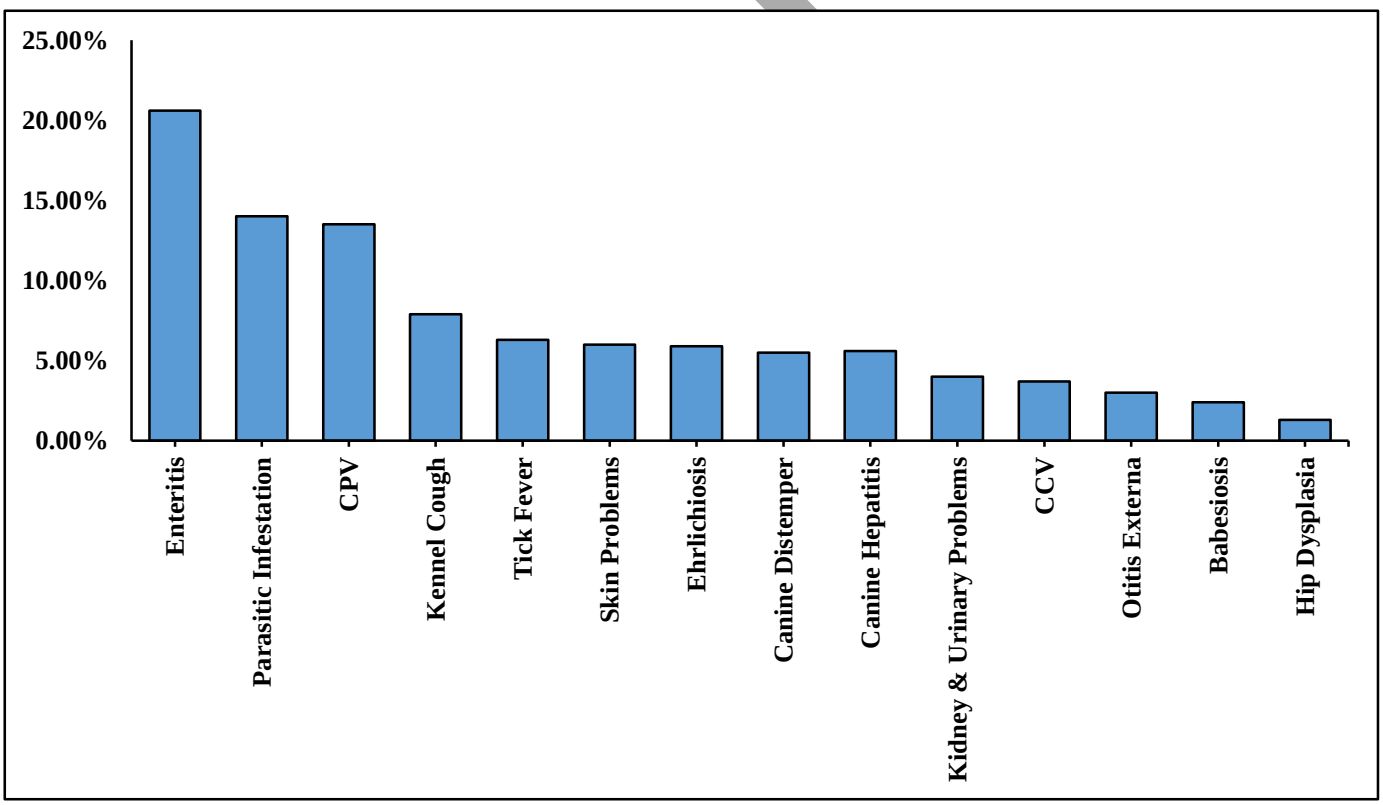


**Figure 3.** Hospital-based occurrence (%) of the most common clinical diseases diagnosed in dogs

**Table 2:** Prevalence of surgical cases in dogs in relation to sex, age and breed

| Surgical Cases | Overall Occurrence (n=333) | Sex-wise prevalence (%) | | Age-wise prevalence (%) | | | Breed-wise prevalence (%) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Male (n=148) | Female (n=185) | <3 M (n=30) | 3 M to 1 Y (n=95) | >1 Year (n=208) | German Shepherd (n=72) | Labrador (n=39) | Local (n=222) |
| **Spaying** | 95 (28.5%) | NA | 95 (51.4%) | 3 (10.0%) | 31 (32.6%) | 61 (29.3%) | 12 (16.7%) | 9 (23.1%) | 74 (33.3%) |
| **Neutering** | 78 (23.4%) | 78 (52.7%) | NA | 7 (23.3%) | 26 (27.4%) | 45 (21.6%) | 14 (19.4%) | 2 (5.1%) | 62 (27.9%) |
| **Soft Tissue Surgery** | 44 (13.2%) | 16 (10.8%) | 28 (15.1%) | 8 (26.7%) | 12 (12.6%) | 24 (11.5%) | 15 (20.8%) | 7 (17.9%) | 22 (9.9%) |
| **Wound Debridement** | 42 (12.6%) | 28 (18.9%) | 14 (7.6%) | 9 (30.0%) | 11 (11.6%) | 22 (10.6%) | 9 (12.5%) | 8 (20.5%) | 25 (11.3%) |
| **Pyometra** | 23 (6.9%) | NA | 23 (12.4%) | 0 | 3 (3.2%) | 20 (9.6%) | 9 (12.5%) | 6 (15.4%) | 8 (3.6%) |
| **Hernia** | 14 (4.2%) | 8 (5.4%) | 6 (3.2%) | 2 (6.7%) | 5 (5.3%) | 7 (3.4%) | 5 (6.9%) | 3 (7.7%) | 6 (2.7%) |
| **Cesarean Section** | 14 (4.2%) | NA | 14 (7.6%) | 0 | 3 (3.2%) | 11 (5.3%) | 3 (4.2%) | 2 (5.1%) | 9 (4.1%)[a] |
| **Fracture Management** | 12 (3.6%) | 8 (5.4%) | 4 (2.2%) | 1 (3.3%) | 3 (3.2%) | 8 (3.8%) | 2 (2.8%) | 0 | 10 (4.5%) |
| **Urolithiasis** | 8 (2.4%) | 7 (4.7%) | 1 (0.5%) | 0 | 1 (1.1%) | 7 (3.4%) | 2 (2.8%) | 2 (5.1%) | 4 (1.8%) |
| **Enucleation** | 3 (0.9%) | 3 (2.0%) | 0 | 0 | 0 | 3 (1.4%) | 1 (1.4%) | 0 | 2 (0.9%) |

NA = not applicable (procedure anatomically impossible). 0 = zero cases observed (possible but none occurred). Percentages: within sex (male n=148, female n=185); within age (<3m n=30, 3m–1y n=95, >1y n=208); within breed (German Shepherd n=72, Labrador n=39, local n=222). Overall % from total surgical cases (n=333). [a]All 9 cases in the "Local" breed category for Cesarean Section were brachycephalic breeds.

### 3.2. Sex-wise prevalence of clinical diseases and surgical cases

Female cats had significantly higher clinical disease occurrence (60.3%) than males (39.7%; $\chi^2 = 29.02$, $p < 0.001$), particularly for enteritis and endoparasitism (Table 3, Figure 4). Conversely, male cats dominated surgical admissions (46.9%), primarily for neutering and urolithiasis (Table 1).

In dogs, males exhibited higher clinical disease occurrence (54.2%) than females (45.8%; $\chi^2 = 9.86$, $p = 0.002$), notably for enteritis; however, canine parvovirus was more common in females (57/94) (Table 4, Figure 4). Female dogs underwent more surgical procedures (55.6%), mainly spaying and pyometra, whereas males accounted for all neutering cases and most wound debridement (Table 2).

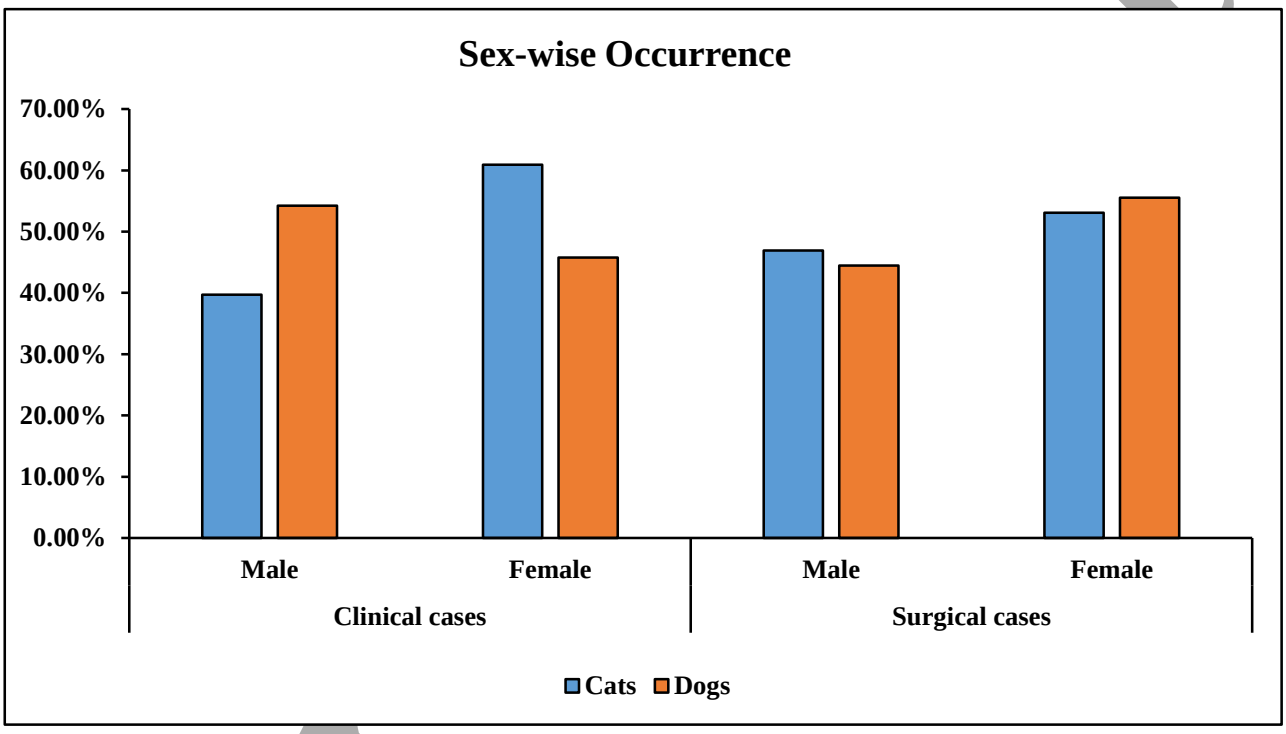


**Figure 4.** Sex-wise distribution of clinical disease occurrence in cats and dogs

**Table 3:** Prevalence of clinical diseases in cats in relation to sex, age and breed

| Diseases | Overall Occurrence (n=685) | Sex-wise prevalence (%) | | | Age-wise prevalence (%) | | | | Breed-wise prevalence (%) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Male (n=272) | Female (n=413) | *p*-value | <3 M (n=278) | 3 M to 1 Y (n=194) | >1 Year (n=213) | *p*-value | Imported (n=341) | Local (n=140) | Cross breed (n=204) | *p*-value |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Enteritis** | 112 (16.4%) | 42 (15.4%) | 70 (16.9%) | 0.560 | 72 (25.9%) | 21 (10.8%) | 19 (8.9%) | <0.001 | 65 (19.1%) | 17 (12.1%) | 30 (14.7%) | 0.535 |
| **Feline endoparasitism** | 98 (14.3%) | 33 (12.1%) | 65 (15.7%) | 0.184 | 41 (14.7%) | 28 (14.4%) | 29 (13.6%) | 0.714 | 36 (10.6%) | 21 (15.0%) | 41 (20.1%) | 0.003 |
| **Species-specific** *Toxocara cati* | 56 (8.2%) | 19 (7.0%) | 37 (9.0%) | 0.362 | 24 (8.6%) | 16 (8.2%) | 16 (7.5%) | 0.657 | 21 (6.2%) | 12 (8.6%) | 23 (11.3%) | 0.043 |
| **Species-specific** *Ancylostoma* spp. | 27 (3.9%) | 9 (3.3%) | 18 (4.4%) | 0.487 | 11 (4.0%) | 8 (4.1%) | 8 (3.8%) | 0.911 | 10 (2.9%) | 6 (4.3%) | 11 (5.4%) | 0.144 |
| **Species-specific** *Dipylidium caninum* | 15 (2.2%) | 5 (1.8%) | 10 (2.4%) | 0.597 | 6 (2.2%) | 4 (2.1%) | 5 (2.3%) | 0.903 | 5 (1.5%) | 3 (2.1%) | 7 (3.4%) | 0.141 |
| **Allergic Dermatitis** | 74 (10.8%) | 31 (11.4%) | 43 (10.4%) | 0.679 | 14 (5.0%) | 37 (19.1%) | 23 (10.8%) | <0.001 | 49 (14.4%) | 3 (2.1%) | 22 (10.8%) | <0.001 |
| **FURTD** | 73 (10.7%) | 24 (8.8%) | 49 (11.9%) | 0.190 | 32 (11.5%) | 19 (9.8%) | 22 (10.3%) | 0.675 | 38 (11.1%) | 17 (12.1%) | 18 (8.8%) | 0.519 |
| **FPV** | 51 (7.4%) | 22 (8.1%) | 29 (7.0%) | 0.570 | 33 (11.9%) | 12 (6.2%) | 6 (2.8%) | <0.001 | 11 (3.2%) | 9 (6.4%) | 31 (15.2%) | <0.001 |
| **FCV** | 45 (6.6%) | 17 (6.3%) | 28 (6.8%) | 0.784 | 11 (4.0%) | 16 (8.2%) | 18 (8.5%) | 0.033 | 7 (2.1%) | 21 (15.0%) | 17 (8.3%) | <0.001 |
| **FLUTD** | 42 (6.1%) | 11 (4.0%) | 31 (7.5%) | 0.064 | 13 (4.7%) | 2 (1.0%) | 27 (12.7%) | <0.001 | 33 (9.7%) | 0 | 9 (4.4%) | <0.001 |
| **FIP** | 38 (5.5%) | 16 (5.9%) | 22 (5.3%) | 0.755 | 17 (6.1%) | 11 (5.7%) | 10 (4.7%) | 0.494 | 21 (6.2%) | 13 (9.3%) | 4 (2.0%) | 0.004 |
| **FIV** | 31 (4.5%) | 15 (5.5%) | 16 (3.9%) | 0.308 | 9 (3.2%) | 5 (2.6%) | 17 (8.0%) | 0.008 | 22 (6.5%) | 6 (4.3%) | 3 (1.5%) | 0.011 |
| **CKD** | 33 (4.8%) | 29 (10.7%) | 4 (1.0%) | <0.001 | 5 (1.8%) | 9 (4.6%) | 19 (8.9%) | <0.001 | 21 (6.2%) | 3 (2.1%) | 9 (4.4%) | 0.210 |
| **Feline Hepatopathy** | 28 (4.1%) | 11 (4.0%) | 17 (4.1%) | 0.959 | 4 (1.4%) | 9 (4.6%) | 15 (7.0%) | 0.001 | 7 (2.1%) | 18 (12.9%) | 3 (1.5%) | <0.001 |
| **FeLV** | 19 (2.8%) | 7 (2.6%) | 12 (2.9%) | 0.796 | 9 (3.2%) | 7 (3.6%) | 3 (1.4%) | 0.195 | 11 (3.2%) | 0 | 8 (3.9%) | 0.032 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Allergic Bronchitis** | 13 (1.9%) | 2 (0.7 %) | 11 (2.7 %) | 0.0 54 | 3 (1.1 %) | 6 (3.1 %) | 4 (1.9 %) | 0.4 56 | 12 (3.5 %) | 0 | 1 (0.5 %) | 0.0 10 |
| **Neoplastic Conditions** | 12 (1.8%) | 4 (1.5 %) | 8 (1.9 %) | 0.6 37 | 7 (2.5 %) | 4 (2.1 %) | 1 (0.5 %) | 0.0 76 | 2 (0.6 %) | 7 (5.0 %) | 3 (1.5 %) | 0.0 02 |
| **Poisoning/Toxicity** | 11 (1.6%) | 5 (1.8 %) | 6 (1.5 %) | 0.6 94 | 5 (1.8 %) | 6 (3.1 %) | 0 | 0.0 31 | 6 (1.8 %) | 1 (0.7 %) | 4 (2.0 %) | 0.5 57 |
| **Feline Diabetes Mellitus** | 5 (0.7%) | 3 (1.1 %) | 2 (0.5 %) | 0.3 48 | 3 (1.1 %) | 2 (1.0 %) | 0 | 0.2 16 | 0 | 4 (2.9 %) | 1 (0.5 %) | 0.0 01 |

Percentages are calculated within each column (e.g., percentage of imported breed cats with enteritis = 65/341 = 19.1%). P-values are from chi-square tests comparing: sex (male vs female), age across three groups (<3m, 3m–1y, >1y), and breed across three groups (imported, local, crossbreed). P-values < 0.05 were considered statistically significant. FURTD = feline upper respiratory tract disease; FPV = feline panleukopenia virus; FCV = feline calicivirus; FLUTD = feline lower urinary tract disease; FIP = feline infectious peritonitis; FIV = feline immunodeficiency virus; CKD = chronic kidney disease; FeLV = feline leukemia virus.

**Table 4:** Prevalence of clinical diseases in dogs in relation to sex, age and breed

| **Diseases** | **Overall Occurrence (n=695)** | **Sex-wise prevalence (%)** | | | **Age-wise prevalence (%)** | | | | **Breed-wise prevalence (%)** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **Male (n=377)** | **Female (n=318)** | ***p*-value** | **<6 M (n=309)** | **6 M to 1 Y (n=183)** | **>1 Year (n=203)** | ***p*-value** | **German Shepherd (n=273)** | **Labrador (n=174)** | **Local (n=249)** | ***p*-value** |
| **Enteritis** | 143 (20.6%) | 76 (20.2%) | 67 (21.1%) | 0.767 | 82 (26.5%) | 39 (21.3%) | 22 (10.8%) | <0.001 | 58 (21.2%) | 34 (19.5%) | 51 (20.5%) | 0.841 |
| **Parasitic Infestation** | 97 (14.0%) | 56 (14.9%) | 41 (12.9%) | 0.457 | 51 (16.5%) | 22 (12.0%) | 24 (11.8%) | 0.089 | 33 (12.1%) | 25 (14.4%) | 39 (15.7%) | 0.357 |
| **Specie** *Toxocara canis* | 54 (7.8%) | 31 (8.2%) | 23 (7.2%) | 0.620 | 29 (9.4%) | 12 (6.6%) | 13 (6.4%) | 0.235 | 19 (7.0%) | 14 (8.0%) | 21 (8.4%) | 0.744 |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Ancylostoma* spp. | 27 (3.9%) | 16 (4.2%) | 11 (3.5%) | 0.591 | 14 (4.5%) | 6 (3.3%) | 7 (3.4%) | 0.560 | 9 (3.3%) | 7 (4.0%) | 11 (4.4%) | 0.764 |
| *Dipylidium caninum* | 16 (2.3%) | 9 (2.4%) | 7 (2.2%) | 0.867 | 8 (2.6%) | 4 (2.2%) | 4 (2.0%) | 0.663 | 5 (1.8%) | 4 (2.3%) | 7 (2.8%) | 0.691 |
| **CPV** | 94 (13.5%) | 37 (9.8%) | 57 (17.9%) | 0.002 | 61 (19.7%) | 23 (12.6%) | 10 (4.9%) | <0.001 | 49 (17.9%) | 12 (6.9%) | 33 (13.3%) | 0.002 |
| **Kennel Cough** | 55 (7.9%) | 31 (8.2%) | 24 (7.5%) | 0.738 | 31 (10.0%) | 15 (8.2%) | 9 (4.4%) | 0.022 | 17 (6.2%) | 9 (5.2%) | 29 (11.6%) | 0.015 |
| **Tick Fever** | 44 (6.3%) | 28 (7.4%) | 16 (5.0%) | 0.190 | 6 (1.9%) | 14 (7.7%) | 24 (11.8%) | <0.001 | 19 (7.0%) | 11 (6.3%) | 14 (5.6%) | 0.740 |
| **Skin Problems** | 42 (6.0%) | 24 (6.4%) | 18 (5.7%) | 0.693 | 15 (4.9%) | 11 (6.0%) | 16 (7.9%) | 0.162 | 15 (5.5%) | 12 (6.9%) | 15 (6.0%) | 0.785 |
| **Ehrlichiosis** | 41 (5.9%) | 26 (6.9%) | 15 (4.7%) | 0.219 | 7 (2.3%) | 13 (7.1%) | 21 (10.3%) | <0.001 | 18 (6.6%) | 11 (6.3%) | 12 (4.8%) | 0.548 |
| **Canine Distemper** | 38 (5.5%) | 21 (5.6%) | 17 (5.3%) | 0.886 | 7 (2.3%) | 8 (4.4%) | 23 (11.3%) | <0.001 | 11 (4.0%) | 19 (10.9%) | 8 (3.2%) | 0.001 |
| **Canine Hepatitis** | 39 (5.6%) | 24 (6.4%) | 15 (4.7%) | 0.330 | 22 (7.1%) | 11 (6.0%) | 6 (3.0%) | 0.043 | 14 (5.1%) | 9 (5.2%) | 16 (6.4%) | 0.740 |
| **Kidney & Urinary Problems** | 28 (4.0%) | 12 (3.2%) | 16 (5.0%) | 0.217 | 4 (1.3%) | 5 (2.7%) | 19 (9.4%) | <0.001 | 10 (3.7%) | 8 (4.6%) | 10 (4.0%) | 0.816 |
| **CCV** | 26 (3.7%) | 14 (3.7%) | 12 (3.8%) | 0.978 | 16 (5.2%) | 7 (3.8%) | 3 (1.5%) | 0.025 | 9 (3.3%) | 6 (3.4%) | 11 (4.4%) | 0.690 |
| **Otitis Externa** | 21 (3.0%) | 12 (3.2%) | 9 (2.8%) | 0.778 | 4 (1.3%) | 6 (3.3%) | 11 (5.4%) | 0.006 | 7 (2.6%) | 10 (5.7%) | 4 (1.6%) | 0.025 |
| **Babesiosis** | 17 (2.4%) | 11 (2.9%) | 6 (1.9%) | 0.382 | 2 (0.6%) | 6 (3.3%) | 9 (4.4%) | 0.003 | 8 (2.9%) | 4 (2.3%) | 5 (2.0%) | 0.720 |
| **Hip Dysplasia** | 9 (1.3%) | 5 (1.3%) | 4 (1.3%) | 0.964 | 1 (0.3%) | 3 (1.6%) | 5 (2.5%) | 0.053 | 5 (1.8%) | 3 (1.7%) | 1 (0.4%) | 0.193 |

Percentages are calculated within each column (e.g., percentage of German Shepherd dogs with enteritis = 58/273 = 21.2%). P-values are from chi-square tests comparing: sex (male vs female), age across three groups (<6m, 6m–1y, >1y), and breed across three groups (German Shepherd, Labrador,

Local). P-values < 0.05 were considered statistically significant. CPV = canine parvovirus; CCV = canine coronavirus.

### 3.2. Age-dependent distribution of clinical and surgical cases

In cats, clinical diseases peaked in kittens under 3 months, especially enteritis (n=72) and feline panleukopenia (n=33), while surgical interventions (neutering/spaying) were highest in adults over 1 year (Table 1, Table 3, Figure 5).

**3.3.** Among dogs, puppies under 6 months showed the highest clinical disease burden, predominantly enteritis (n=82) and CPV (n=61), whereas surgical procedures were most frequent in dogs over 1 year (Table 2, Table 4, Figure 5).

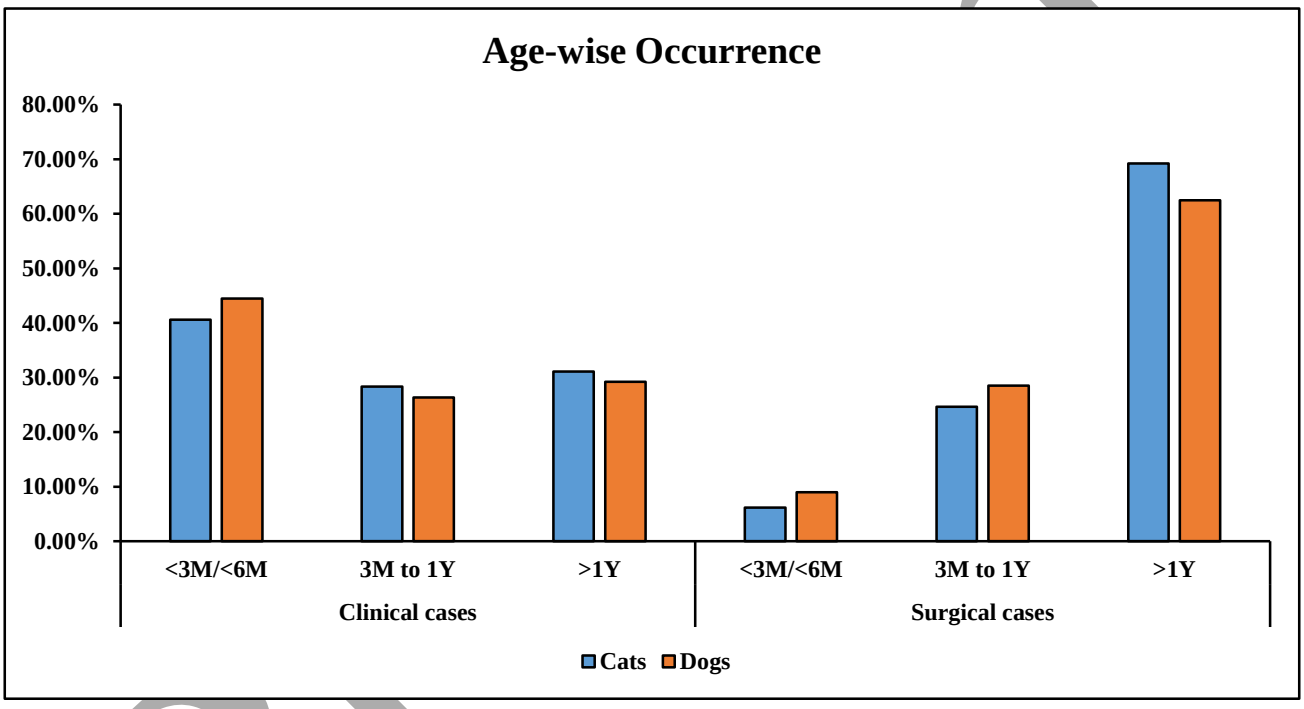


**Figure 5.** Age-wise distribution of clinical disease occurrence in cats and dogs

### 3.4. Breed-associated occurrence of clinical and surgical cases

Breed variation was significant in both species. In cats, imported breeds had higher clinical disease prevalence (enteritis n=65, allergic dermatitis n=49), while local breeds underwent more surgical interventions (soft tissue surgery n=21). Crossbreed cats showed a notably higher occurrence of feline panleukopenia (n=31) (Table 1, Table 3).

Among dogs, local breeds accounted for the most clinical and surgical cases (spaying n=74, neutering n=62). German Shepherds were particularly susceptible to CPV (n=49), and Labradors showed higher rates of canine distemper (n=19) (Table 2, Table 4).

### 3.5. Species-specific parasitic infections

*Toxocara* spp. were the most common gastrointestinal parasites in both species (*T. cati* in 8.2% of feline cases; *T. canis* in 7.8% of canine cases), followed by Ancylostoma spp. and *Dipylidium caninum*. Detailed distributions by sex, age, and breed are presented in Tables 3 and 4.

### 3.6. Statistical comparisons

Chi-square tests confirmed significant associations between overall clinical disease occurrence and sex, age, and breed in both cats and dogs ($p < 0.05$ for all comparisons). In cats, females ($\chi^2 = 29.02$, $p < 0.001$), kittens under 3 months ($\chi^2 = 16.99$, $p < 0.001$), and crossbreeds ($\chi^2 = 92.36$, $p < 0.001$) had significantly higher occurrence. In dogs, males ($\chi^2 = 9.86$, $p = 0.002$), puppies under 6 months ($\chi^2 = 52.34$, $p < 0.001$), and local breeds ($\chi^2 = 22.15$, $p < 0.001$) showed significantly higher disease frequencies (Tables 3-4).

## 4. Discussion

This Karachi-based clinic study provides a critical epidemiological picture of companion animal health in Pakistan's largest metropolis, reflecting endemic viral infections, parasitic burdens, and evolving surgical demands influenced by urbanization and shifting veterinary practices.

There was significant endemicity of infectious diseases. The prevalence of our Canine Parvovirus (CPV) findings are in line with Fatima et al. [14] who found 38.4% across the country. CPV was significantly more common in female dogs (17.9% vs. 9.8%; $\chi^2 = 9.72$, $p = 0.002$), puppies under 6 months (19.7% vs. 4.9%; $\chi^2 = 61.42$, $p < 0.001$), and German Shepherds (17.9% vs. 13.3%; $\chi^2 = 12.87$, $p = 0.002$), supporting targeted vaccination strategies. The difference in seroprevalence of FIV reported by Ali et al. [15] in Faisalabad (28.9%) may be due to demographic, diagnostic, or geographic differences, and underscore the importance of national standardization in the surveillance of FIV. The prevalence of Feline Leukemia Virus (FeLV) (2%) was similar to that of Yasir et al. [16] but given the high pathogenicity of the virus, regular screening is recommended. There was a significant male predominance in feline chronic kidney disease (CKD) ($\chi^2 = 33.62$, $p < 0.001$). Our setting did not have the option of PCR confirmation, and the detection of CDV in neurologic/non-neurologic forms by Mojtahedzadeh et al. [17] demonstrate the merits of this confirmation.

The substantial parasitic disease burden highlights a significant zoonotic risk for Karachi's pet-owning households. In our study, Toxocara cati (8.2%) and T. canis (7.8%) were identified, consistent with Shabbir et al. [18] (29.5% in cats, 22.4% in dogs). T. canis prevalence was significantly higher in puppies than adults (9.4% vs. 6.4%; $\chi^2 = 9.18$, $p = 0.010$). Our 7.8% rate is comparable to Acharya et al. [19] (75.49% overall prevalence in Nepal, with higher rates in young animals), supporting targeted deworming programs. Similarly, Khan et al. [20] reported Giardia (9.11%) and Cryptosporidium

(3.91%) in Faisalabad, with higher infection rates in younger animals, reflecting our clinical experience. Tick-borne pathogens are also widespread, with Ehrlichia canis (29% in Lahore [21]) and Babesia spp. (42% in Punjab [22]) confirming severe endemicity. Both ehrlichiosis and babesiosis were significantly more common in adult dogs than puppies ($p < 0.001$ for both), underscoring the need for robust parasite control.

The high proportion of elective sterilization (spaying/neutering) in adults suggests growing uptake of preventative healthcare, while other surgeries such as soft tissue surgeries for trauma, abscesses, and wounds reflect other urban hazards (e.g., traffic accidents, abusing each other). Cases of urolithiasis, frequently diet- and water-related, identify a potential opportunity for owner education to decrease the number of surgeries. The heartworm, Dirofilaria immitis, was not found, as reported by Muneeb et al. [23] but active surveillance is needed because of the vector dynamics changes.

There are some limitations to this study. First, selection bias is a natural feature of the clinic-based sampling, and our results are not representative of the entire companion animal population, but only of the animals who come to a single private hospital in Karachi. Secondly, the lack of a population denominator, the percentages reported represent hospital-based occurrence rather than true prevalence. Third, diagnostic testing was inadequate in 15-20% of cases because of owner financial limitations, and so, a presumptive diagnosis was made. Fourth, some pathogens were not confirmed by PCR, which could have led to misclassification. Nevertheless, this study is a valuable baseline information for the health of companion animals in the urban areas of Pakistan.

## 5. Conclusion

This first clinic-based survey in Karachi confirms a high burden of preventable infectious and zoonotic diseases, alongside growing demand for elective surgeries, in metropolitan companion animals. Key recommendations include: standardizing preventive care guidelines, conducting public education on zoonotic risks, and expanding clinic-based surveillance across Karachi. This study underscores the importance of a One Health approach to improve animal welfare, veterinary practice, and public health in urban Pakistan.

## Compliance with ethical guidelines

This study was conducted in accordance with the ethical standards of the Institutional Review Board and Ethics Committee of Gomal University, KP, Pakistan.

## Data availability

The data used to support the findings of this study is available from the corresponding author upon reasonable request.

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**Author's Contribution**

Conceptualization: MM. Investigation and data curating: MM. Writing draft: MM. Editing manuscript: MM. AYK, AS and MHE supervised the activities. All authors read and approved the final version of the manuscript.

**Conflict of interest**

The authors have declared no conflict of interest exists.

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**Declaration of Generative Artificial Intelligence (AI)**

The authors affirm that the article, including its tables and figures, was not generated using AI or AI-assisted technologies.

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