

Felicia Trembath, PhD, MPH
Assistant Professor
Master of Public Health Program
Midwestern University
Glendale, AZ 85308

Report for Council Bluffs, IA

I am an Assistant Professor in the Master of Public Health Program at Midwestern University. I have a master's degree in public health and a PhD in epidemiology. I have also worked with health departments in several states as an epidemiologist and received advanced training from the Centers for Disease Control and Prevention (CDC) in health systems integration and health informatics. Additionally, I have taught a variety of university level courses in public health, including introduction to public health, social determinants of health, epidemiology, and biostatistics. Epidemiologists study patterns of disease transmission in the population, identify trends, and recommend solutions/interventions. This is done either by collecting data or analyzing data that has already been collected by health officials and health care organizations. I have been researching human-animal interactions for over a decade. Animals can have a positive or negative effect on the health of humans and vice versa. When I began studying human-animal interactions, I was struck by the abundance of personal opinions and anecdotal evidence used to support programs and policies. My background and paradigm are as an epidemiologist, and I found that many of the individuals who research human-animal interactions are clinicians by training, and often they lack the statistical or epidemiological training to properly evaluate these issues. Consequently, much of the published literature on human-animal interactions relies upon personal opinions and anecdotal evidence. My approach to studying human-animal interactions has been to ignore personal opinions and to apply a rigorous scientific methodology to analyzing these issues. In 2016, I conducted a study to evaluate the effectiveness of breed-specific legislation (BSL) at reducing dog bite injuries. This project had 3 objectives: 1) propose standardized terminology for discussing breed-specific ordinances, 2) establish the prevalence of BSL in the USA, and 3) conduct a systematic review of the effectiveness of BSL. I have been asked by the defendant to review their breed-specific animal ordinance and provide my opinion on the Council Bluffs, IA ordinance, characteristics of pit bulls, dog bites as a public health problem, and the effectiveness of BSL. My opinions are based upon my training, my research, and a review of published data/literature.

Review of the Council Bluffs, IA Breed-specific Ordinance

When people think of BSL, they typically think of an ordinance that bans one or more breeds of dogs; however, there are several different types of ordinances that have breed-specific language. These range from ordinances that simply state a specific breed is considered a dangerous dog to ordinances that ban one or more breeds of dog. One of the things that hampers research into breed-specific ordinances is the lack of standardized terminology for describing the regulatory effect of these ordinances. As part of my 2016 study, I proposed standardized terminology for discussing and evaluating BSL. Based upon my review of pro-BSL

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websites, anti-BSL websites, published literature discussing BSL, and 100 randomly selected ordinances with breed-specific language, I proposed the following terminology to describe the regulatory action of breed-specific ordinances:

Declaration: A statement that declares a particular breed of dog to be dangerous, but places no restrictions upon their ownership.

Restriction: A restriction allowing ownership of the breed in question, but imposing restrictions, such as mandatory insurance and/or spaying or neutering.

Ban: Prohibits ownership of a certain breed or breeds of dog.

Grandfather clause: Allows for the keeping of dogs of a banned breed previously within the city limits as of the effective date of the ordinance. Often these clauses require registration and include restrictions on the keeping of the animals.

A specific ordinance could have one or more of these regulatory actions. For example, an ordinance may include a statement in the definitions section that a certain breed is automatically considered to be dangerous, but ownership of the breed is permitted without restriction. On the other hand, an ordinance may include a statement in the definitions section that a certain breed is automatically considered to be dangerous, and also ban ownership.

Either a research assistant or I reviewed and classified 945 active municipal ordinances with breed-specific language in the USA. Of the 945 breed-specific ordinances reviewed, 505 declared a breed dangerous a priori, 741 placed ownership restrictions, and 513 banned at least one breed. Exemptions for existing animals were included in 338 of the bans. Pit bulls were the most commonly regulated breed, with 941 of the 945 ordinances reviewed specifically mentioning pit bulls. Pit bulls were the only breed regulated by 742 or 78.5% of the ordinances, while 199 or 21.1% regulated pit bulls and one or more other breeds. The other regulated breeds varied from Rottweilers to Chihuahuas.

I reviewed ordinance no. 5821 for the City of Council Bluffs, IA. This is a breed-specific ordinance that regulates pit bulls. This ordinance falls under the classification of a ban with a grandfather clause, and restrictions on the keeping of grandfathered animals. In section 1.4.20.112 (2) the term pit bull is defined as an American Pit Bull Terrier, American Staffordshire Terrier, Staffordshire Bull Terrier, or any dog displaying the majority of physical traits of any one or more of the above breeds. The AKC and UKC breed standards are referenced and are stated to be on file with the administrative authority. The breed standards being kept on file is not an uncommon provision; however, the majority of breed-specific ordinances that I have reviewed do not contain this provision. The ordinance details exceptions to the prohibition of pit bulls in section C. These include current licensed animals, the animal shelter, licensed veterinarians treating animals, and public exhibitions. These exceptions are fairly typical for breed-specific ordinances that ban certain breeds of dogs. The exception for currently licensed animals is what I would classify as a grandfather clause, and of the ordinances that I reviewed which ban certain breeds of dogs, a grandfather clause was present in the majority (67%) of them. In section D of the ordinance, restrictions are listed for the keeping of grandfathered animals. This is also a common provision, with 93% of the ordinances with a grandfather clause that I reviewed

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providing restrictions for the keeping of these dogs. However, in my opinion the restrictions listed in this ordinance under section D are more specific than the majority of ordinances that I have reviewed which place restrictions on the keeping of grandfathered animals. The provisions listed that are pretty typical of other similar ordinances are the requirements for licensing the animal (1), maintaining insurance (3), sterilization (4), secure confinement while on the owner's property and a muzzle when not on the property (6), and signage on the owners property (8). The provisions that are more specific than other ordinances that I reviewed are requirements that the owner be over 18 years of age (2), the city will insert a microchip and maintain a registry of restricted animals (5), and the owner can only sell or transfer the animal to a family member who is over 18 years of age (7). Each of the restrictions listed in subsections 1-8 are very detailed, and where appropriate refer to other sections of the City's municipal code. Specific steps are provided for the dog owner to appeal the decision in section F. In my opinion, this level of specificity in terms of the breed standards being on file with the administrative authority, the detail provided for the restrictions placed on the keeping of grandfathered animals, and the avenue provided for owner appeal is uncommon, making the Council Bluffs, IA ordinance more detailed and thorough than most other breed-specific ordinances in the USA.

Characteristics of Pit Bulls

Breeds of dogs exist because dogs were selectively bred by humans to exhibit specific physical or behavioral traits

Dog breeds are groups of individual dogs that share incredibly similar characteristics.¹ Dog breeds are the byproduct of human selection for certain physical or behavioral characteristics.² There are approximately 350 recognized dog breeds.³ The most widely accepted method of categorizing dog breeds is based on which task(s) the animals are associated with. Examples of breed-specific tasks or behaviors include herding, pointing, and retrieving. These behaviors were developed through human selection, and the dimensions of behavior can be changed when the selection pressures being exerted change.⁴

Pit bull breeds descend from 19th century bulldogs, which were used in England for bullbaiting

Pit bull is not a breed in and of itself, but rather is a class of dog composed of three breeds: 1) American pit bull terrier, 2) American Staffordshire terrier, and 3) Staffordshire bull terrier. Dogs which are mixes of any of these three breeds are also considered pit bulls. American pit bull terrier is a recognized breed by the United Kennel Club (UKC), American Staffordshire terrier is a recognized breed by American Kennel Club (AKC), and the Staffordshire bull terrier is recognized as a breed by both the AKC and the UKC. Breed standards which describe the physical characteristics of these breeds have been developed by the AKC and the UKC.

Pit bulls descend from 19th century bulldogs, who were originally bred in England to be used for bull-baiting. Bull-baiting was a sport where an animal, usually a dog, was set upon a bull in a pen or enclosed area.⁵ Once bull-baiting was outlawed, participants switched to dogfighting for entertainment and continued to breed these dogs.

Pit bulls breed-specific traits

One of the characteristics that pit bulls have been bred for is a low level of inhibition against fighting.⁶ Animals bred for fighting will fight with no provocation and will continue to fight to the point of extreme exhaustion or death. This behavior does not make sense from an evolutionary standpoint, and is a behavior produced as a result of human intervention.⁶

Pit bulls also attack without provocation or warning.^{7,8} Dogs typically display behaviors that would indicate that they are unhappy with a situation or that they are becoming agitated. When people recognize these symptoms, they can diffuse or remove themselves from the situation in order to prevent a bite. On the contrary, pit bulls have been bred to attack without displaying any of the typical warning signals. In a 2004 training video for law enforcement officers, Dr. Randall Lockwood explained how he personally witnessed this behavior:

“Fighting dogs lie all the time. I experienced it firsthand when I was investigating three pit bulls that killed a little boy in Georgia. When I went up to do an initial evaluation of the dog's behavior. The dog came up to the front of the fence, gave me a nice little tail wag and a "play bow" -- a little solicitation, a little greeting. As I got closer, he lunged for my face. It was one of those "ah ha" experiences. Yeah, that would really work. That would really work in a dog pit. Because 99% of dogs are going to read that as "Oh boy I am your friend, let's play -- and there's my opening."^{9, disk 2}

While this behavior confuses human observers, it makes sense from a selective breeding perspective. If a dog is in a fight, it would be to the dog's advantage to not signal when it is going to attack. Thus, selective pressures in breeding for fighting dogs encouraged this trait in pit bulls.⁸

Some people say that pit bulls have a jaw that will lock once they bite. This is not true, anatomically the jaw of pit bulls is similar to that of other breeds. However, pit bulls display the behavior of biting and shaking or tearing, rather than biting and retreating.^{6,7} This hold and shake style can cause severe bone and muscle damage. “The increased destructiveness of pit bull bites is attributable to the behavioral factors of persistence and stamina rather than to any biomechanical factors.”^{6p. 4} This propensity to bite and hold was dramatically displayed in the case of *Toledo, Ohio v Paul Tellings* when the Lucas County Dog Warden, Tom Skeldon, showed a video of a tranquilized pit bull suspended from a steel cable. Despite being essentially unconscious, the dog still does not release its bite grip on the steel cable.

Breed-specific behaviors are heritable traits. Among studies evaluating the heritability of specific traits aggression is one of the most commonly demonstrated heritable traits

Numerous studies in the last 15 years have found that breed-specific behaviors are heritable traits, meaning that they are transmitted from parents to offspring.^{2,3,10-14} Additionally, among studies that evaluated which traits were inherited, aggression was one of the most commonly demonstrated inherited behavioral traits.^{2,10-13}

Visual identification of dog breeds is the industry standard practice; pit bulls are identifiable by their unique physical characteristics

It is a myth that is impossible to identify a pit bull. This is perpetuated by propaganda, such as online “Find the Pit Bull” tests. These tests are designed to confuse the public, policy makers, and the media. These tests frequently include photos that don’t show relative size, juvenile animals who are not fully developed, dog breeds that are extremely rare in the USA, examples of dog breeds that are closely related to pit bulls, and photos that don’t show distinguishing characteristics for the breed.

Breed standards which describe the physical characteristics of these breeds have been developed by the AKC and the UKC. Although DNA tests could determine the breed of a dog, it is not used by the AKC nor UKC to determine whether a dog can be registered as a specific breed. Visual inspection and comparison to published breed standards is the industry standard practice for breed identification. It is only common sense that if visual inspection is truly unreliable, these registering organizations and organized dog competitions would have shifted over to DNA testing. DNA testing has only been used by these organizations to determine parental lineage and dog identification in cases of consumer disputes. Visual identification has also been accepted by courts, who ruled in *Ohio vs. Anderson, 1991* that a dog owner of reasonable intelligence could recognize a pit bull based upon its unique physical appearance. According to Wapner & Wilson (2002),¹⁵ in *Ohio vs. Anderson*, the Court also found that “impossible standards of specificity are not required” in order for an ordinance to be enforceable. (p. 1554) Rather, the ordinance must merely be “sufficiently definite so that a person of ordinary intelligence can reasonably tell what is prohibited”. (p. 1554) Ordinances which provide detailed descriptions of the breeds that are regulated and/or reference the breed standards published by the AKC and UKC clearly meet this requirement. In the case of *American Dog Owners Association v. City of Yakima*, the City of Yakima, Washington’s breed-specific ordinance was challenged on the grounds that the ordinance was too vague. However, the court found that the criteria for specificity was met by the ordinance, since the Yakima ordinance used professional breed standards and illustrations that would enable law enforcement officers to make non-subjective decisions.¹⁵

In a practical application of breed identification, animal shelter workers are 96% accurate at identifying pit bull and pit bull mix dogs

In 2013, the Richmond SPCA did a study to evaluate whether animals who had a DNA test result card on their cage would be adopted at a higher rate than animals simply labeled as “pit mixes”.¹⁶ To do this, they tested the DNA for 91 dogs who the shelter staff had identified as pit bulls or pit bull mixes. They used the MARS Wisdom panel for DNA test results. Since pit bull is not a specific breed, but a composite term for several breeds, the Wisdom panel does not have a result for pit bull. At the time of this study, the Wisdom panel would identify whether a dog had bull breed DNA, which would include the breeds considered to be a pit bull. When the researchers compared the visual identification to the DNA results, they found that the shelter staff was 96% accurate in identifying dogs that had at least 25% bull breed DNA as pit bull mixes. Additionally, 57% of the dogs identified as pit bull mixes had one of the bull breeds as their primary breed on the DNA results. The researchers were surprised by this finding as they

expected more variation between the visual identification and the DNA results. Since there was so little variation between the visual identification and the DNA results, the researchers were unable to evaluate whether having the DNA test result card on the cage improved the odds that a dog would be adopted. The strengths of this study were that:

- o Identification was limited to identifying bull breed dogs and non-bull breed dogs
- o Large sample size with 91 dogs included
- o Shelter staff evaluated a real population of dogs in an animal shelter, instead of a convenience sample of owner volunteered animals
- o Shelter staff evaluated dogs in person instead of simply viewing photographs or video clips

In my opinion the study done by the Richmond SPCA is representative of what would happen in a real-life situation when an official is trying to identify a dog in order to enforce a breed-specific ordinance. Further, this study is more representative of how this information will be applied in the real world than the scenarios put forth by studies such as the ones done by Dr. Voith. As such, I have confidence in relying upon these results that showed that animal caretakers were 96% accurate in their visual identification of dogs who were pit bull and pit bull mixes.

Dog Bites as a Public Health Problem

Dog bites persistent and serious public health concern

Despite reductions to other areas of preventable injuries, dog bites rates remain fairly constant and continue to present a public health problem.^{17,18} An estimated 4.5 million dog bites occur annually in the USA.^{17,19} Approximately 17-20% of these bites require medical attention,¹⁷ while 1-3% require hospitalization.^{20,21} Dog bites are significant source of medical expenditures, with the average dog bite related hospital stay costing \$18,200, an amount 50% higher than the average injury-related hospitalization.²² In the USA, dog bites are the third leading cause of homeowner insurance claims.²³ In 2019, dog bite related liability claims cost insurance companies 797 million dollars, with an average cost per claim of \$44,760.²⁴ When insurance claims are coupled with hospitalizations and lost productivity, dog bites in the USA alone cost an estimated \$2 billion/year.²³

Children disproportionately affected

Dog bites disproportionately affect children, especially young males,^{25,26} with males under the age of nine usually being the most frequently afflicted group.^{27,28} Children are also more likely to suffer more severe injuries and more wounds to the head and face.^{25,26,29,30} Furthermore, in addition to the medical impact, dog bites often inflict emotional trauma on children, with as many as 50% of children reporting some form of post-traumatic stress for more than one month following a dog bite.^{31,32}

Evidence that the rate of severe bites is increasing

Even though dog bites are a reportable public health condition in the USA, they are consistently underreported.³³⁻³⁷ Underreporting for public health conditions is not unique to dog bites,

rather it is a common phenomenon for many conditions, including foodborne illness. Opponents of BSL would argue that dog bite statistics are not reliable because many dog bites are not reported to authorities. Just because dog bites are underreported, this doesn't mean that we don't have reliable data and we can't make reasonable conclusions about the epidemiology of dog bites. Underreporting for public health conditions is a known phenomenon, and as a field public health has developed methods to estimate the incidence of events based on reported data and other factors. When we look at the epidemiology of dog bites, we also have to consider the concepts of frequency and severity. Frequency refers to how often something occurs, while severity refers to how serious something is when it does occur. For dog bites, are we more concerned with the frequency or the severity of bites? When we evaluate other public health issues, like traffic accidents, we know that many minor fender benders go unreported. However, from a public health standpoint what we are concerned with is identifying and preventing risk factors that lead to severe and fatal motor vehicle accidents. This same principle holds true for dog bites. We know that dog bites are underreported, but from a public health standpoint we should focus our efforts on identifying and preventing risk factors that lead to severe and fatal dog attacks.

Although the estimated number of dog bites in the USA has remained relatively constant for over 20 years,^{17,19,37} there are indicators that the rate of severe bites is increasing. Between 1986 and 1994, the number of dog bites requiring medical attention increased by 36%,²⁷ and between 1993 and 2008, dog bite injury hospitalizations (DBIH) increased by 86%.²² Additionally, the number of dog bite related fatalities (DBRFs) has been increasing. Between 1979 and 1994, there were an average of 17 DBRFs per year,^{38,39} while from 2005-2019 there were an average of 35 DBRFs annually.⁴⁰ Taking into account the USA population, this represents an 64% increase in the rate of DBRFs.

Another alarming trend is the increase in maulings and DBRFs attributed to shelter animals. Between 1859 and 2009, there were 32 maulings attributed to shelter animals, but between just 2010 and 2014 this increased to 123 maulings attributed to shelter animals. The same trend is seen with DBRFs. Between 1859 and 1999, there were 2 DBRFs attributed to shelter animals. Between 2000-2009 there were 3 DBRFs attributed to shelter animals, and between 2010-2014 there were 35 DBRFs attributed to shelter animals.⁴¹ These represent dramatic increases in maulings and DBRFs that warrant further review and intervention.

Pit bulls are disproportionately responsible for dog bites and dog bite fatalities

Pit bulls make up an estimated 4-6% of the overall USA dog population.⁴² Yet despite being a relatively small percentage of the overall dog population, they are implicated in the majority of dog bites.⁷ Across many states in the USA, pit bulls were the leading breed in all biting incidents between 2005 and 2020.^{43,44} Pit bull advocates would argue that these numbers and these breed identifications are not accurate. This could be the case if these were isolated findings that we are discussing. However, when this type of information is being consistently reported by almost half of the states in the USA, it lends credibility to the validity of the data.

In addition to being disproportionately represented in dog bite injuries, pit bulls are also disproportionately represented in DBRFs since at least the 1980s. Between 1979 and 1998 pit bulls accounted for 30% of DBRFs where the breed was known.³⁹ The percentage of DBRFs that pit bulls are responsible for has increased dramatically from 30% from 1997-1998 to 66% from 2005-2019. The following image illustrates the proportion of breeds responsible for DBRFs in the United States from 2005-2019:

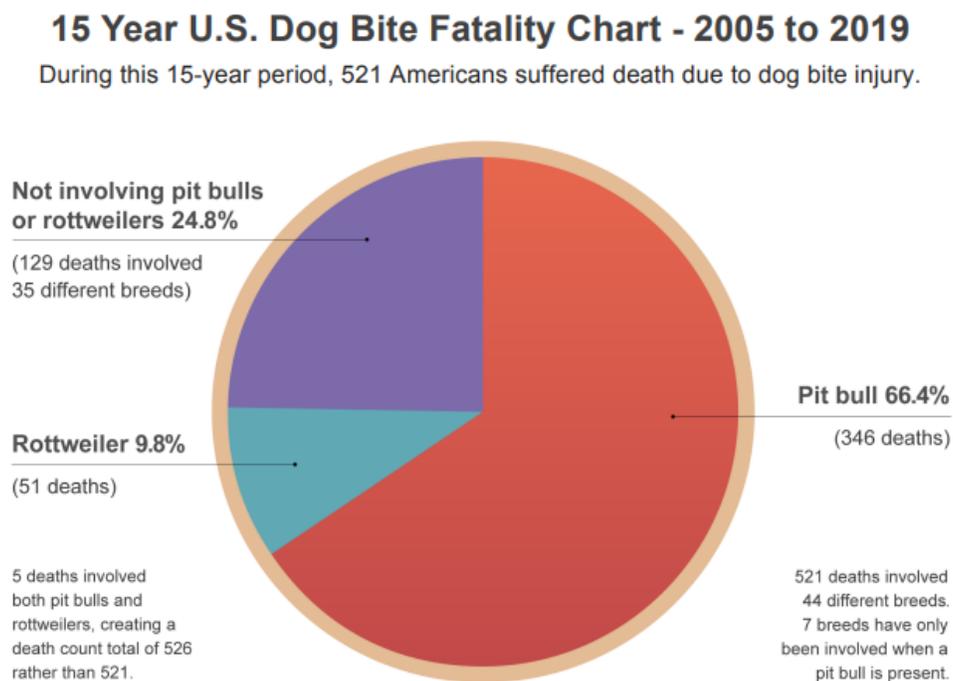


Image source: DogsBite.org

Opponents of BSL argue that the breed identification is unreliable. However, DBRFs are thoroughly investigated and documented by law enforcement officials, so while the data may be less reliable for dog bites overall, we can be fairly confident that the data for DBRFs is accurate. Additionally, the majority of DBRFs involve an owned animal attacking a family member or close family friend.^{19,33,45-50} Because of this familiarity with the dogs involved, the breed identification provided is likely accurate. Further, some online sources compile photographs of dogs involved in fatal attacks on humans since 2013.⁵¹ Photographs are available for the majority of DBRFs between 2013 and 2020, and these photographs enable some level of confirmation of the breed description.

Pit bulls are more likely than other breeds of dogs to inflict severe injuries

Level 1 Trauma Centers represent the highest level of care available for severe traumatic injuries. A review of published data from eleven Level 1 Trauma Centers from around the country shows that for dog bite cases where breed information was available, pit bulls were the most frequently reported breed causing injuries at 10 of these trauma centers.^{18,45,52-60} The only

one of the eleven Level 1 Trauma Centers that did not report pit bulls as the most common breed causing injury was a pediatric trauma center in the Denver-Aurora area, where pit bulls were banned until 2020.⁵⁴ In addition to causing the majority of the bites being treated at these trauma centers, pit bulls also were involved in over 50% of the bites requiring surgical repair. Further, pit bulls had a 4.4 times higher probability of causing a complex wound than other top biting breeds and they were more than 2.5 times as likely to bite the victim in multiple anatomical locations.^{60,61} Hospital records do not always have breed data included; however, some of these locations captured breed information for up to 79% of the cases. Additionally, in the majority of these cases the animal was known to the victim, thus we can have pretty good confidence in the accuracy of the breed identification.⁴⁵ The finding that injuries inflicted by pit bulls were both more frequent and more severe than that of other breeds has been consistently reported across the USA.^{30,62-64}

Pit bulls are disproportionately responsible for severe and fatal attacks on other animals

In addition to disproportionately causing injuries to humans, pit bulls are also the most implicated breed in attacks on other dogs.^{65,66} Approximately 50-60% of dog attacks on other animals are attributable to pit bulls.^{65,66} Using established methodology to estimate the number of severe and fatal attacks inflicted on other animals by dogs, and taking into account the dog population, in 2013-2014, an estimated *1 out of 40 pit bulls* killed or seriously injured another animal, this is compared to about *1 out of 50,000 dogs* for other breeds.⁶⁷

Effectiveness of BSL

We should use data, not personal opinions or anecdotes, to evaluate the effectiveness of public policies, including BSL

Since its inception, BSL has been controversial, with some touting it as an effective method to reduce dog bite injuries, while others claim it is ineffective and have even labelled it “canine racism”.⁶⁸ The use of charged language, such as “canine racism” is indicative of the deeply held personal beliefs many people have about BSL. A search of Google Scholar for breed-specific legislation returns thousands of results, but even a cursory review shows the vast majority rife with non-scientific opinion and anecdotal evidence. In order to develop sound public policies and reduce injuries, we have to set our personal opinions aside and use data and science to inform our decision making.

We also have to keep in mind that risk assessment is not about you or me as individuals, but about populations of people. For example, many people smoke and don’t get lung cancer, but this doesn’t change the fact that smoking is a risk factor for developing lung cancer. Similarly, we cannot predict the behavior of an individual animal, but we can say that some breeds are more likely to have certain behaviors. We assess risk at the population level, and we cannot predict outcomes for specific individuals. Just like when we look at traffic accidents. We can’t say what the risk is that an individual driver would get into a car accident, but we can say on average how many car accidents would occur and what the risk is overall for getting into a car accident. This is the same for dog bites. We can’t predict the likelihood that a specific dog would bite someone, but we can say that certain breeds are more likely to bite. When we look

at the population level, pit bulls as a breed represent a higher risk of both biting and causing a fatal injury compared to other breeds of dogs.

BSL is correlated with a reduction in dog bites in cities across the United States

Numerous cities around the USA have experienced a reduction in dog bites after implementation of BSL, including:

Denver, CO
Pawtucket, RI
Ottumwa, IA
Prince George County, MD
Springfield, MO
Salina, KS
Saginaw, MI
Lancaster, CA

Additionally, Council Bluffs, IA provided me with dog bite data from 2003-2020 and asked me to analyze the data. In Council Bluffs, IA, there has been a steady reduction in dog bites since BSL became effective in 2005. A detailed descriptive analysis of this data is included as an addendum to my report. If a reduction in dog bites after implementation of BSL was an isolated finding, we might question the results, but this is a consistent finding across municipalities in the USA. This consistency across jurisdictions gives us greater confidence in the finding that BSL is correlated with a reduction in dog bite injuries.

BSL is effective at reducing dog bite injuries presenting to the emergency department and dog bite injury hospitalizations

Despite the myriad opinions about the efficacy of BSL, very few studies have utilized data to answer this question. Professional opinion can be important in guiding treatment decisions and developing guidelines, but opinion is no substitute for evidence.⁶⁹ I conducted a systematic review of the literature to locate studies published in peer-reviewed journals or as a thesis that utilized empirical data to evaluate the effectiveness of BSL. Studies which utilized empirical data to analyze the effectiveness of BSL and were published in a peer-reviewed journal or completed as part of a thesis between 1980 and March of 2015 were eligible for inclusion. To evaluate the effectiveness of the legislation in reducing dog bite injuries, studies must include data related to dog bite injuries from two time periods (pre-BSL and post-BSL) and/or from two comparison groups (one with BSL and one without BSL). Since BSL was popularized in the 1980s, 1980 was chosen as the beginning of the timeframe. A total of 321 unique items were identified, but after review of these items only 5 met the study inclusion criteria. The included articles were published between 1996 and 2013. The study locations were Canada, UK, and Spain. No studies which met the inclusion criteria were based in the USA. The primary or secondary purpose of each study was to evaluate the effectiveness of BSL at reducing dog bite injuries, but the methods of the included articles varied widely. Raghavan et al.,⁷⁰ Rosado et al.,⁷¹ and Villalbí et al.⁷² utilized existing data sources, while Clarke and Fraser,⁷³ and Klaassen et al.⁷⁴ used surveys to collect data. The outcome measures examined also varied widely with Clarke and Fraser analyzing the number of dog bites reported to animal control, Klaassen et al. evaluating the

number of patients presenting to an ED, Raghavan et al. and Villalbí et al. investigating the number of DBIH, and Rosado et al. examining the number of dog bites reported to the public health department. The 5 studies which met the inclusion criteria and the outcome measure that each of them utilized to evaluate dog bite injuries are shown in the following table:

Lead author	Year	Country	Outcome measure
Clarke	2013	Canada	Rate of dog bites reported to animal control departments.
Klaassen	1996	Scotland	Emergency department visits for dog bite related injuries.
Raghavan	2012	Canada	Dog bite injury hospitalizations.
Rosado	2007	Aragon, Spain	Rate of dog bites reported to public health departments.
Villalbí	2010	Catalonia, Spain	Dog bite injury hospitalizations (DBIH).

I conducted an additional literature review to determine if any additional studies which would have met the study criteria were published between 2015 and 2020. I reviewed an additional 20 articles and determined that two of these would have met the inclusion criteria for this study. Both of these articles, Mariti et al.⁷⁵ and Nilson et al.,⁷⁶ used emergency department visits as their primary outcome measure. Since these articles would have also met the study criteria, they will be included in the discussion for the remainder of this analysis. These additional two studies are presented in the following table:

Lead author	Year	Country	Outcome measure
Mariti	2015	Italy	Emergency department visits for dog bite related injuries.
Nilson	2018	Denmark	Emergency department visits for dog bite related injuries.

The study conclusions as presented by the authors are shown in the following table:

Lead author	Year	Country	Author's conclusions
Clarke	2013	Canada	Minimal difference was detected in the bite rate between jurisdictions with and without breed-specific legislation. Reported bite rates were lower in jurisdictions with higher ticketing rates.
Klaassen	1996	Scotland	Total number of dog bites observed was the same in both time periods. Authors conclude that the Dangerous Dogs Act does little to reduce incidence.
Mariti	2015	Italy	A statistically significant reduction in injuries was recorded after implementation of the ordinance. The authors theorize that this could have been the continuation of a pre-existing trend towards declining dog bite injuries.
Nilson	2018	Denmark	The ban significantly reduced the number of dog bite injuries by 15%. The authors conclude that the ordinance had a limited effect on the overall level of dog bite injuries.
Raghavan	2012	Canada	Breed-specific legislation resulted in a reduction of dog bite injury hospitalizations in urban populations. The effect was more pronounced in those aged <20 years.
Rosado	2007	Aragon, Spain	Reported dog bite rates in rural areas increased during the study period. Bite rates did decrease for the urban population, but this difference was not statistically significant.
Villalbí	2010	Catalonia, Spain	During the study period, there was a 38% reduction in dog bite injury hospitalizations. The effect was more pronounced in rural areas.

The GRADE approach was used to evaluate the quality of the evidence. The GRADE system “offers a transparent and structured process for developing and presenting summaries of evidence, including its quality”.^{77, p. 384}

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Of the 7 studies which used data to analyze the effectiveness of BSL, 6 of them reported some effect from BSL. The effect seen is reported in the following table:

Lead author	Year	Country	Effect seen
Clarke	2013	Canada	0.1 difference in bite rate between municipalities with and without breed-specific legislation.
Klaassen	1996	Scotland	No effect- 134 dog bites recorded in both time periods studied.
Mariti	2015	Italy	25% reduction in injuries was recorded after implementation of the ordinance.
Nilson	2018	Denmark	15% reduction in dog bite injuries; 17% reduction for dog bite injuries in private spaces.
Raghavan	2012	Canada	-25.5 lower rates of DBIH; -27.4% lower rates DBIH for those aged <20 years.
Rosado	2007	Aragon, Spain	68% reduction in reported dog bites in urban areas. 2% increase in reported dog bites in rural areas.
Villalbí	2010	Catalonia, Spain	-38% lower rates of DBIH

Because the five studies evaluated three different outcome measures, I ended up with three subquestions:

- o *SQ1: Does BSL reduce the number of reported dog bites?*
Two studies, Clarke and Fraser and Rosado et al., evaluated the impact of BSL on reported dog bites. Rosado et al. showed a reduction in reported dog bite rates in urban populations, but not rural populations, while Clarke and Fraser found a small difference in reported dog bite rates for jurisdictions with and without BSL. The GRADE quality for these studies was rated is very low. We do not have enough valid data to answer this subquestion.
- o *SQ2: Does BSL reduce the number of dog bite injuries treated at EDs?*
Klaassen et al., Mariti et al., and Nilson et al. examined the number of dog bite injuries treated in an ED. Klaasen et al. reported that the number patients with dog bite injuries was identical in both time periods, while Mariti et al. reported a statistically significant reduction in minor injuries, and Nilson et al. study showed a 15% reduction in dog bite injuries in the 4 years after the BSL was introduced. The GRADE quality for these studies is low. The Klaasen et al. study was extremely poorly designed, and no conclusions can be drawn from it. The studies by Mariti and Nilson both had limitations, primarily in the period of time included in the analysis; however, both of these studies showed a statistically

significant reduction in dog bite injuries presenting to EDs.

- o *SQ3: Does BSL reduce the number of dog bite injury hospitalizations (DBIH)?*
Both Raghavan et al. and Villalbí et al. evaluated the number of DBIH over a >10-year time period, and both reported lower DBIH in groups with BSL, with -25.5% and -38% lower rates of DBIH being reported respectively. Raghavan et al. also reported a more pronounced difference in the DBIH rate for those <20 years of age in areas with BSL, with a -27.4% lower DBIH rate for this age group. The GRADE quality for these studies is moderate. Both of these studies received a GRADE quality rating of 3, which is interpreted as moderate. However, it is important to note that an observational (nonrandomized) study begins with a rating of 2 and then can be upgraded or downgraded based on the study characteristics. Utilizing the GRADE approach, only a randomized trial can receive a rating of 4; however, randomization is often not appropriate or ethical when studying public health outcomes. Although all of the studies had some flaws in the design or execution, the two best designed studies were those by Raghavan et al. and Villalbí et al. Both of these studies evaluated DBIH and both demonstrated a reduction in DBIH after BSL was implemented. This effect was more pronounced in subgroups, such as children. We have two reasonably well-designed studies that addressed this question, and we can have reasonable confidence in the validity of the results. These studies give consistent results from two different study populations that DBIHs declined after implementation of BSL.

There are limitations to being able to analyze dog bite data, including: different ways to measure dog bite injuries, no standardization in the data that is collected, and no standardized in how the collected data is stored. Given these challenges, the best source for reliable data on dog bite injuries currently is hospitalization data. Both of the studies which evaluated DBIH for groups with and without BSL showed a difference, with Raghavan et al. and Villalbí et al. reporting 25.5% and 38% lower rates of DBIH respectively. These studies were conducted in different countries, and yet showed consistent results, which further lends credibility to the effect of BSL in reducing DBIH. Additionally, numerous cities in the USA have documented declines in reported dog bites after implementation of BSL. The decline may be immediate, or it may be more gradual. It takes time to see the true effect of policy changes on health outcomes, and a lag time between cause and effect is common in public health.⁷⁸ For example, the lag time between population decreases in smoking rates and a reduction in lung cancer rates can be up to 20 years. The length of the lag time for BSL will vary depending upon the type of BSL that is enacted. For example, a ban with a grandfather clause allows the existing animals to remain in the population either with or without restrictions on their keeping. Since the current population of the banned dogs remains for their natural lifespan, while some effect may become evident immediately, a pronounced effect may not become demonstrable until the population of banned dogs naturally begins to die off; a process which could take 10 or more years. The concept of an effect becoming more pronounced over time is bolstered by the fact that the only two studies located for this review which analyzed data for a decade or longer

both found a reduction in DBIH over that time period. Additionally, the effectiveness of BSL at reducing dog bite injuries depends on enforcement. This is not unique to BSL, no policy that alters behavior is effective without adequate enforcement. For example, seatbelt laws and laws against texting and driving are only effective if there is periodic enforcement.

In many instances, BSL is a more humane method of managing the population of regulated animals; shelter euthanasia rates of pit bulls decline in areas with pit bull bans

In addition to having benefits to human health and wellbeing, BSL is also more humane to the regulated breeds, such as pit bulls. For example, in California Chihuahuas are subject to mandatory spay or neuter. It is likely that this is an effort to control the breed population due to the high percentage of Chihuahuas in animal shelters in California, rather than an effort to reduce dog bite injuries. By controlling the Chihuahua population through mandatory spay and neuter, the goal is to reduce the overall number of Chihuahuas in animal shelters in California in order to prevent euthanasia of unwanted animals. Despite comprising around 4-6% of the dog population in the USA, pit bulls comprise around 40%-65% of the shelter dog population in many areas.⁷⁹⁻⁸¹ Additionally, pit bulls represent about 50-60% of the dogs that are euthanized in animal shelters.⁸² This equates to an estimate of 724,000 pit bulls euthanized in 2014 alone.⁴¹ According to Dr. Emily Weiss with the ASPCA, looking at euthanasia data from 68 shelters across the USA showed a sharp contrast between euthanasia rates for pit bulls versus other breeds. “Looking at euthanasia rates, we see an incredibly sharp contrast, with 40% of all canine euthanasia being of pit-type. The sharp, and I mean sharp, drop for the next breed type of 9% for Labradors is compelling”.^(para. 5) This blog post from 2017 has since been removed from the ASPCA website, but is preserved in web archives. Reducing the pit bull population through regulation of the breed would both reduce the number of pit bulls in shelters and the number of pit bulls being euthanized each year. This idea is supported by the fact that jurisdictions with BSL experienced a decline in the number of pit bulls being euthanized in their animal shelters.⁸³ According to Cheryl Conway, a former spokeswoman for the animal care division in Aurora, CO, after the ban was enacted in 2005 euthanasia of pit bulls decreased by 93%.

Reactive dog policies that regulate individual animals only after an attack has happened are not sufficient to prevent severe and fatal attacks

There is a saying among those who advocate against BSL that we should “punish the deed not the breed.” However, despite the popular myth that strays, or dogs used for fighting purposes are responsible for most dog bite injuries and fatalities, the majority of injuries are inflicted by pets.^{33,45-48,50} Additionally, in the majority of instances a family member or person acquainted with the animal is the victim.^{33,45,48,49} In fact, in one study, 85% of patients seeking treatment for a dog bite injury in an ED had been bitten by their own dog.⁸⁴

Reactive dog policies that regulate individual animals only after an attack has happened are not sufficient to prevent severe and fatal attacks. This is especially true given the propensity of certain breeds to attack without warning or provocation and to inflict severe or even fatal injuries during their first attack. These reactive policies are the exact type of policies that were in place for many years prior to the popularization of BSL in the USA. BSL was developed and

implemented because these reactive policies were not working sufficiently to prevent dog bite injuries.

Legal challenges to BSL and the voluntary repeal of BSL is not based on science, but on public relations and emotional appeals

Shortly after municipalities began passing breed-specific ordinances in the 1970s, opponents of the legislation in the USA started advocating for states to pass laws banning ordinances with breed-specific language.⁸⁵ By 1992, ten states, including California, Florida, and Texas, had adopted state-levels laws prohibiting local jurisdictions from enacting animal ordinances with breed-specific language.⁸⁵ Between 1997 and 2004, anti-BSL laws had been passed by three more states. Currently 19 states have anti-BSL laws.⁸⁵ However, many of the state anti-BSL laws didn't overturn existing legislation, rather they merely preempted new legislation from being enacted. This trend towards the reversal or repeal of breed-specific legislation is not based upon science, but rather based on public relations campaigns and emotional appeals. Often these appeals are accompanied by stories about individual animals or an individual owner's attachment to their animal. When we are evaluating public health interventions, we have to make decisions based on science and based on population level risk assessments. We cannot either implement or reverse regulations based on our personal opinions or experiences.

BSL will not eliminate all dog bites, but it is an effective solution to reduce the incidence of dog bites overall and to reduce the incidence of severe dog bite injuries

Dog bites are a persistent and complex public health problem. These types of problems require a multi-faceted approach. For example, to reduce motor vehicle fatalities we have seat belt laws, mandated vehicle safety features, laws against distracted driving etc. These approaches work together, and we wouldn't conclude that one of them isn't worthwhile because that factor alone can't prevent all motor vehicle fatalities. Similarly, we should not expect that there is one mechanism that will eliminate all dog bites. However, BSL is an effective solution that is correlated with a reduction in dog bite injuries and has been shown to be effective at reducing the number of dog bites presenting to EDs as well as DBIHs.

Summary of Opinions

Based upon my training, my research, and a review of published literature, it is my opinion that:

1. The Council Bluffs, IA ordinance is more detailed than most breed-specific ordinances that I have reviewed. This ordinance provides a lot of detail about what animals are prohibited, what restrictions are placed upon grandfathered animals, and what remedies are available to the owners who disagree with the city's assessment.
2. Breeds of dogs exist because dogs were selectively bred by humans to exhibit specific physical or behavioral traits.
3. Pit bull breeds descend from 19th century bulldogs, which were used in England for bullbaiting.
4. Pit bulls exhibit the following breed-specific traits: aggression, attacking without warning or provocation, biting and holding.

5. Breed-specific behaviors are heritable traits. Among studies evaluating the heritability of specific traits aggression is one of the most commonly demonstrated heritable traits.
6. Visual identification of dog breeds is the industry standard practice; pit bulls are identifiable by their unique physical characteristics.
7. In a practical application of breed identification, animal shelter workers are 96% accurate at identifying pit bull and pit bull mix dogs.
8. Dog bites are a persistent and serious public health concern, affecting approximately 4.5 million Americans per year.
9. Dog bites disproportionately affect children; additionally, children who are bitten by dogs are more likely to suffer bites to the head, face, and neck.
10. Although the number of estimated dog bites has remained relatively constant for over 20 years, the rate of severe and fatal dog bites seems to be increasing. Comparing the time periods 1979-1994 and 2000-2009 there was a 37.7% increase in dog bite related fatalities.
11. Pit bulls are disproportionately responsible for dog bites and dog bite fatalities.
12. Pit bulls are more likely than other breeds of dogs to inflict severe injuries.
13. Pit bulls are disproportionately responsible for severe and fatal attacks on other animals.
14. We should use data, not personal opinions or anecdotes, to evaluate the effectiveness of public policies, including BSL.
15. BSL is correlated with a reduction in reported dog bites in Council Bluffs, IA as well as other cities across the United States.
16. BSL is effective at reducing dog bite injuries presenting to the emergency department and dog bite injury hospitalizations.
17. In many instances, BSL is a more humane method of managing the population of regulated animals; shelter euthanasia rates of pit bulls decline in areas with pit bull bans.
18. Reactive dog policies that regulate individual animals only after an attack has happened are not sufficient to prevent severe and fatal attacks.
19. Legal challenges to BSL and the voluntary repeal of BSL is not based on science, but on public relations and emotional appeals.
20. BSL will not eliminate all dog bites, but it is an effective solution to reduce the incidence of dog bites overall and to reduce the incidence of severe dog bite injuries.

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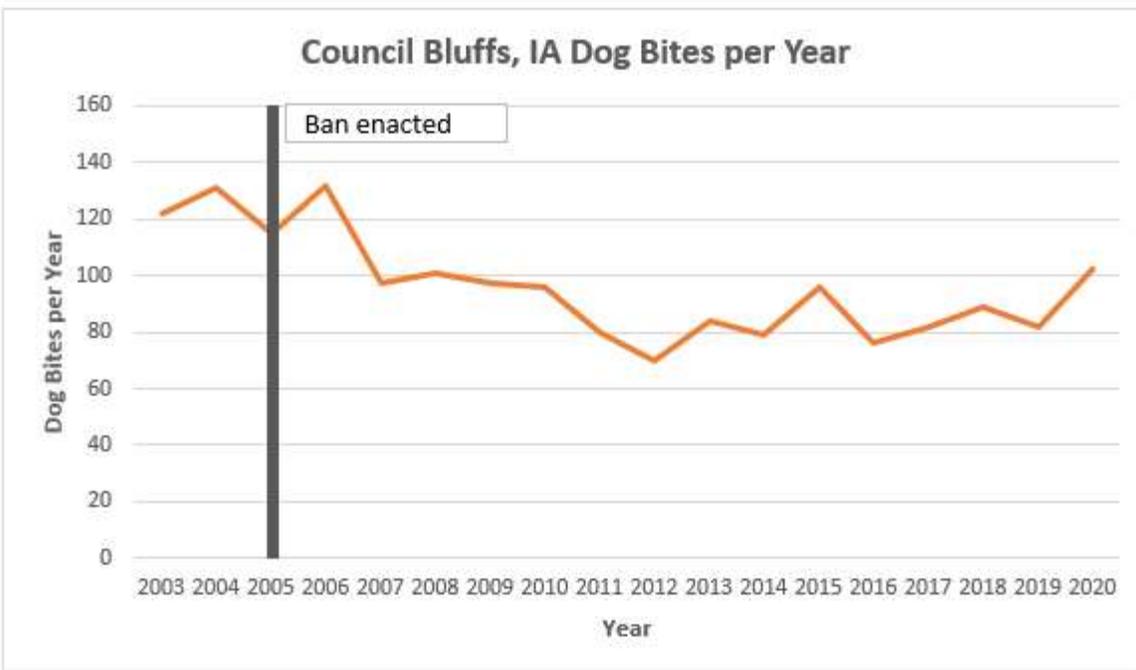
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Addendum: Data Analysis of Dog Bites in Council Bluffs, IA Between 2003 and 2020**Total Dog Bites in Council Bluffs, IA**

This data analysis is based on data provided by Galen Barrett, the Chief Animal Control Officer for the City of Council Bluffs. Mr. Barrett keeps data on dog licensures, dog bites, and the number of dog bites per breed in Council Bluffs, IA. For this analysis, Mr. Barrett provided me with data for the years 2003-2020. Based on this data, we see the following total numbers of dog bites:

Year	Bites
2003	122
2004	131
2005	115
2006	132
2007	97
2008	101
2009	97
2010	96
2011	80
2012	70
2013	84
2014	79
2015	96
2016	76
2017	82
2018	89
2019	82
2020	102

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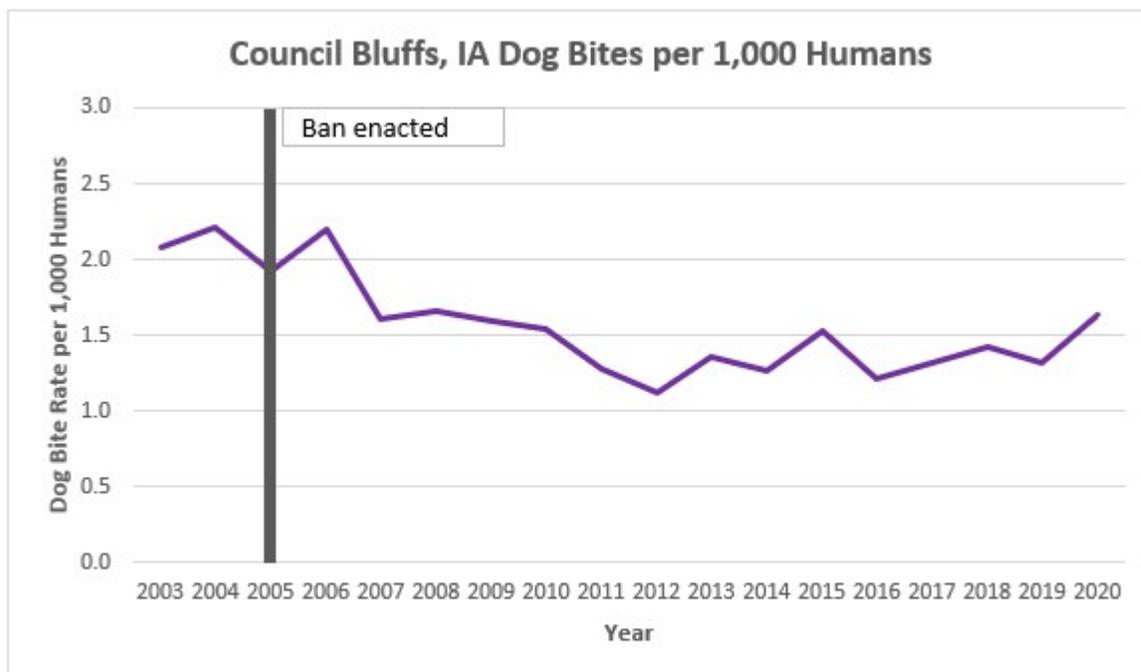


Looking at the overall number of dog bites shows that in Council Bluffs there has been a downward trend in dog bites between 2003-2020. There are a couple of years where it trends upward, but with the exception of 2020, these represent a small increase in dog bites and is probably due to normal fluctuation. In 2020 there were 102 dog bites reported, this is up from 82 dog bites in 2019. I don't think this is an isolated finding from Council Bluffs though, since an increase in dog bites during 2020 has been noted by many jurisdictions. This is probably due to people being home more and having increased interactions with dogs in the home because of the COVID-19 pandemic. An increase in dog bites because people are at home more is also consistent with the findings of previous studies, which showed that the majority of dog bites happen within the home and the majority of the time a close friend or family member is the one being bitten.

Looking at the overall number of dog bites doesn't tell the whole picture because we don't know what is going on with the human or dog population over that same time period. While we are seeing an overall decrease in dog bites between 2003-2020 it could be that the human or dog population also decreased during this time, which would account for the decrease in dog bites. To take this into account we would calculate a rate. A rate is a method of standardizing data into a common scale so that comparisons can be made over time or across different geographic areas. A rate takes the number of events that occurred divided by the population at risk and then multiplies that by a unit of measurement. For the unit of measurement, or scale, any number could be used, but it is most common to use 1,000, 10,000, or 100,000 as the scale. For determining the population at risk when analyzing dog bite data, there are two populations that are commonly used: the human population and the number of registered dogs.

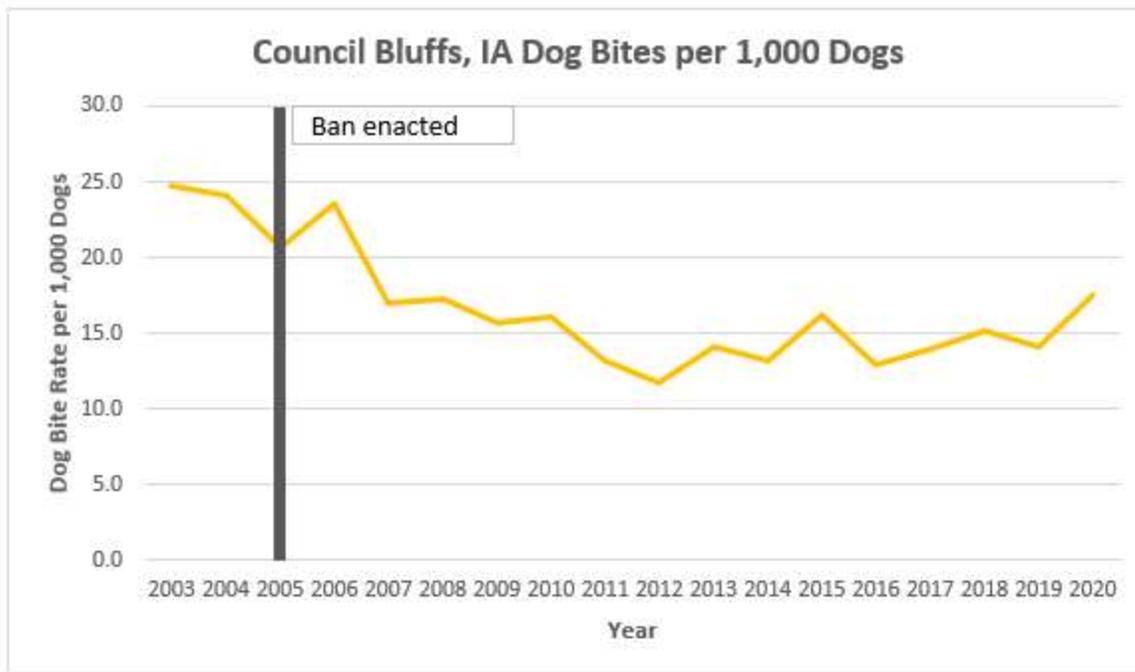
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The human population is estimated by government sources, such as the Census Bureau. There may be some slight variations between different sources, but as long as you use the same source across the periods of time or populations that you are studying, then you can have good confidence in the validity of the comparisons. For these rate calculations I chose to use 1,000 as the scale because the number of registered dogs in Council Bluffs per year is under 10,000. For consistency, I also used 1,000 as the unit of measurement for calculating the rate based on the human population. Taking into account the human population over this time period shows that overall in Council Bluffs, the rate of dog bites per 1,000 humans decreased between 2003-2020.



The other method for calculating dog bite rates is to use the number of dogs in the population as the population at risk. We don't have surveys to determine exactly how many dogs live in an area like we do with the Census for humans; however, most areas do require dogs to be registered with the city or county. There are critics who would argue that using the number of registered dogs in an area is not accurate because not all animals are registered. While it is likely that not all dogs in an area are registered, dog registrations are still a good estimate of the dog population in that area. Further, there is not convincing evidence that the percentage of dogs registered varies drastically by breed. Thus, the number of dogs registered is likely a good estimate of the overall dog population in that area as well as the distribution of dog breeds in that area. Taking into account the dog population over this time period shows that overall in Council Bluffs, the rate of dog bites per 1,000 dogs decreased between 2003-2020.

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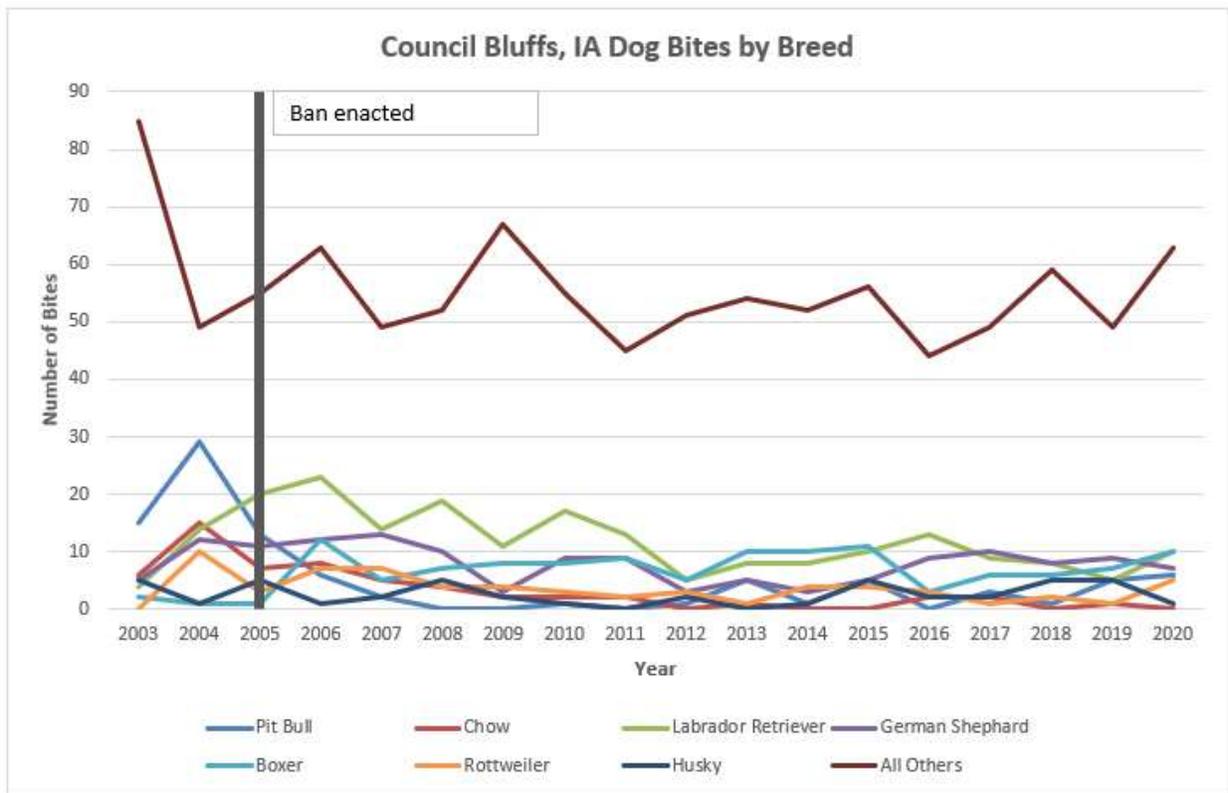


All of these sources show a consistent picture that the number of dog bites has declined in Council Bluffs since 2005 when BSL took effect.

Dog bites by breed in Council Bluffs, IA

During the time period 2003 and 2020, there were 1731 total dog bites caused by over 80 different breeds of dogs. The breed of dog was determined for 96% of the bites. Many of the breeds were responsible for only a handful of bites over the 17-year time period. To analyze the trends in bites by breed over time, the breeds chow, Labrador retriever, German shepherd, boxer, pit bull, rottweiler, and husky were separated out and all “other breeds” of dogs were grouped together. These breeds were chosen, since they are the breeds most frequently discussed when looking at dog bites by breed in the context of BSL. When we look at the number of overall bites based on breed we see that the number of bites for most breeds remained relatively steady. We see a reduction in the number of bites by “other breeds” and a reduction for bites by pit bulls.

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The most dramatic reduction in bites is for bites attributable to pit bulls, which can be seen more clearly when we just look at the bites by pit bulls over this time period.

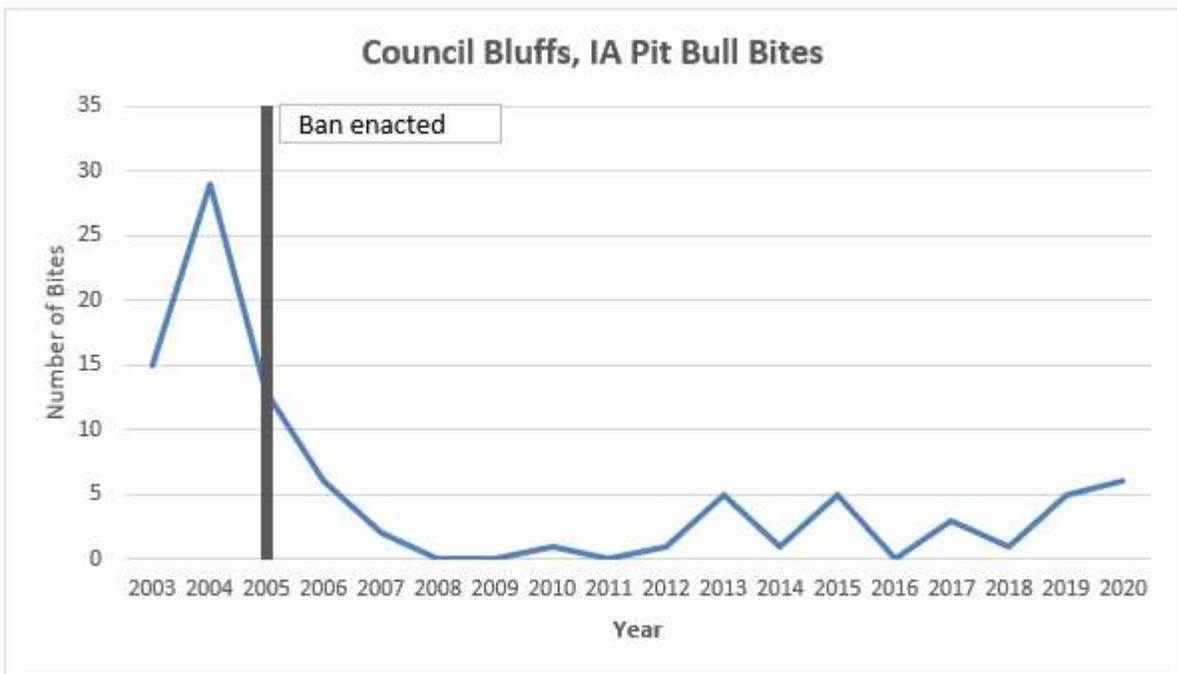
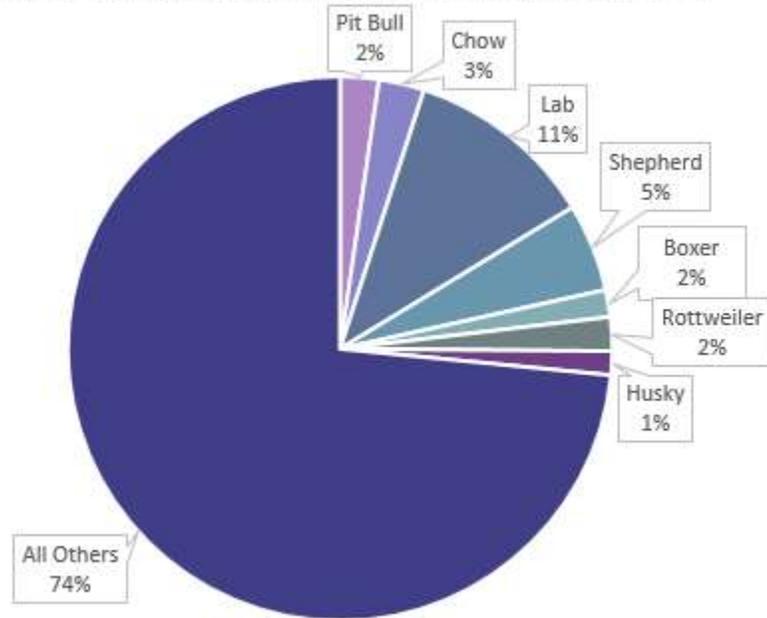


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Another thing we would want to look in determining whether a breed bites more or less than other breeds is the number of bites by that breed in comparison to the total number of dogs from that breed in the population. If there are no breed differences in dog bites, you would expect to see that the percentage of dog bites by each breed is similar to the overall percentage of those dogs in the population. For example, critics often say that Labrador retrievers are responsible for the most bites per breed. While this may be true in many cases, Labrador retrievers are also one of the most popular dog breeds in America, meaning that there are far more Labrador retrievers compared to other breeds. When you take into account the number of bites by Labrador retrievers based on the number of Labrador retrievers, you usually see that it is in line with, or even lower than, the number of overall Labrador retrievers in that population. If one breed is overrepresented in dog bite data, meaning that the percentage of bites caused by that breed is disproportionate to the percentage of dogs in that population, then you could conclude that the breed bites more often than other breeds. Conversely, if the breed is underrepresented in dog bite data, meaning that the percentage of bites caused by that breed is much lower than the percentage of dogs in that population, then you could conclude that the breed bites less often than other breeds. The percentage of licensed dogs by breed and the percentage of dog bites by breed for Council Bluffs, IA in 2004 are represented in the following figures:

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Dog Licenses by Breed in Council Bluffs, IA 2004



Dog Bites by Breed in Council Bluffs, IA 2004

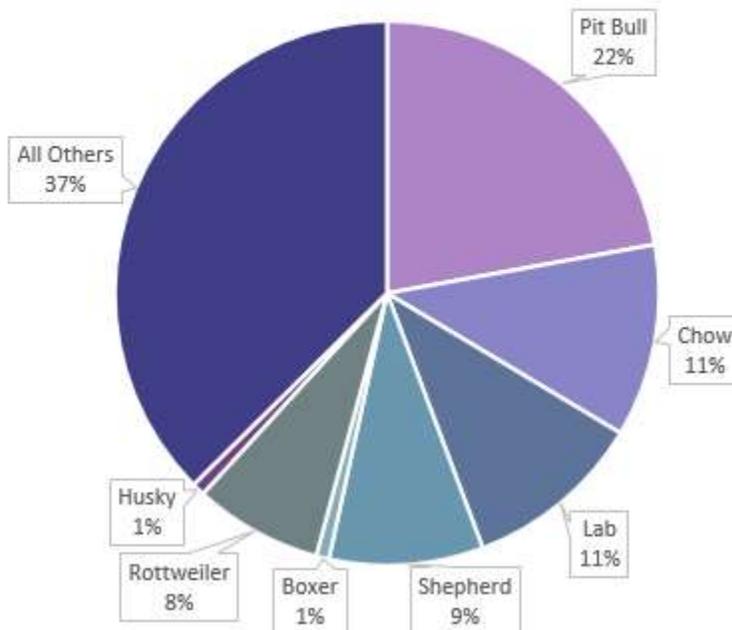


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This data shows us that in 2004 pit bulls disproportionately caused dog bites, since pit bulls represented about 2% of the licensed dog population but were responsible for about 22% of the dog bites. Another way to interpret this is that in 2004, pit bulls were responsible for almost 10x as many bites than you would expect them to cause if the number of bites caused by pit bulls was in line with the number of registered pit bulls. On the other hand, Labrador retrievers represented about 11% of the licensed dog population and were responsible for about 11% of the dog bites, and “other breeds” represented about 74% of the licensed dog population but only about 37% of the dog bites. This data shows that in Council Bluffs in 2004 pit bulls were more likely to cause a bite than other breeds, Labrador retrievers caused dog bites consistent with their overall number in the population, and “other breeds” were much less likely to cause a dog bite. Since the Council Bluffs pit bull ban included a grandfather clause for existing animals, you would not expect to see a sudden drop off in the number of pit bulls and the number of bites caused by pit bulls. Rather you would expect to see a gradual reduction in each over time. When we look at the data, this is indeed what we see:

Pit Bulls		
	Licenses	Bites
2003	142	15
2004	125	29
2005	139	13
2006	109	6
2007	90	2
2008	79	0
2009	67	0
2010	50	1
2011	43	0
2012	31	1
2013	28	5
2014	15	1
2015	10	5
2016	5	0
2017	2	3
2018	2	1
2019	3	5
2020	2	6

From when the ban took effect in 2005 to 2020, there is a steady decline in the number of registered pit bulls, and with a few exceptions a steady decline in the number of bites attributable to pit bulls. The increase in bites caused by pit bulls in 2019 and 2020 is potentially

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a cause for concern, since in the 12 years prior to this there were not two consecutive years with elevated bite counts. Instead what you would see is an increase one year followed by a reduction the next year. For example, in 2013 there were 5 bites caused by pit bulls, but this number fell to 1 in 2014 then rose again to 5 in 2015 before falling to 0 in 2016. Slight up and down patterns like this are likely reflective of natural variation. Additionally, between 2005-2018, for the years with elevated bites by pit bulls there was also an overall increase in dog bites. However, in 2019 the number of bites caused by pit bulls rose even though the overall number of bites that year was lower than the previous year. Then instead of falling, the number of bites caused by pit bulls rose again in 2020. The number of bites caused by pit bulls in 2019 and 2020 was more than the number of registered pit bulls in the population, meaning that these bites were caused by dogs who were either registered as a breed other than pit bull but determined to be a pit bull after causing a bite, visiting someone in the city, or living in the city but not registered. The increase in bites attributable to pit bulls in 2020 could be representative of the increased interaction people are having with animals because of the COVID-19 pandemic, but since this is a trend that started in 2019, it could also indicate that people in Council Bluffs are not complying with the BSL. Lack of compliance could especially be an issue in 2019 and 2020, since there was impending litigation and the enforcement of BSL has essentially been on hold because of the legal challenge. No public policy is effective without enforcement and compliance, and BSL is no exception. This increase in bites caused by pit bulls in 2019 and 2020 is a trend that officials in Council Bluffs should keep an eye on.

Two important concepts in epidemiology are correlation and causation. Correlation means that two things are related, or in other words they are happening at the same time. Causation on the other hand means that one thing causes another. From the data we are seeing a decrease in dog bites after Council Bluffs enacted BSL in 2005. This is a correlation, meaning that these two things are related. We cannot determine from this data that the BSL caused the decrease in dog bites; however, there is compelling logical evidence that BSL in Council Bluffs has had an effect on dog bite injuries, since:

- The number of dog bites in Council Bluffs declined, while the overall number of dog bites in the United States stayed the same.
- The number of dog bites in Council Bluffs declined, even once taking into account trends in the human and dog population.
- The most dramatic reduction in dog bites during the time period analyzed was for bites attributable to pit bulls.
- The number of licensed pit bulls and the number of bites caused by pit bulls declined steadily over time, which is exactly what we would expect to see with a breed ban that includes a grandfather clause for existing animals.

This data analysis included descriptive data that illustrates the trend of reduction for both total dog bite injuries and injuries attributable to pit bulls, more detailed analysis is currently underway.

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