

## FAQ

# Bee Sting Allergies and Municipal Regulations

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**Punchline:** There's no evidence on the impact of beekeeping regulations on human safety. Likewise, anaphylactic reactions from stings leading to death are so rare that there is little reason to factor them into decisions about honeybee policies — rather, decision-makers should be aware of the nonfatal but more common problems that can accompany possible anaphylactic reactions to insect stings.

### What effects do beekeeping regulations have?

There does not seem to be *any* research on the efficacy of *any* regulations of beekeeping. That is, there is no evidence that regulating (limiting) honeybees has any effect on the number of bee stings. Beekeepers argue that setbacks, a standard land-use tool, don't make sense when talking about bees and make logical arguments for lowering setbacks based on their knowledge of bee behavior. There's no rigorous empirical evidence that they are right or wrong. The closest thing we have to evidence is that even within the US Africanized Honeybee zone, in many places (especially Texas and Arizona) there are few regulations of honeybees and apparently little to no sense that there is a need to increase restrictions. In fact, regulations have been going in the direction of being less restrictive (Santa Monica, Phoenix, Salt Lake City).

Nonetheless, it is worthwhile for policy-makers to get a sense of bee sting allergies.

### How can bee stings kill?

Honeybee stings can lead to death in two major ways: (a) hundreds of stings overwhelming the body's ability to respond to the venom in the stings and (b) anaphylactic shock stemming from as little as one sting. Since 'mass attack' deaths are not normally associated with bees kept by humans but feral, if not Africanized honeybees, they won't be discussed here.<sup>1</sup> (Not that there is any good data anyway.)

### What is anaphylactic shock?

Anaphylactic shock is an intense allergic reaction to even minuscule amounts of a substance, which can lead to the heart stopping or suffocation through the swelling of the air passage. Perhaps the most well-known cause of anaphylactic is from eating peanuts, but it is also the reason why nurses and pharmacists ask whether you're allergic to latex or penicillin. Some define an anaphylactic reaction as to only include life-threatening conditions; others define it as "any type of systemic allergic reaction" (Neugut, Ghatak and Miller 2001, 16). This obviously can affect estimates of how common such reactions are.

### What percentage of people are allergic to insect stings?

There is very little good data on this — and numbers seem to appear out of nowhere in the medical literature and get repeated and repeated. (This does not inspire confidence.) The one rigorous study with clear results concluded that 3.3 percent of the study population had an allergic reaction to

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<sup>1</sup> As a beekeeper explained it to me, European honeybees will attack en masse if provoked (e.g., you knock over their hive) but they will pursue for 30-40 feet, making them easy to escape, whereas Africanized bees can pursue for half a mile.

honeybee or yellow jacket venom. It stressed, however, that “the prevalence figures obtained in this study should be generalized with caution.” (Golden et al. 1989, 243)

### **What are the odds of an allergy leading to an anaphylactic reaction? A reaction leading to death?**

Without any certainty in statistics of the frequency of such allergies, it’s difficult to establish the odds of someone with an allergy going into anaphylactic shock. Neugut, Ghatak and Miller mention older numbers (1979, 1986) suggesting that someone who has an anaphylactic reaction has a 1 percent chance of dying. Yocum et al. (1999) intensely studied records in one Minnesota and found 1 death from the 157 anaphylactic reactions recorded over 5-year period.

Prompt medical attention can make a huge difference but does not guarantee survival.

### **So what do death rates look like?**

Well, if we want to simply look at deaths from “Contact with hornets, wasps and bees” [mortality code X23], we get 503 deaths in the US from 1999 to 2007, or 57 deaths per year.<sup>2</sup>

There has never been a national study from which risk of death from sting-related anaphylaxis can be calculated, and I do not have confidence in the estimates I’ve found. If we can make the assumption that the US is like Australia, we can extrapolate. There is a study of the Australian national mortality recording system (Liew, Williamson and Tang 2009) suggests a death rate for **anaphylaxis for ALL stinging insects** to be **the equivalent in US terms of 40 deaths per year for a population of 313 million**.<sup>3</sup> This ironically is identical to the low end estimate appearing without origin in the US literature.<sup>4</sup> As with all extremely rare events, such statistics, however, are very rough: we’re talking about 20 deaths attributed to stinging insects over a 9-year period for the southern continent.<sup>5</sup> I should note that my estimate here has been criticized by an immunologist for arguably understating the

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<sup>2</sup> This is from the CDC Compressed Mortality File (Actual search: <http://wonder.cdc.gov/controller/datarequest/D53;jsessionid=8AB58AB32311FE08C0FAC8B27D1099CD>).

<sup>3</sup> The study concludes a death rate of .64 per million per year for all anaphylaxis, of which insect stings represent 17.86 percent. Their use of the end year population for the denominator, however, seems to downplay the rate and needs to be adjusted for population growth. This is done by dividing 19.4 million (the 2001 population) by 17.5 million (1992) population and multiplying the result by .64. The US population is taken as approximately 313 million. This assumes of course that the Australia’s national mortality system is accurate (e.g., cause of death always correctly identified). Link for population figures: [http://www.google.com/publicdata/explore?ds=d5bncppjof8f9\\_&met\\_y=sp\\_pop\\_totl&idim=country:AUS&dl=en&hl=en&q=australian+population](http://www.google.com/publicdata/explore?ds=d5bncppjof8f9_&met_y=sp_pop_totl&idim=country:AUS&dl=en&hl=en&q=australian+population)

<sup>4</sup> Neugat, Ghakar and Miller (2001, 18) suggest a range of 40-100 and claim that “this number is believed to be severely underestimated.” Their sources, however, do not contain these numbers.

<sup>5</sup> A similar calculation from a British study (Pumphrey 2004, 286), which found only 4 honeybee deaths and 14 unidentified sting deaths over the same 9-year period in the UK, leads to a US estimate of 11 deaths per year, assuming that all the unidentified stings were honeybees. This is based on a 1992 population of 57.58 million. ([http://www.google.com/publicdata/explore?ds=d5bncppjof8f9\\_&met\\_y=sp\\_pop\\_totl&idim=country:GBR&dl=en&hl=en&q=uk+population](http://www.google.com/publicdata/explore?ds=d5bncppjof8f9_&met_y=sp_pop_totl&idim=country:GBR&dl=en&hl=en&q=uk+population)).

severity of the problem because the cause of anaphylaxis cannot always be identified and that perhaps this number should be doubled.

If we accept the 40 deaths as roughly accurate, however, then the deaths for all stinging insects is very close to US annual deaths by lightning strike.<sup>6</sup> It is important recognize, however, that this includes the positive benefits of medical attention. If people did not get medical attention, undoubtedly this number would be higher.

### **Can be a bee sting allergy be managed?**

Yes. Immunotherapy has a high rate of success. This is a consistent point in the articles I found.

### **So is the risks of bee sting allergies overblown?**

In terms of the risk of death, yes, but there are a few complications. People don't necessarily know that they have a bee sting allergy, meaning that they don't know they might benefit immunotherapy and a significant number of those who die from stings appear to have died from their first sting. Furthermore, insect stings can lead to trips to the emergency room (though CDC statistics don't seem to be broken down well enough to pinpoint exactly how many per year). Likewise, emergency room visits often lead to observation for 6-24 hours because of the risk that the anaphylactic reaction recur after initially subsiding. There are emotional and financial costs associated with such visits, as well as with missed time from school or work. Furthermore, anaphylaxis can be frightening; non-fatal stings can still be a miserable experience; and for children at least, getting allergy shots is no fun (personal experience).

### **Bibliography**

- Golden, David B.K. 2010. Long-term outcome after venom immunotherapy. *Current Opinion in Allergy and Clinical Immunology* 10:337-341.
- Golden, David; Marsh, David; Kagey-Sobotka, Anne; Freidhoff, Linda; Szklo, Moyses; Valetine, Martin D.; and Lawrence M. Lichtenstein. 1989. Epidemiology of insect venom sensitivity. *Journal of the American Medical Association* 262(2): 240-244.
- Liew, Woei Kang, Williamson, Elizabeth, and Mimi L.K. Tang. 2009. Anaphylaxis fatalities and admissions in Australia. *Journal of Allergy and Clinical Immunology*. 434-342.
- Neugat, Alfred I.; Ghatak, Anita T.; and Rachel L. Miller. 2001. Anaphylaxis in the United States. *Archives of Internal Medicine* 161: 15-21.
- Peng, Michael M., and Hershel Jick. 2004. A population-based study of the incidence, cause, and severity of anaphylaxis in the United Kingdom. *Archives of Internal Medicine* 164: 317-319.
- Pumphrey, Richard. 2004. Anaphylaxis: Can we tell who is at risk of a fatal reaction? *Current Opinion in Allergy and Clinical Immunology* 4:285-290.

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<sup>6</sup> CDC notes 458 deaths from 1999-2007.