



Summary of Reported Animal Bites

Allegheny County, PA, 2018

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Prepared by

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Introduction

Animal bites can cause significant injury and may require substantial medical treatment to prevent infection. The rabies virus can be transmitted from an infected mammal via saliva during an animal bite.¹ Symptoms may take months or years to manifest. But once symptoms of rabies develop, rabies is almost always fatal.² If exposure to a rabid animal occurs, the disease can be prevented in humans via post-exposure prophylaxis (PEP) for rabies. Rabies PEP consists of a single dose of Human Rabies Immune Globulin (HRIG) and a four-dose series Human Diploid Cell Vaccine (HDCV).¹ If the PEP is administered correctly, the series is 100% effective at preventing rabies.²

In the U.S., there are only about 1 to 3 human rabies cases reported each year. In Pennsylvania, there has not been a human case since 1984.³ In the US, most rabid animals reported to CDC are bats, raccoons, and skunks.⁴ In 2017, out of 4,454 rabid animals reported to the CDC, 276 (6%) were cats and 62 (1%) were dogs.⁴ Globally, however, most human rabies cases are still caused by exposure to rabid dogs.¹ The low incidence rate of human rabies in the U.S., as well as the low number of domestic animal rabies cases, is a result of public health efforts such as vaccinating pets and eliminating stray dogs, as well as medical advances in post-exposure treatment for rabies.

In Allegheny County, health care providers are required to report animal bites to the Allegheny County Health Department (ACHD) so that proper follow up with the victim and/or animal owner can be conducted to mitigate rabies risk and prevent spread in the community. This report examines the animal bites reported to ACHD in the year 2018.

Methods

Health care providers report animal bites to ACHD either by filling out an electronic form in an Oracle database to document the incident or by faxing a bite report form to ACHD. ACHD staff then enter data from the faxed form into the Oracle database. The Immunization Program at ACHD then contacts the bite victim and animal owner to make recommendations and to finish filling out the form. The health department places domestic animals on an in-home quarantine period, usually for ten days, to monitor for signs of rabies. If the animal is deceased, testing of the animal for rabies is requested. Testing for rabies is done via a direct fluorescent antibody test at the ACHD laboratory. Post-exposure prophylaxis (PEP) for rabies is recommended to the victim if the animal is not available to be observed during the ten-day quarantine period, if the animal cannot be tested, or if the animal tests positive for rabies. ACHD monitors the progress of the four-dose vaccine sequence to ensure the victim completes the treatment.

Bite data from the year 2018 was exported from the Oracle database into a Microsoft Excel spreadsheet. SAS, version 9.4, was used to clean the data. Duplicate observations, which were identified by name and bite date, were deleted. Bite incidents were deleted if they did not occur in the year 2018. If the bite date was missing, the incident was included if it had a report date in 2018. Bite reports not involving mammals were excluded as rabies is a mammalian disease.

Cases in which the bite location, victim residence, and owner residence were all outside of Allegheny County were excluded.

Descriptive analysis was performed in SAS; tables and graphs were created using Microsoft Excel. Information on population by age group was obtained from American FactFinder, the US Census's Bureau online tool, for the year 2018 to calculate rates per 100,000 population. Data on dog breeds licensed in Allegheny County in 2018 were obtained from the Allegheny County Treasurer's Office and the City of Pittsburgh Open Records Office to compare to the breeds involved in bite incidents reported in 2018. Epi Info™ was used to calculate chi-square statistics comparing the proportion of each breed involved in bites with the proportion of each breed registered in the county. A p-value of 0.05 was used to assess statistical significance.

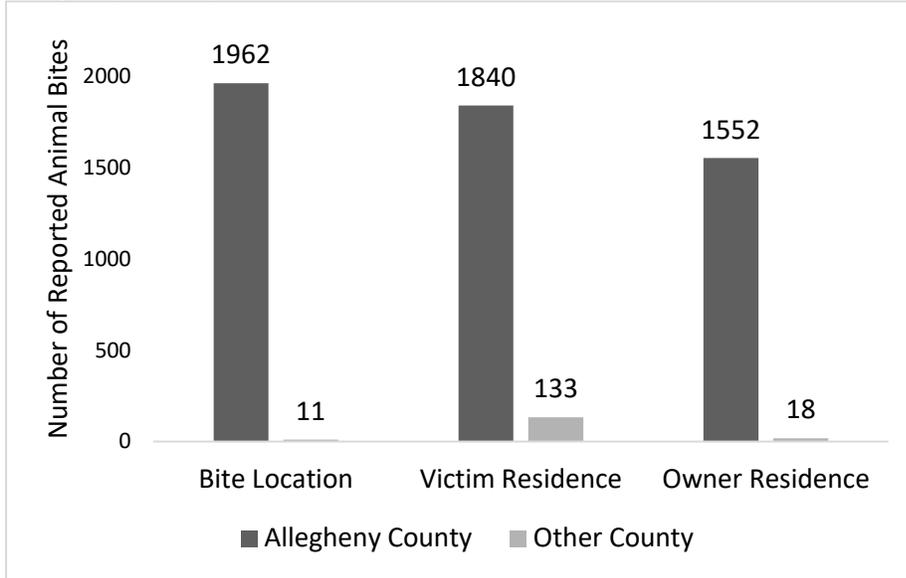
Bite incidence rates per 100,000 people, by zip code of residence of the bite victim, were displayed on a map of Allegheny County using ArcMap™ 10.5.1. The rate per 100,000 people was calculated using the number of bite victims per zip code divided by the total population of that zip code. Population data by zip code was obtained from the 2010 census. Rates were calculated using the number of bites occurring in each zip code in Allegheny County only. Therefore, since some zip codes are only partially within county, bite incidence rates may be an under-representation of bite incidence in border zip codes.

Note that the terms "bite" and "exposure" are used interchangeably in this report and encompass animal bites and scratches.

Results

In 2018, there were 1,973 animal bites reported to ACHD. Most bite victims (93.3%) were Allegheny County residents. Nearly all bite locations (99.4%) and animal owner addresses (98.9%) were within Allegheny County (**Figure 1**).

Figure 1: County of bite location, victim residence, and owner residence for reported animal bites, Allegheny County, 2018



Note: Only bite incidents involving “pets” were analyzed for owner residence.

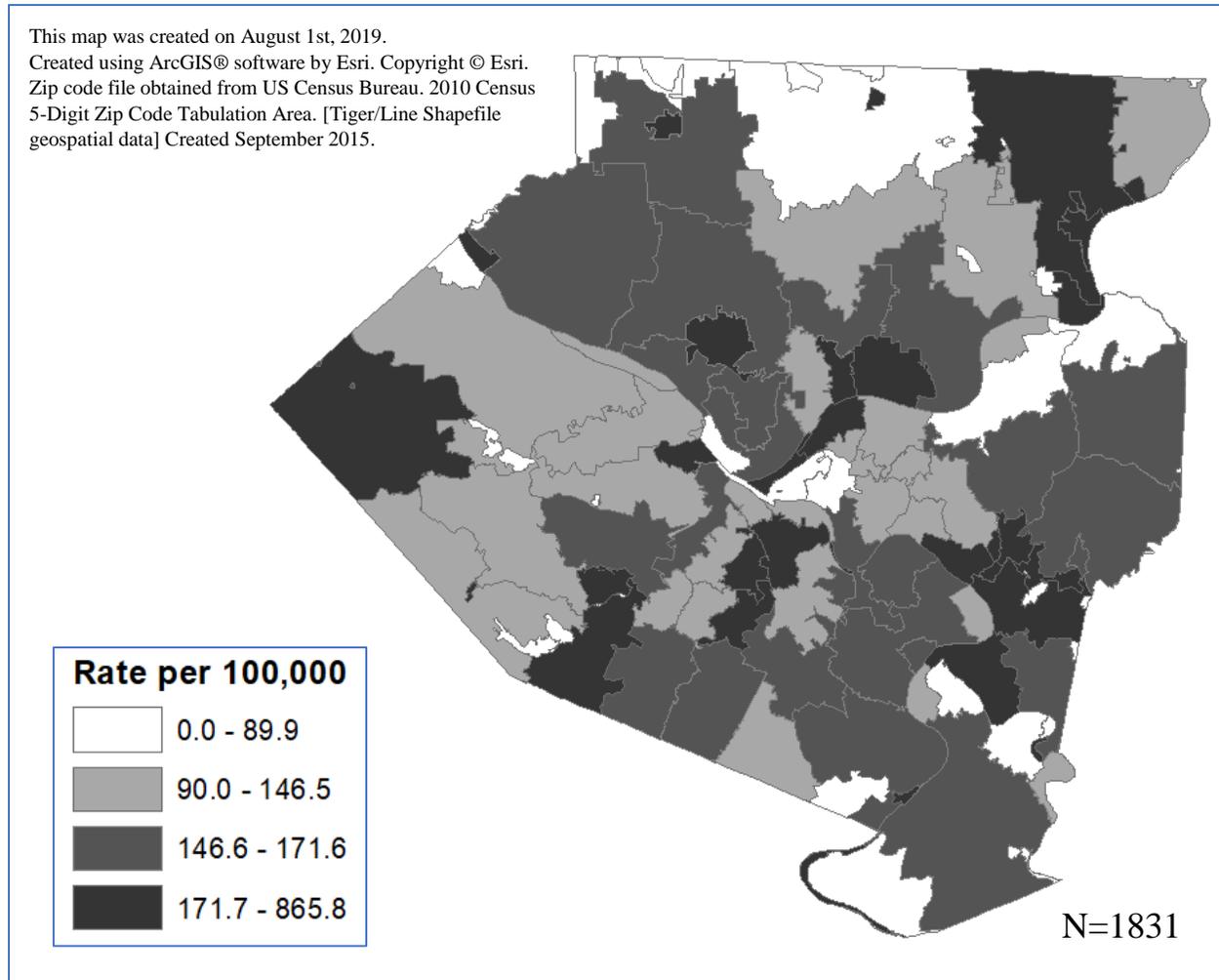
Most reported bites involved dogs (74.9%) or cats (22.2%). Bats (0.7%) and raccoons (0.4%) were the most common wild animals noted in bite reports. All other mammals reported accounted for less than 0.4% of cases. There was one instance in which the animal type could not be positively identified by the victim. Data on animal type was missing on five reports (**Table 1**).

Table 1: Bites reported by animal type, Allegheny County, 2018

Species	Number	
	N	%
Dog	1477	74.9
Pet	1264	64.1
Stray	23	1.2
Unknown/Missing	190	9.6
Cat	438	22.2
Pet	297	15.1
Stray/Feral	82	4.2
Unknown/Missing	59	3.0
Bat	14	0.7
Raccoon	8	0.4
Groundhog	5	0.3
Squirrel	5	0.3
Rat	5	0.3
Mouse	3	0.2
Vole	2	0.1
Rabbit	2	0.1
Skunk	1	<0.1
Chipmunk	1	<0.1
Hamster	1	<0.1
Muskrat	1	<0.1
Horse	1	<0.1
Pig	1	<0.1
Fox	1	<0.1
Primate	1	<0.1
Unknown	1	<0.1
Missing	5	0.3
Total	1973	100

Bite incidence rate by zip code of victim can be seen in **Figure 2**.

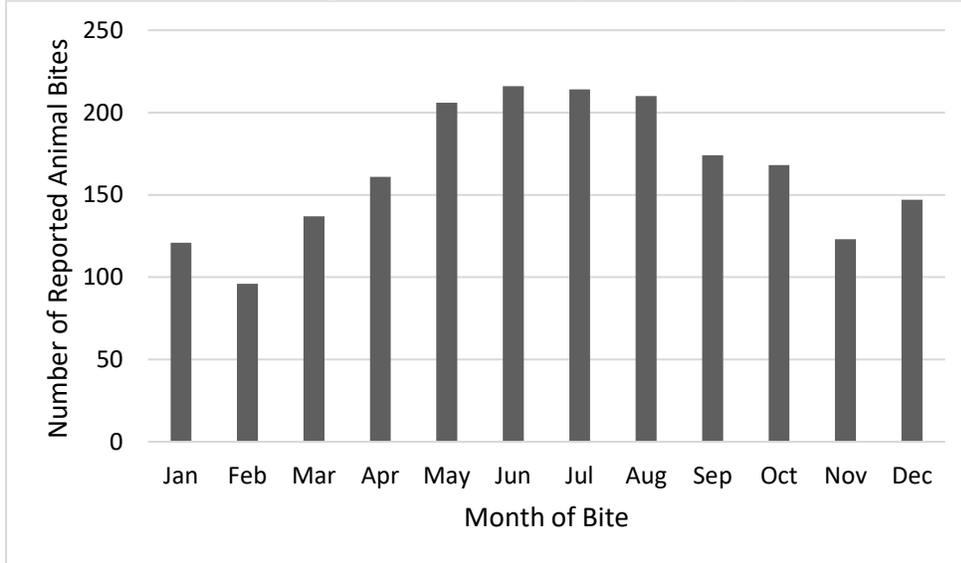
Figure 2: Bite incidence rate per 100,000 people by zip code of victim residence, Allegheny County, 2018



* The zip code of residence was available for 1,831 Allegheny County bite victims. Bite rates for zip codes not entirely within Allegheny County may be an under-estimation.

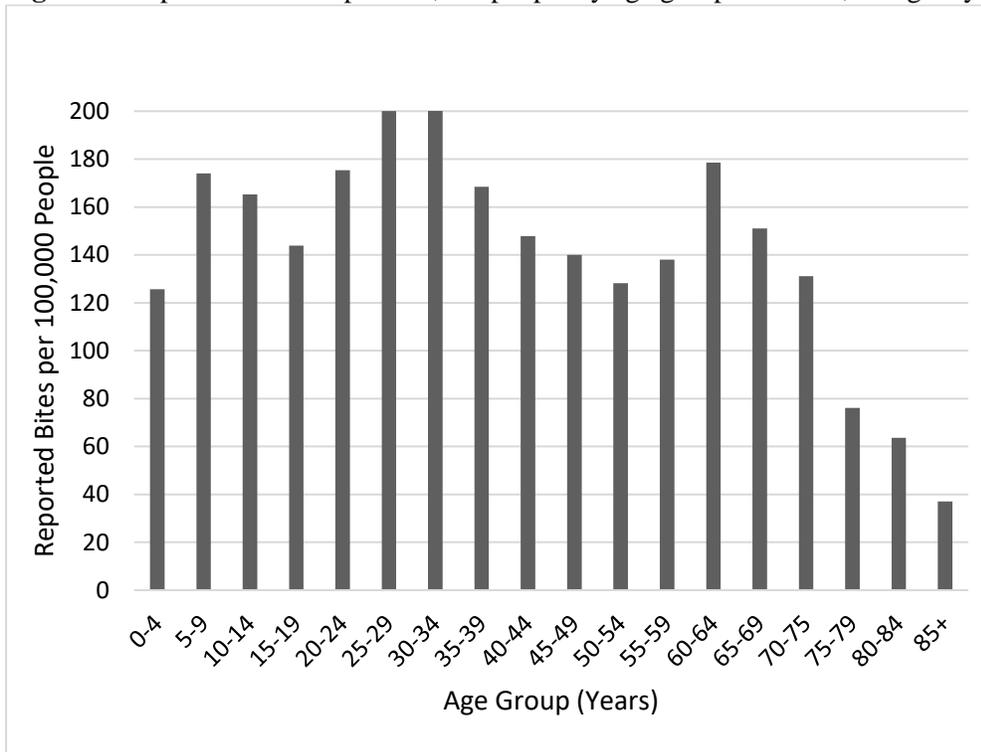
The number of reported bites peaked during the late spring and summer months (**Figure 3**).

Figure 3: Distribution of reported animal bites by month, Allegheny County, 2018



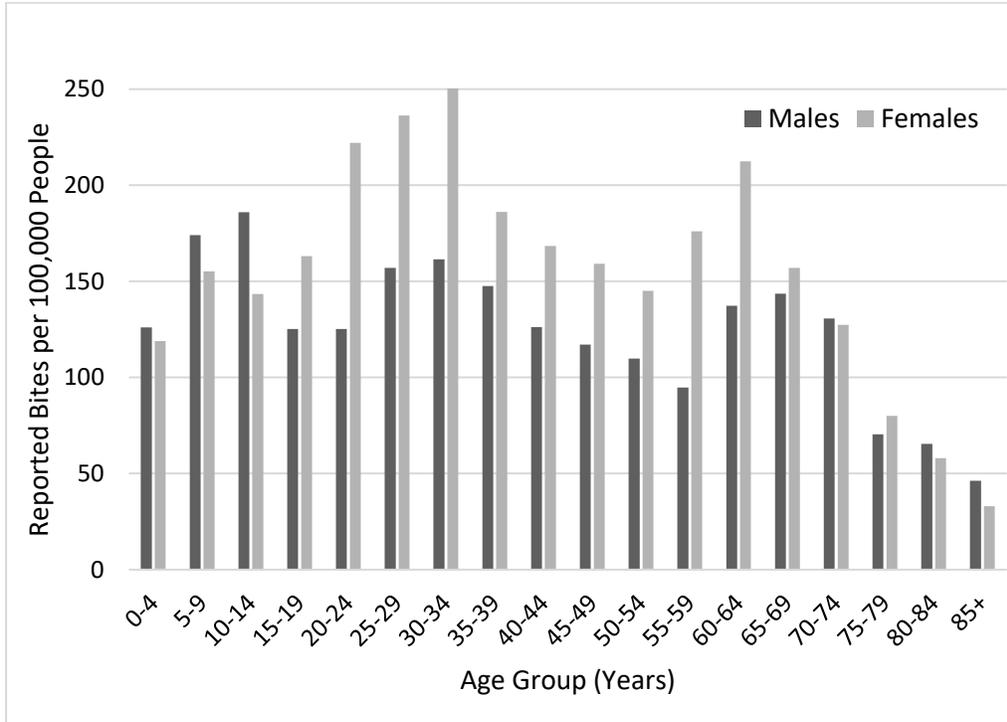
Victims ranged in age from less than 1 year old to 96 years old. The median age was 35 years and the mean age was 37 years. Bite rates per 100,000 people were highest for individuals aged 25-34 years (**Figure 4**).

Figure 4: Reported bite rate per 100,000 people by age group of victim, Allegheny County, 2018



Of 1,949 bite victims with known sex, 58% were female and 42% were male. Male children had a higher reported bite incidence rate than female children for each respective age group through ages 10-14. Females had a higher reported bite incidence rate than males for each respective age group from ages 15-19 through ages 65-69. Elderly male and female individuals had similar reported bite incidence rates (**Figure 5**).

Figure 5: Reported bite rate per 100,000 people by age group and sex of victim, Allegheny County, 2018



Of animals reported in bite incidents, 70 were tested for rabies by the ACHD laboratory. These mostly consisted of domestic animals such as dogs and cats. Three animals tested positive for rabies: a feral cat, a bat, and a fox (**Table 2**). Other animals found within Allegheny County not associated with human bites are also tested for rabies at the ACHD lab. Of 612 animals brought in for testing, 25 tested positive for rabies. Raccoons and bats were the most common rabid animals. No dogs tested positive for rabies in Allegheny County in 2018 (**Table 3**).

Table 2: Number of animals tested for rabies and number positive among animals listed on bite reports, Allegheny County, 2018

	Number Known to Be Tested for Rabies N	Number Positive n (%)
Dog	38	0
Pet	30	0
Stray	1	0
Missing	7	0
Cat	24	1 (4.2)
Pet	14	0
Stray/Feral	7	1 (14.3)
Unknown/Missing	3	0
Bat	4	1 (25.0)
Fox	1	1 (100.0)
Squirrel	1	0
Groundhog	1	0
Vole	1	0
Total	70	3 (4.3)

Table 3: Number of animals tested for rabies at the ACHD lab and number positive for rabies, Allegheny County, 2018

	Number Tested for Rabies in ACHD Lab N (%)	Number Positive n (%)
Cat	144	2 (1.4)
Bat	143	9 (6.3)
Raccoon	133	12 (9.0)
Dog	107	0
Groundhog	55	1 (1.8)
Squirrel	8	0
Fox	8	1 (12.5)
Skunk	6	0
Chipmunk	2	0
Rat	2	0
Rabbit	1	0
Mouse	1	0
Possum	1	0
Vole	1	0
Total	612	25 (4.1)

Table 4 shows the circumstances under which animal bites occurred. Nearly half (48%) of bite reports did not have the circumstances listed. The most common incident types listed were playing with the animal (6.7%), the animal got spooked (6.0%), and breaking up a fight (5.7%). Situations where the bite was not provoked (“at a community area and animal came up and bit the victim” and “walking on the road”) accounted for 112 (5.7%) bites.

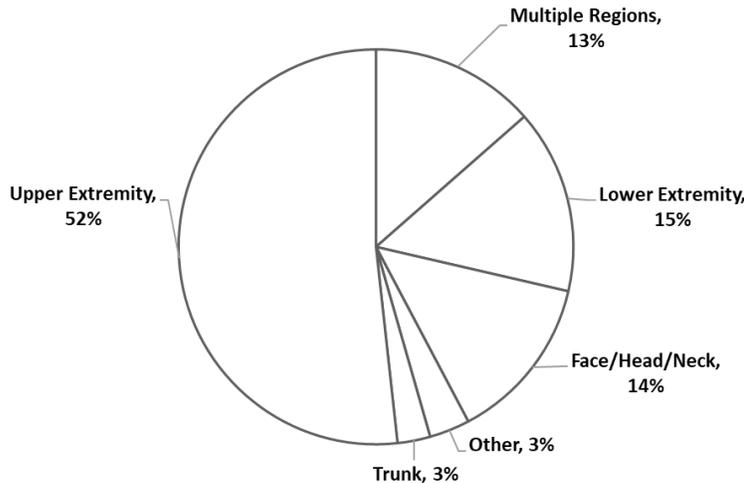
The data on circumstances are also shown separately for dogs and cats. Situations in which cat bites occurred more frequently than dog bites include performing a medical procedure, trying to capture the animal, and giving medication to or cleaning a wound on the animal.

Table 4: Type of incident for reported bites, Allegheny County, 2018

Incident Type	All (N=1973)		Dog (N=1477)		Cat (N=438)	
	n	(%)	n	(%)	n	(%)
Playing with the animal	132	(6.7)	111	(7.5)	20	(4.6)
The animal got spooked	119	(6.0)	78	(5.3)	40	(9.1)
Breaking up a fight	113	(5.7)	103	(7.0)	9	(2.1)
Trying to pet the animal	76	(3.9)	53	(3.6)	22	(5.0)
At a community area and animal came up and bit the victim	68	(3.4)	65	(4.4)	2	(0.5)
Performing a medical procedure	50	(2.5)	21	(1.4)	28	(6.4)
Walking on the road	44	(2.2)	42	(2.8)	2	(0.5)
Trying to capture the animal	36	(1.8)	14	(1.0)	21	(4.8)
Entering the owner’s house	32	(1.6)	30	(2.0)	2	(0.5)
Trying to feed the animal	26	(1.3)	20	(1.4)	5	(1.1)
Bathing/Grooming the animal	24	(1.2)	13	(0.9)	11	(2.5)
Taking something from the animal	19	(1.0)	19	(1.3)	0	(0)
Trying to put the animal in a crate	17	(0.9)	9	(0.6)	8	(1.8)
Walking into the owner’s yard	16	(0.8)	16	(1.1)	0	(0)
Delivering the mail	14	(0.7)	14	(0.9)	0	(0)
Touching a wound or painful spot on the animal	12	(0.6)	10	(0.7)	2	(0.5)
Bitten by a bat	9	(0.5)	N/A		N/A	
Giving medication to or cleaning a wound on the animal	9	(0.5)	3	(0.2)	6	(1.4)
Greeting a new animal	9	(0.5)	7	(0.5)	2	(0.5)
Bitten by a wild animal	6	(0.3)	N/A		1	(0.2)
Yelling at or hitting the animal	6	(0.3)	6	(0.4)	0	(0)
Checking the animal for a collar and tags	4	(0.2)	4	(0.3)	0	(0)
Repairing/Installing an item on the owner’s property	2	(0.1)	2	(0.1)	0	(0)
Waking up in a room with a bat	2	(0.1)	N/A		N/A	
Worker from phone/cable company that is on or near the owner’s property	2	(0.1)	2	(0.1)	0	(0)
Other	178	(9.0)	135	(9.1)	38	(8.7)
Missing	948	(48.0)	700	(47.4)	219	(50.0)
Total	1973	(100)	1477	(100)	438	(100)

The majority of bites were to upper extremities (arms and hands) (52%), followed by lower extremities (15%), and face/head/neck (14%). Thirteen percent of individuals were bitten on multiple regions. Only 3% of exposures were solely to the trunk (abdomen, back, chest, or buttocks). Eleven percent of reports did not have information on location of the bite on the body (not included in graph) (**Figure 6**).

Figure 6: Location of exposure for bites reported with known site, Allegheny County, 2018.



Note: Upper extremity was defined as shoulder, arm, wrist, finger and hand. Lower extremity was defined as leg, hip, foot, ankle, and toe. Face/head/neck was defined as face, head, neck, and ear. Trunk was defined as buttocks, abdomen, chest, and back. Other was defined as any location that did not fit in the above-mentioned categories. Multiple locations was defined as greater than one location on the body.

Antibiotics were prescribed for 61.7% of victims involved in a reported animal bite; 28.6% of victims received a tetanus shot and 5.2% received at least one dose of the rabies PEP vaccine series. A third (33.4%) did not receive any treatment.

Among victims bitten by dogs, 62.1% were prescribed antibiotics, 28.6% received a tetanus shot, and 3.6% received at least one dose of the rabies PEP vaccine series; 33.6% did not receive treatment. Among victims bitten by cats, 64.6% were prescribed antibiotics, 28.8% received a tetanus shot, and 6.4% received at least one dose of the rabies PEP vaccine; 32% did not receive any treatment (**Table 5**).

Table 5: Type of treatment received, Allegheny County, 2018

Treatment Type	All Bites (N=1973)		Dogs (N=1477)		Cats (N=438)	
	n	(%)	n	(%)	n	(%)
Antibiotic (systematic + topical)	1218	(61.7)	917	(62.1)	283	(64.6)
Wound Cleansed	1151	(58.3)	917	(62.1)	210	(47.9)
Tetanus Vaccine	565	(28.6)	422	(28.6)	126	(28.8)
Rabies PEP	103	(5.2)	53	(3.6)	28	(6.4)
Other Treatment	74	(3.8)	64	(4.3)	8	(1.8)
No Treatment	659	(33.4)	497	(33.6)	140	(32.0)

The most common antibiotic prescribed was Augmentin, given to about 50% of bite victims overall. About 33% of reports did not specify the type of antibiotic prescribed (**Table 6**).

Table 7: Type of antibiotic prescribed for animal bites, Allegheny County, 2018

Antibiotic	All Bites (N=1218)		Dog Bites (N=917)		Cat Bites (N=283)	
	n	(%)	n	(%)	n	(%)
Augmentin	610	(50.1)	462	(50.4)	137	(48.4)
Doxycycline	45	(3.7)	29	(3.2)	16	(5.7)
Unasyn	32	(2.6)	22	(2.4)	10	(3.5)
Amoxicillin	24	(2.0)	20	(2.2)	4	(1.4)
Clindamycin	11	(0.9)	9	(1.0)	2	(0.7)
Keflex	6	(0.5)	7	(0.8)	3	(1.1)
Bactrim	5	(0.4)	3	(0.3)	2	(0.7)
Topical Only	10	(0.8)	9	(1.0)	1	(0.4)
Other	15	(1.2)	5	(0.5)	5	(1.8)
Multiple	62	(5.1)	43	(4.7)	17	(6.0)
Not Specified	398	(32.7)	308	(33.6)	86	(30.4)

A total of 103 victims received the rabies PEP vaccine series. Three bite victims received the vaccine because they were exposed to an animal that tested positive for rabies. The majority of individuals received rabies PEP because they were exposed to an animal that could not be observed for rabies symptoms or tested for rabies. Twenty bite victims received the rabies PEP vaccine unnecessarily. The animal was healthy and the victim chose to get the rabies PEP anyway, or the victim received an improper recommendation to get the rabies PEP (**Table 8**).

Table 8: Reason for getting rabies PEP, Allegheny County, 2018

Reason	N= 103
	n (%)
Exposed to an animal that had rabies	3 (2.9)
Exposed to an animal that could not be observed or tested	80 (77.7)
Invalid Reason	20 (19.4)

On bite reports, 23.7% of dogs and 17.1% of cats were reported to be vaccinated against rabies. But for over half of dog and cat bites (56.8%), the vaccination status of the animal was not listed.

Table 9 summarizes the most common dog breeds involved in animal bites. Only breeds that were involved in 10 or more bites are listed. The most common dog breeds involved in bites other than mixed breed (19.2%) were pit bulls (17.8%), German Shepherds (9.1%), and Labrador Retrievers (6.4%). For 29.4% of dog bites, no breed was listed in reports. Some breeds were overrepresented in the data compared to county breed registry statistics. Breeds that had a statistically significant higher percentage of bite involvement than the percentage licensed in

Allegheny County are shown in bold font, and most notably include pit bulls, German Shepherds, and bulldogs.

Table 9: Dog breeds involved in animal bites, Allegheny County, 2018

Breed	Total Bites* (N=1044) n (%)	Licensed in Allegheny County or City of Pittsburgh (N=100,473) n (%)	Chi-Square Test P-Value
Mixed Breed	200 (19.2)	10865 (10.8)	< 0.01
Pit Bull	186 (17.8)	4676 (4.7)	< 0.01
German Shepherd	95 (9.1)	3864 (3.8)	< 0.01
Labrador Retriever	67 (6.4)	12304 (12.2)	< 0.01
Bulldog	41 (3.9)	1611 (1.6)	< 0.01
Rottweiler	33 (3.2)	1184 (1.2)	< 0.01
Boxer	25 (2.4)	2882 (2.9)	0.36
Husky	24 (2.3)	1243 (1.2)	< 0.01
Golden Retriever	24 (2.3)	3354 (3.3)	0.06
Beagle	23 (2.2)	4716 (4.7)	< 0.01
Chihuahua	21 (2.0)	3806 (3.8)	< 0.01
Shih-Tzu	16 (1.5)	3372 (3.4)	< 0.01
Jack Russell	14 (1.3)	492 (0.5)	< 0.01
Yorkshire Terrier	14 (1.3)	3234 (3.2)	< 0.01
Mastiff	12 (1.1)	670 (0.7)	0.06
Corgi	12 (1.1)	493 (0.5)	< 0.01
Australian Shepherd	11 (1.1)	825 (0.8)	0.41
Dachshund	11 (1.1)	2350 (2.3)	< 0.01
Doberman Pinscher	10 (1.0)	561 (0.6)	0.09
Border Collie	10 (1.0)	1207 (1.2)	0.47
Great Dane	10 (1.0)	586 (0.6)	0.12
Breeds with < 10 bites	185 (17.7)		

*433 missing. Percentages are based off of 1044 instead of 1477.

Breeds show in bold font are **significantly** overrepresented in reported animal bites compared to the county license data from 2018.

Note: If two or more breeds were listed as a dog breed (e.g. pit bull + boxer) then breed was categorized as the first breed noted (pit bull). If a breed was listed as a single breed mix (e.g. pit bull mix), the breed was categorized as a single breed (pit bull).

Discussion

In summary, there were 1,973 animal bites reported to the Allegheny County Health Department in 2018. However, animal bites are often underreported.⁵ So this number may be an underestimation of the number of animal bites occurring in the county.

The vast majority of bites reported involved dogs, which accounted for about 1000 more bites than cats, the second most common animal involved in bites. The most common wild animals involved in bites were bats, raccoons, groundhogs, and squirrels. Only three animals involved in bites reported to ACHD in 2018 had rabies: a feral cat, a bat, and a fox. Overall, 25 animals found within the county tested positive for rabies at the ACHD lab. The most common rabid animals were raccoons and bats. Wild animals remain the main threat for rabies exposure in Allegheny County.

Females had higher bite incidence rates than males from ages 15 to 69. Male children had higher bite incidence rates than female children through 14 years of age. A similar trend was seen in the animal bite data for 2017 in Allegheny County. This pattern may be observed due to differences in seeking medical care by female individuals, as compared to males.

Rabies vaccines for pets are required once the pet reaches three months of age in Pennsylvania.⁶ But the state does not enforce this law. Of bites reported in 2018, 23.7% of dogs and 17.1% of cats were documented to be vaccinated against rabies; however, data on vaccination were missing for over half of reported cases.

The number of each dog breed licensed in Allegheny County can be obtained from the Allegheny County Treasurer's Office and City of Pittsburgh Open Records Office, respectfully, as owners are required to have a license for their dog. This is not true of cats, however, so the analysis of breeds was only possible for dogs. Certain dog breeds were overrepresented in animal bites in the county for 2018, namely pit bulls, German Shepherds, and bulldogs. These results were similar to previous years.

Bite wounds are a source of infection and should therefore be properly cleansed and irrigated.⁷ Despite mixed data in the literature on effectiveness of antibiotics, antibiotics are often prescribed for high-risk bites and considered for average-risk bites.⁷ Overall, 61.7% of bite victims were prescribed antibiotics in Allegheny County in 2018. Augmentin is the first-line antibiotic choice for animal bites and accounted for half of the antibiotic prescriptions for animal bites in Allegheny County in 2018.⁷

In Allegheny County in 2018, 28.6% of all bite victims received a tetanus shot. A tetanus shot is indicated if the victim has not had a tetanus shot within the past ten years for minor wounds and within five years for other wounds, or if they have less than three doses of the vaccine in their lifetime.⁷ If a patient is unsure of when they received a tetanus vaccine, health care professionals can consult the Pennsylvania Statewide Immunization Information System (PA-SIIS) to determine when the last tetanus shot was documented. This allows accurate determination of whether the vaccine is indicated and reduces unnecessary vaccination.

The HRIG/HDCV post-exposure prophylaxis regimen for rabies should only be administered if a victim is exposed to an animal that is rabid, an animal that could not be observed during the quarantine period, or an animal that could not be tested for rabies. Despite these guidelines, 20 persons received the rabies vaccine unnecessarily. The animal involved may have been healthy and observable, and the victim chose to get vaccinated anyway, or an improper recommendation was made to get the vaccine. The PEP regimen for rabies costs between \$1,200 and \$6,500 per person (an average of \$3,800).¹ This indicates about \$76,000 was unnecessarily spent on PEP for rabies in Allegheny County in 2018.

Fortunately, all three persons reported to be bitten by rabid animals received the rabies vaccine series.

Recommendations

1. **Avoid contact with wild animals.** Do not attempt to feed, touch, or take in wild animals as pets. Avoid contact with dead wild animals to prevent rabies exposure.
2. **Pet owners should comply with Pennsylvania's rabies vaccine regulations for pets.** All pet owners should have their pets vaccinated by three months of age. This will protect pets and their owners from rabies virus. Pets should also not be unsupervised in situations where they could come in contact with wildlife.
3. **Health care providers should be familiar with the protocol for animal bites and rabies PEP.** Health care providers should only recommend/provide the PEP vaccine series for rabies if the victim was exposed to an animal that had rabies, an animal that could not be observed during a quarantine period, or an animal that could not be tested for rabies. Health care providers should check PA-SIIS for information on tetanus vaccinations. Additionally, they should continue to report bites to the health department.
4. **Animals should be submitted for rabies testing if possible.** If pets involved in bites are euthanized during the quarantine period, the animal should be submitted for rabies testing. Bats found in homes should be captured and submitted for testing at the ACHD laboratory.
5. **Pennsylvania should enforce rabies vaccinations of dogs.** In order for a dog to be licensed, pet owners should be required to show proof of rabies vaccination. This will provide a mechanism to increase vaccination rates of dogs, protecting both dogs and owners from rabies virus.
6. **Pennsylvania should require licensing of cats.** Licensing of cats may provide a mechanism to mandate rabies vaccination, which will protect cats and owners from rabies virus.

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