In the know about noses: Burrowing into brachycephalic dog breeds (Part 1)

Dogs with significantly shortened faces and muzzles, known as brachycephalic breeds, are at particularly high risk for a variety of significant diseases. The Nationwide® Pet Health Analytics and Insights Team analyzed data representing more than 450,000 dog years of canine claims from their database of dogs protected by Nationwide insurance. The analysis reveals insights into diseases representing increased risks for brachycephalic dogs and extreme brachycephalic dogs and suggests clinically relevant actions that could significantly impact their health. January 2023

Executive summary

This white paper examines claims submitted concerning Nationwide-insured brachycephalic dogs. The data reveal significant, specific health problems and some dramatic breed tendencies. While much has been published on the diseases common to brachycephalic dogs, we believe that our large dataset adds previously unavailable context and reveals new insights on breeds with an extreme brachycephalic phenotype. Part 1 of our analysis, in this paper, focuses on quantifying the risk of diseases found in brachycephalic breeds compared to non-brachycephalic breeds. Part 2, to be published in February 2023, will analyze disease comorbidities in brachycephalic dogs. Together, the two parts reveal the particular disease threats faced by these increasingly popular breeds.

This analysis shows:

- **"Extreme brachycephalic" dogs at increased risk –** While most brachycephalic dog breeds are at increased risk of certain diseases, a subset of these dogs face far greater risk than the rest of the group. These findings overlap with established research that identifies these "extreme brachycephalic" breeds as the French Bulldog, English Bulldog, and Pug.
- **Popular pups drive the numbers –** The proportion of extreme brachycephalic dogs insured by Nationwide has almost doubled over the past decade, driven primarily by the popularity of the French Bulldog, which has increased by over 400%.
- **Nationwide's unmatched dataset enables unique research –** Analysis of data from over 450,000 purebred dog years (which include 50,000 individual brachycephalic dogs) allows for:
  - **Greater resolution at a breed level** for existing brachycephalic-associated conditions like brachycephalic obstructive airway syndrome (BOAS) and brachycephalic ocular syndrome (BOS).
  - **Novel insights** into the risks of pneumonia, heatstroke, complications of pregnancy and systemic allergic reactions for brachycephalic breeds.

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Introduction

Brachycephalic dog breeds have become increasingly popular in recent years. Their often-compact frames frequently contain big personalities, making them companions of choice for many celebrities and their fans. In 2022, the Best in Show and Reserve Best in Show dogs at the National Dog Show were both brachycephalic dogs: Winston, a French Bulldog, and Cooper, an English Toy Spaniel, respectively.

While the popularity of brachycephalic breeds is reaching new heights, their well-documented predisposition to health conditions has raised concerns for their welfare and the ethics of continued breeding. These concerns have resulted in regional and even national bans on further breeding or selling of brachycephalic breeds.1 The ethical decision to continue breeding these dogs is a subject of debate amongst veterinarians and breeders alike and beyond the scope of this paper.

While there are increasing numbers of publications evaluating health problems in brachycephalic dogs, most are single-site evaluations, using groups of fewer than 100 dogs. Our analysis incorporates data from more than 450,000 purebred dog years at risk (DYAR), including more than 50,000 individual brachycephalic dogs. A comprehensive review of the analysis methodology can be found in a separate methodology document at the link below:

www.petinsurance.com/petdata

Unless otherwise noted, all noted differences reached statistical significance at Bonferroni-adjusted $p<0.01$.

Overview: Brachycephalic breeds and their health

What is brachycephaly?

The term brachycephaly translates as short (brachy-) head (-cephaly).[2] The distinctive shortened muzzle and skull, underbite and wide-set eyes characteristic of brachycephalic dogs and cats result in a somewhat juvenile appearance considered cute and highly desirable by their owners.[3] Unfortunately, this appearance also comes with health problems, many of which arise from excessive soft tissues in the nose, mouth, and throat compared to their skull size. [1,4]

What breeds are brachycephalic?

For purposes of this analysis, brachycephalic breeds were defined as those identified as brachycephalic in a minimum of three peer-reviewed articles.

The equivalent criterion was used to identify extreme brachycephalic breeds or those with the most exaggerated phenotypic traits.[5,6,7] A more detailed explanation of how Nationwide approached breed selection for this analysis and the peer-reviewed papers consulted can be found in the methodology document.

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Table 1 - Brachycephalic dogs by Nationwide purebred breed rank

Breed	Breed Rank
French Bulldog	3
Shih Tzu	6
English Bulldog	7
Boxer	8
Pug	16
Boston Terrier	20
Cavalier King Charles Spaniel	21
Lhasa Apso	61
Bull Mastiff	74
Chinese Shar-Pei	76
Pekingese	79
Chow Chow	87
Brussels Griffon	97
Dogue De Bordeaux	108
Japanese Chin	123

Table 1 shows the breeds included in the analysis and their relative rank among Nationwide-insured purebred dogs, as of October 2022.[8]

Fifteen purebred brachycephalic dog breeds met the inclusion criteria for this study. Three breeds (Pugs, French Bulldogs, and English Bulldogs) met the criterion for extreme brachycephalic breeds.

The three extreme brachycephalic breeds were ranked 3rd, 7th, and 16th in the overall Nationwide purebred population, and 1st, 3rd, and 5th among brachycephalic dog breeds.

Some readers may be surprised to find the Shar-Pei included in this list. However, they have been identified as brachycephalic in at least 3 peer-reviewed articles, thus meeting the inclusion criteria.

A note on relative risk

Readers have varying levels of comfort with statistics, so we've worked to make the information here as easy to understand as possible for everyone. We have therefore provided risk ratios ("half as likely," "three times as likely") with the combined claims relative risk data. Where appropriate, we included the relative percentages.

For example, if breed A has a 163.5% risk of having a pneumonia claim submitted when compared to the mean (average) rate for other dogs, this is equivalent to noting that breed A is 1.63 times more likely to have had a pneumonia claim submitted than the average dog, or that breed A had a 63.5% greater risk of a pneumonia claim.

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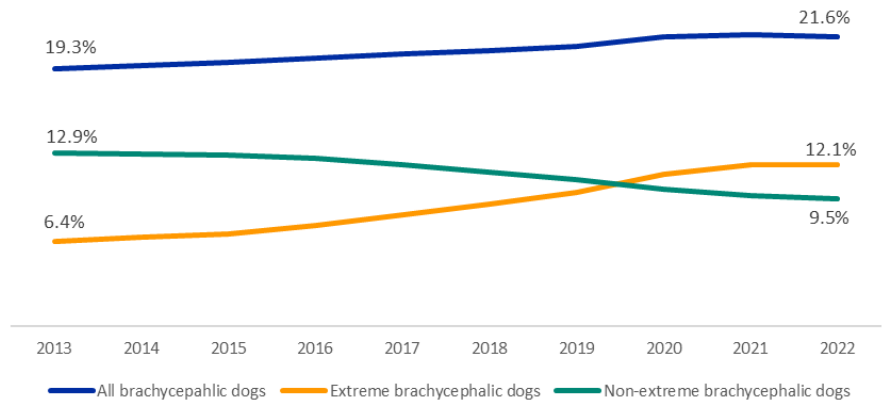
How popular are brachycephalic breeds?

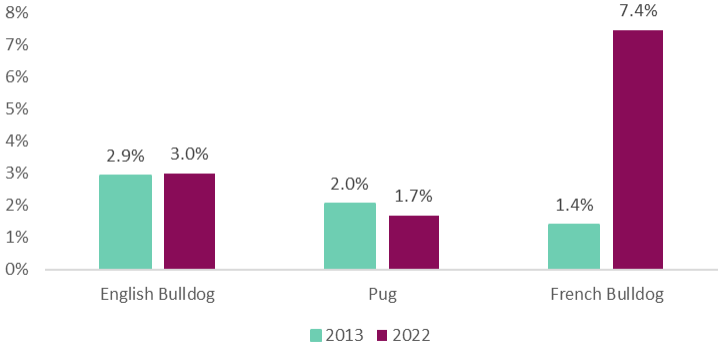
Brachycephalic breeds currently account for more than one in five (21.6%) of purebred dogs insured by Nationwide.[8] Although the breeds have been popular for many years, the relative popularity of non-extreme brachycephalic breeds vs. the extreme breeds has changed over the past 10 years, as seen in Figure 1. Between 2013 and 2022, the proportion of extreme brachycephalic breeds insured by Nationwide nearly doubled, from 6.4% to 12.1% of the insured purebred population, while non-extreme brachycephalic breeds fell from 12.9% to 9.5%.

Figure 1 - Brachycephalic dogs as a percentage of all Nationwide-insured purebred dogs for years 2013 to 2022



Further evaluation of this growth in the popularity of extreme brachycephalic dogs reveals that a single breed is responsible for most of the increase. French Bulldogs have moved from the 19th most popular purebred breed in 2013 to the third most popular in 2022 (Figure 2). The breed has been embraced by high-profile celebrities, including Lady Gaga, Megan Thee Stallion, and Hugh Jackman, which may be contributing to their popularity.[9]

Figure 2 - Extreme brachycephalic breeds as a percentage of all Nationwide-insured purebred dogs



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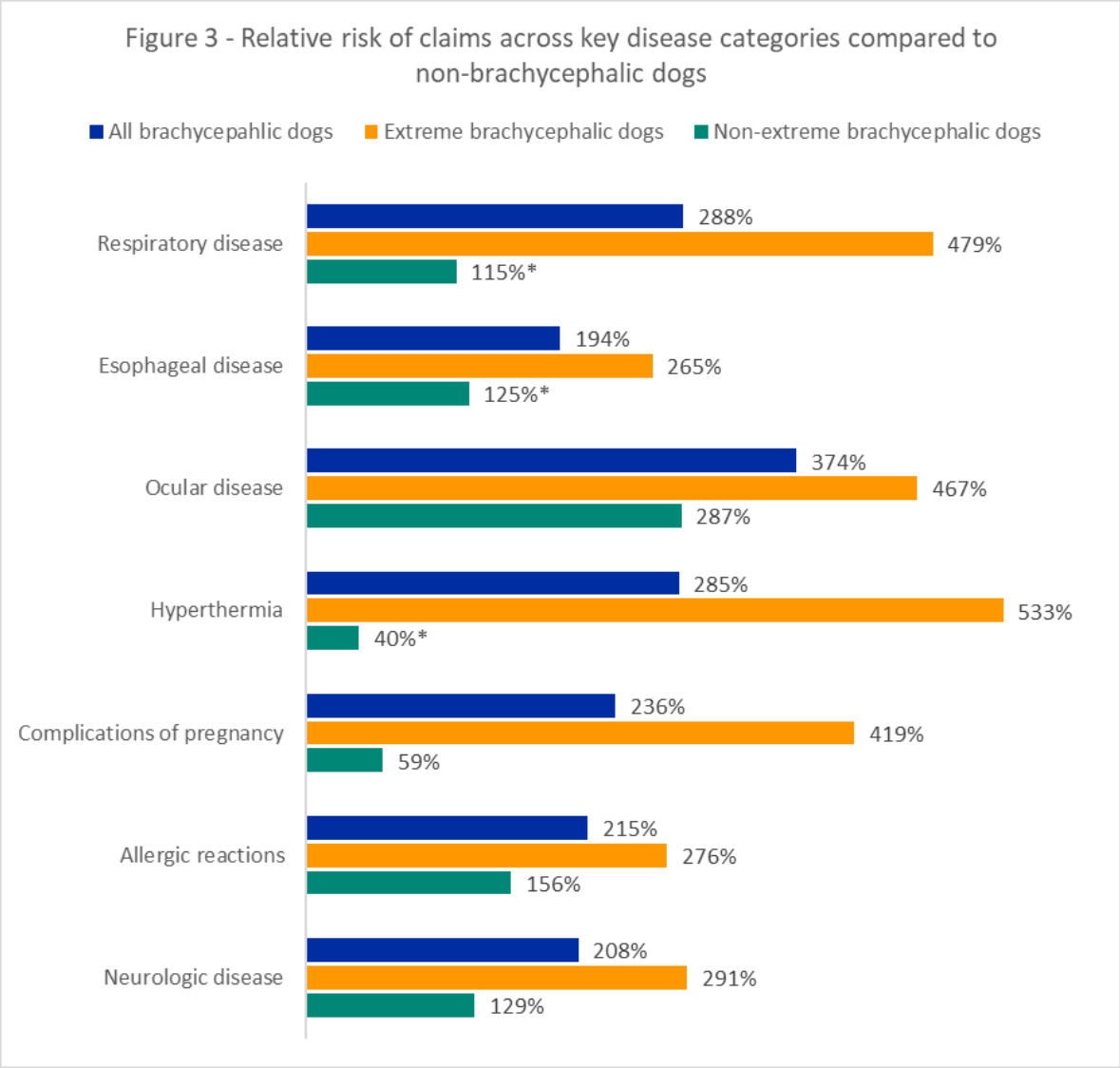
Brachycephalic health conditions

When reviewing the data on all types of brachycephalic dogs, it became clear that the extreme brachycephalic breeds have different clinical experiences across many of the studied disease areas. The statistical power of our large dataset allowed a comparison of the risks between brachycephalic and extreme brachycephalic dogs for these disease areas. This unique analysis provides new insights into the disease risks of these two subsets of brachycephalic dogs, in addition to the relative risks faced by all brachycephalic dogs compared with their non-brachycephalic counterparts.

Figure 3 shows the disease areas we'll touch on in this analysis, and some that we'll more closely examine in our second brachycephalic study on comorbidities (particularly neurologic disease).



** Esophageal disease and hyperthermia in non-extreme brachycephalic dogs did not meet the standard of statistical significance for this study (Bonferroni- adjusted P<0.01)*

In the know about noses: Burrowing into brachycephalic dog breeds (Part 1)

Respiratory diseases of brachycephalic dogs

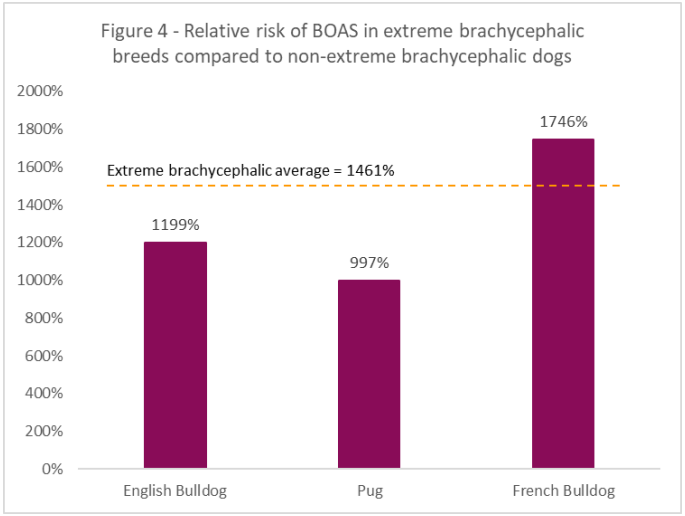
Brachycephalic dogs are subject to a combination of respiratory diseases that together are known as brachycephalic obstructive airway syndrome (BOAS).[10] Our analysis of respiratory disease included diagnosis codes covering BOAS, pneumonia, inflammatory upper airway diseases (e.g., laryngitis, tracheitis), and other diseases of the lung (pleural effusion, interstitial lung disease). Upper respiratory infections like kennel cough and diagnosis codes related to heart failure (e.g., heart failure, pulmonary edema) were excluded.

The risk of brachycephalic dogs submitting a claim for any respiratory condition was almost three times higher than for non-brachycephalic dogs, with a relative risk of 288% (see Figure 3). Claims submitted specifically for BOAS-related conditions represented 63% of brachycephalic dogs with respiratory claims, while accounting for less than 1% of respiratory-affected non-brachycephalic dogs. This difference highlights the existence of BOAS as a disease of brachycephalic dogs.

BOAS (Brachycephalic Obstructive Airway Syndrome)

BOAS is thought to be caused by increased inspiratory resistance secondary to abnormal skull and soft tissue conformation. As negative pressure in the chest increases, the upper airway collapses when soft tissues (e.g., everted laryngeal saccules and tonsils, thickened soft palate) are pulled into the airway, impeding airflow.[10]

Because BOAS is a collection of diseases nearly exclusive to dogs with brachycephaly, comparisons to dogs without the brachycephalic phenotype are not very helpful. Therefore, for BOAS, relative risk is presented between extreme brachycephalic breeds and all other brachycephalic breeds.



As one might expect, BOAS is linked to more claims in extreme brachycephalic breeds than in non-extreme brachycephalic breeds. The three extreme brachycephalic breeds account for 93% of all BOAS claims in the brachycephalic breed data set, a function of both breed popularity and disease risk.

The difference between extreme and non-extreme brachycephalic breeds is dramatic, as illustrated in Figure 4. Extreme brachycephalic breeds are almost 15 times more likely to have a claim submitted for BOAS than non-extreme brachycephalic dogs.

Amongst the three extreme brachycephalic breeds, the French Bulldog is more than 17 times more likely to have a claim submitted for BOAS, the English Bulldog nearly 12 times more likely, and the Pug almost 10 times more likely. Put simply, these three breeds have a dramatically higher risk of having claims for BOAS, even as compared to other brachycephalic breeds.

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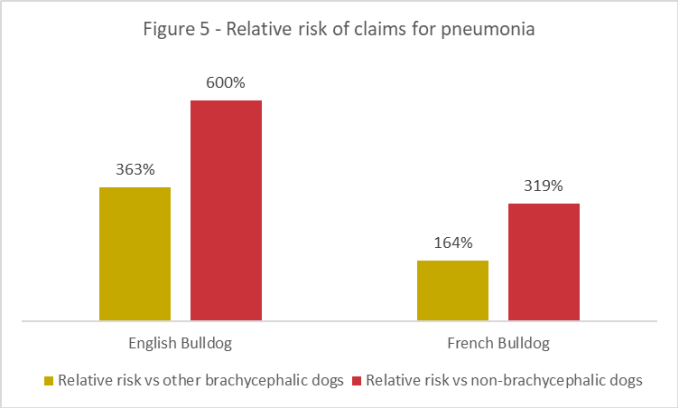
Pneumonia

Aspiration pneumonia is a well-recognized potential post-anesthetic complication for brachycephalic breeds[11], most commonly secondary to gastrointestinal disease.[12]



English Bulldogs are at more than 3.5 times the risk for submitting a claim for pneumonia than other brachycephalic breeds and at six times greater risk than non-brachycephalic breeds (Figure 5). Although French Bulldogs are only at slightly greater risk (1.6 times) of having a claim submitted for pneumonia than the rest of the brachycephalic population, they are still at more than three times greater risk than non-brachycephalic dogs.

Regurgitation and pneumonia have been linked to esophageal disease in brachycephalic dogs.[11, 12] Further analysis of gastrointestinal and other comorbidities in brachycephalic dogs will be explored in Part 2 of this analysis.

Respiratory disease data: Clinical relevance

This analysis suggests that considering the following points when managing the respiratory health of brachycephalic dogs may be helpful:

What actions?

For veterinary healthcare teams:

- **Optimal management:** For some dogs, corrective surgery may be an option to manage clinical signs and reduce the risk of serious disease progression.
- **Optimal management:** As the length of anesthetic episode has been associated with an increased risk of aspiration pneumonia, every effort should be made to reduce anesthetic times. Extra attention during recovery, delayed removal of the endotracheal tube, and pre- and post-anesthetic treatment with gastric prokinetic drugs may be helpful.[10, 11]

Advice to give pet families:

- **Prevention:** Obesity is a known risk factor for BOAS. Maintaining a healthy body condition throughout a dog's life can help reduce this risk.[11, 13]
- **Prevention:** Using a properly fitted harness, rather than a collar, will limit pressure on the dog's neck and make breathing easier.[14]
- **Early detection:** Snoring and gagging are not cute little quirks of brachycephalic dogs. Along with difficulty breathing, exercise intolerance, and regurgitation, they can be signs of illness requiring veterinary attention.[15]
- **Recognizing emergencies:** Any brachycephalic dog with difficulty breathing, severe coughing, blue or pale gums, collapse, or fainting requires immediate veterinary attention.[15]

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Ocular disease of brachycephalic dogs

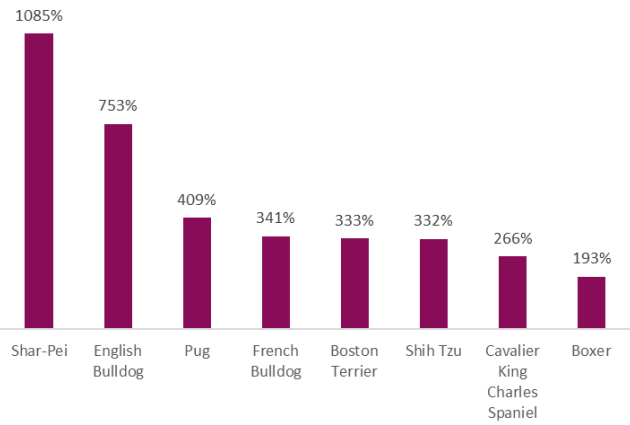
Ocular disease is often considered the "other" disease of brachycephalic breeds. In addition to exophthalmia caused by their skull shape, common abnormalities like ectropion, entropion, lagophthalmos, and reduced corneal sensitivity predispose them to ocular diseases, including corneal ulceration, keratitis, and increased risk of ocular trauma.[16]

Diseases specific to the physical challenges of inadequate ocular coverage and lubrication in these breeds are grouped under the umbrella term brachycephalic ocular syndrome (BOS). Unlike BOAS, each of the conditions included in BOS can also occur in non-brachycephalic dogs. However, many ocular diseases with a known or suspected inherited component are concentrated in brachycephalic dogs and are included in this analysis.[16]

All ocular conditions were initially analyzed in a single group, and then were classified as one of four disease types:

- **Prolapsed third eyelid (AKA "cherry eye"):** prolapse of the gland of the nictitating membrane
- **Corneal disease:** corneal ulceration, corneal edema, corneal dystrophy, or keratoconjunctivitis sicca (KCS)[a]
- **Eyelid disease:** entropion, ectropion, distichiasis, trichiasis, or blepharitis
- **Ocular trauma:** enucleation, evisceration, or other ocular trauma

Figure 6 - Relative risk of ocular disease in brachycephalic breeds compared to non-brachycephalic dogs



With their shortened faces and altered orbital structures, brachycephalic dogs are 3.7 times more likely than non-brachycephalic dogs to report claims for ocular disease.

Considering breed-specific levels of data across all ocular diseases, the English bulldog is at 75 times increased risk and the Shar-Pei at more than 100x the risk of having a claim submitted for ocular disease vs. non-brachycephalic breeds. Even without these two breeds, the risk of ocular disease in brachycephalic breeds remains higher than that in non-brachycephalic breeds: Pugs (409%), French Bulldogs (341%), Shih Tzus (332%) and Boston Terriers (333%) are at three to four times greater relative risk for ocular diseases than non-brachycephalic dogs. Figure 6 summarizes this data.

[a] Although keratoconjunctivitis sicca is characterized by inflammation of the conjunctiva and lacrimal duct in addition to the cornea, it is grouped with corneal disease as the outcome is often corneal damage.

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Brachycephalic breeds as a group are at greater risk than non-brachycephalic dogs of submitting claims for each of the ocular disease groups (Figure 7). Once again, adding another layer of analysis reveals breed differences. While the English Bulldog and the Shar-Pei both have high relative risk for ocular disease, the causes are different. Figure 8 shows the breakdown of relative risk for the two breeds across the four identified categories of disease contributing to claims associated with BOS. English Bulldogs are at increased risk of prolapsed third eyelid (27 times the risk vs. non-brachycephalic breeds), corneal disease (seven times the risk), and eyelid disease (17 times the risk).

Figure 7 - Relative risk of ocular disease and ocular disease categories in brachycephalic dogs compared to non-brachycephalic dogs

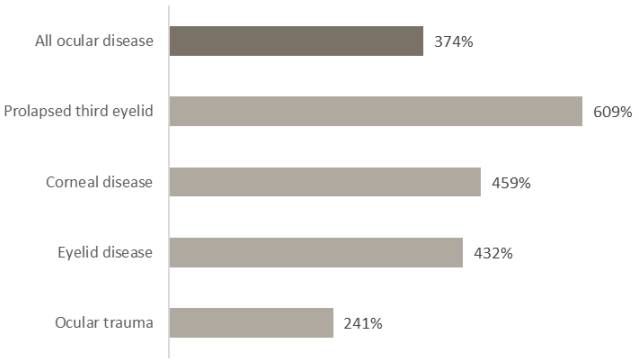
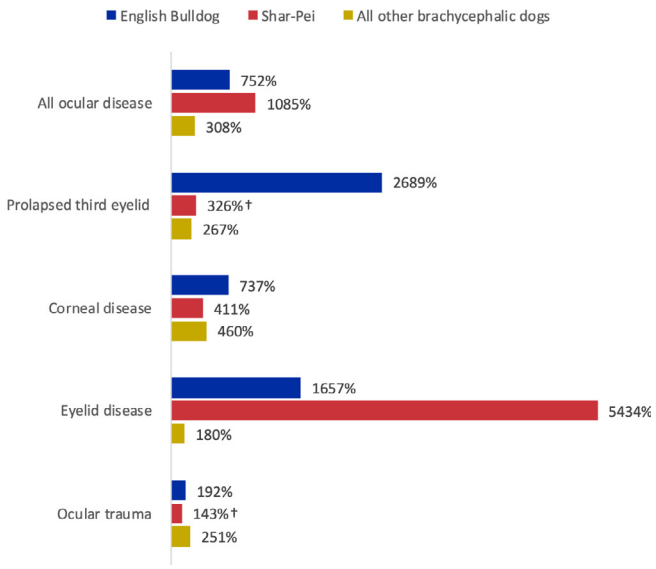


Figure 8 - Relative risk of ocular diseases compared to non brachycephalic dogs



† Prolapsed third eyelid and ocular trauma in Shar-Pei compared to non-brachycephalic dogs did not meet the standard of statistical significance for this study (Bonferroni- adjusted P<0.01)

These numbers are dwarfed by the dramatically increased risk for eyelid disease in the Shar-Pei: more than 54 times the risk than non-brachycephalic dogs. We acknowledge that skin wrinkles caused by excessive hyaluronic acid, which contribute significantly to the relative risk for eyelid disease in the Shar-Pei breed, are not necessarily tied to brachycephalic conformation.[17] The Shar-Pei is at no more dramatic risk for the three other types of BOS abnormalities than are other brachycephalic dogs, although that risk is nonetheless higher than that of non-brachycephalic dogs.

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Ocular disease data: Clinical relevance

This analysis suggests that the following considerations may be helpful when managing ocular disease in brachycephalic dogs:

What actions?

For veterinary healthcare teams:

- **Optimal management:** Identify and (when appropriate) treat underlying causes like entropion, distichiasis, and trichiasis early. Both medical and surgical treatments should be considered, according to the dog's needs.
- **Optimal management:** Regularly monitor brachycephalic dogs for signs of BOS, including excessive tearing, mucoid discharge, and visible ocular discomfort. Investigate any signs and implement appropriate treatment. Regular use of a mild lubricant for dogs with exophthalmos or lagophthalmos may be helpful.

Advice to give pet families:

- **Prevention:** Topical lubricants or protective goggles may be recommended for dogs with pronounced exophthalmos or lagophthalmos. Follow veterinary instructions for any eye medicines carefully.
- **Early detection:** Pain, squinting, rubbing the eyes, and excessive redness or discharge are signs of ocular disease that can rapidly progress to severe disease and even vision loss. Contact a veterinarian at the first sign of eye problems.

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Other diseases in brachycephalic dogs

In addition to diseases directly related to respiratory or ocular disease, the analysis of Nationwide data revealed other diseases for which brachycephalic dogs are at increased risk.

Brachycephalic dogs are

2.9x

more likely to have submitted claims for heatstroke

Heatstroke/Hyperthermia

Panting plays a critical role in thermoregulation for dogs. It is well established that brachycephalic dogs are less effective at lowering their body temperature through panting, putting them at greater risk for overheating when exercising or being exposed to warmer or more humid environments.[14] Published survey data show some brachycephalic pet parents consider their dogs to have greater heat sensitivity and be more susceptible to exercise intolerance, but they do not recognize it as a sign that their dog's health may be impaired.[6,15]

Brachycephalic breeds in our cohort were nearly 2.9 times more likely to submit a claim for heatstroke, with a 285% relative risk compared to non-brachycephalic breeds. Once again, the extreme brachycephalic English Bulldogs and French Bulldogs were the most notably affected breeds, with relative risks of 725% and 517%, respectively, compared to non-brachycephalic dogs, i.e., 7.3 times and 5.2 times more likely to have submitted claims, respectively.

Heatstroke: Clinical relevance

This analysis highlights the importance of educating owners about preventing heatstroke in brachycephalic dogs. The following topics may be helpful:

Advice to give pet families:

- **Prevention:** Keep dogs cool while exercising by scheduling time outside in the morning or evening, choosing shaded areas, and avoiding strenuous exercise.
- **Prevention:** Have a cooling plan if a brachycephalic dog begins panting heavily; provide ice cubes and fresh water, and move them near a fan and into an air-conditioned room
- **Recognize Emergencies:** Immediately seek veterinary advice if the dog has difficulty breathing, becomes weak or collapses, or their gums or mucous membranes turn blue, white, or gray.

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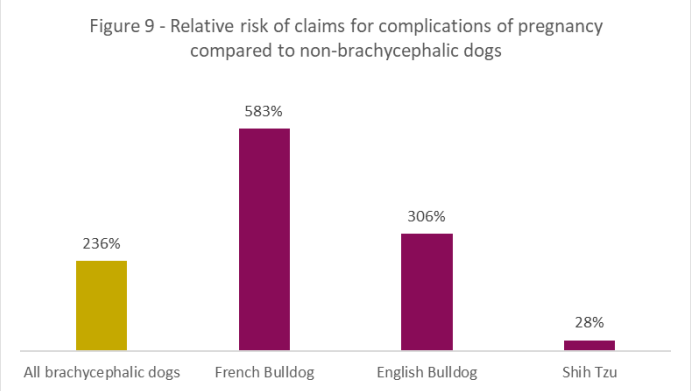
Complications of pregnancy

The anatomical challenges of the brachycephalic phenotype are not limited to the respiratory or ocular systems. The risks of breeding brachycephalic dogs are well-known to veterinarians and breeders and include size mismatch between the dam's pelvis and the puppies' heads.[14] To avoid complications with delivery, many breeders of brachycephalic dogs opt for an elective Cesarean section.[14,15]



The codes included in this analysis included pregnancy and breeding complications, as well as Cesarean sections. Complications of pregnancy are 2.4 times higher for brachycephalic dogs than their non-brachycephalic counterparts.

Figure 9 compares the relative risk of claims for complications of pregnancy among all brachycephalic dogs and for the three individual breeds that passed our stringent statistical significance criteria. The two breeds in this list with extreme brachycephalic phenotypes, the French Bulldog and English Bulldog, are at considerably higher relative risk of submitting claims for pregnancy complications than other brachycephalic dogs as well as non-brachycephalic dogs. Also notable in the graph data is the Shih Tzu; despite the breed's brachycephalic classification, it escapes many of the same disease risks as the extreme brachycephalic breeds.

Pregnancy complications: Clinical relevance

Breeding brachycephalic dogs is a medical and, to some people, ethical challenge. Considering the results of this analysis, the following advice may be helpful:

What actions?

For veterinary healthcare teams:

- **Prevention:** Provide genetic counseling to owners of brachycephalic dogs considering breeding, encouraging breeding for healthy dogs as well as breed standards.

Advice to give pet families:

- **Prevention:** Consult your veterinarian when considering whether to breed your brachycephalic dog, and how to choose the most appropriate mate.
- **Optimal Management:** Bring your pregnant dog for regular monitoring visits throughout her pregnancy. Have a plan for emergency or elective C-section at the end of the pregnancy.

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Systemic allergic reactions

Although brachycephalic breeds have many issues, to our knowledge they have not been shown to be more susceptible to systemic allergic reactions. This analysis revealed something new.

Brachycephalic breeds submitted more claims for allergic reactions, defined as facial swelling, hives, and anaphylactic shock, than non-brachycephalic breeds. Overall, brachycephalic breeds were 2.2 times more likely to have claims submitted for allergic reactions.

Figure 10 - Relative risk of allergic reactions compared to non-brachycephalic dogs

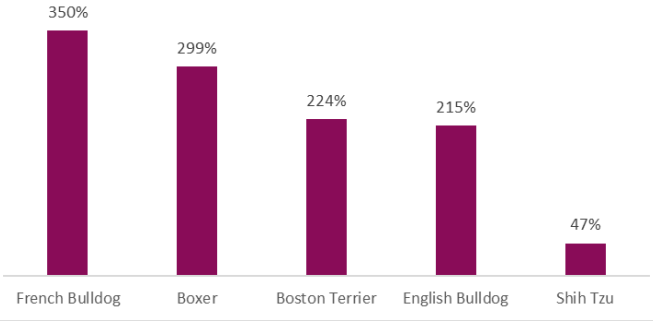

Figure 10 demonstrates that the majority of the risk is attributable to the extreme brachycephalic breeds, of which French Bulldogs and English Bulldogs have more than twice the relative risk of allergic reactions compared to non-brachycephalic breeds. Notable additions to the list, also with more than twice the relative risk vs. non-brachycephalic breeds, were the Boxer and Boston Terrier.

One other brachycephalic breed, the Shih Tzu, was actually at lower relative risk of allergic reactions than non-brachycephalic dogs. The relationship between allergic reaction risk and brachycephalic phenotype may thus be worthy of further investigation.

Allergic reactions: Clinical relevance

While not demonstrating an absolute association between brachycephalic conformation and risk of systemic allergic reaction, the results of this analysis nonetheless indicate that some breeds, particularly the extreme brachycephalic breeds, are more likely to experience these reactions than non-brachycephalic dogs. The following points may therefore be useful to consider:

What actions?

For veterinary healthcare teams:

- **Optimal Management:** Be aware that some brachycephalic dogs, and especially extreme brachycephalic dogs, are at higher relative risk for allergic or anaphylactic reactions. Train your client care team to recognize and respond to signs of allergic reactions.

Advice to give pet families:

- **Early detection:** Be aware of the signs of an allergic response: Any case of hives, facial swelling, difficulty breathing, vomiting or diarrhea, or acute collapse are reasons to contact a veterinarian immediately.

Conclusions

This white paper represents the exploration of pet health insurance data from hundreds of thousands of dog years at risk, and from tens of thousands of individual brachycephalic dogs.

The higher relative risks of brachycephalic dogs for diseases related to their conformation are well-recognized. The additional risks experienced by extreme brachycephalic dogs are, to our knowledge, new and useful information for veterinary health care teams.

The dramatic differences in relative risk between extreme brachycephalic dogs and other brachycephalic dogs, and between all brachycephalic dogs and non-brachycephalic dogs, highlight the importance of comprehensive respiratory and ocular care throughout a brachycephalic dog's life. Careful attention must also be paid to day-to-day events that can expose these dogs to thermoregulatory stress or allergens. Serious consideration must be given to the risks associated with pregnancy and breeding of brachycephalic dogs, and veterinarians can play an important role in genetic counseling and monitoring of pregnancies.

In this paper, Part 1 of the analysis, Nationwide has shared new information on common diseases of brachycephalic dogs. Part 2 of this series will consider comorbidities and their impact on the health and wellbeing of brachycephalic and extreme brachycephalic dogs.

The goal of these Nationwide analyses is to provide pet families and veterinary healthcare teams with objective, data-informed personalized pet health guidance that will help lead to early disease recognition, appropriate interventions, and better health outcomes.

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In the know about noses: Burrowing into brachycephalic dog breeds (Part 1)

About Nationwide's Pet Health Analytics and Insights Team

In 2021, Nationwide's pet insurance division created a dedicated Pet Health Analytics and Insights Team comprised of veterinarians, data scientists, and breed experts working in collaboration with Nationwide actuaries, analytics experts, and technology partners. The goal: providing pet families, veterinary healthcare teams, and the animal health industry with personalized pet insights that contribute.

Previous white papers from Nationwide

Canine Cancer Series

- "**Oodles of Doodles: Popularity and Health**," on the popularity of poodle crosses and their lower rates of cancer claims compared to their contributing breeds – Poodles, Golden Retrievers, and Labrador Retrievers.
- "**Diversity of Risk: Purebred Dogs and Cancer**," on the relative risk of claims for common cancers in popular purebred dogs.
- "**About the Size of It: Scaling Canine Cancer Risk**," on the effect dog size has on the relative risk of cancer, how it differs across body systems, and what effect size and body system has on age of initial cancer claim.

Senior Pets

- "**Aging Well: Old Dogs, New Data (Part 1)**," on common conditions in aging canines, and how risk changes by breed and dog type.

These white papers are available at www.petinsurance.com/petdata, along with expanded explanations of analytical methodology. The publication of white papers based on the analysis of Nationwide pet data is part of a larger effort by Nationwide in pioneering positive change in veterinary medicine. We support the greater use of "big data" by industry players, shared for the benefit of all.

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