

### Real World Graduation: Question 83: Rat Sightings

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#### Question 83

There are 8.143 million (8,143,000) people and an estimated 25 million (25,000,000) rats in the New York City metropolitan area. Suppose that the estimated rat population is accurate. The area of the metropolitan area is 322 square miles (8,976,844,800 square feet). Therefore, density of rats is  $25,000,000/8,976,844,800 = .002784$  rats per square foot, or one rat for every 359 square feet. Likewise, the density of people is  $8,143,000/8,976,844,000 = .000907$  persons per square foot, or one person per 1102.4 square feet. Since the density of rats is higher, and an area of 359 sq. ft. is a square with sides 18.9 ft long, and since the distance from the center of such a square to any corner (where a person could be) is 26.8 ft, a researcher has concluded (to a first approximation) that a person in New York City is at most (on average) 26.8 ft. from a rat.

On the other hand, another researcher conducted a survey about how often rats are observed in New York City. Some people reported seeing rats every day, while others could not recall the last time they saw one, even for protracted periods. A survey was taken in 2002. In the survey, people were asked if they had seen rats or evidence of rats in their homes in the previous 90 days. On the upper end, 43% of Hispanic people with income less than \$25,000 had seen rats or evidence of them, while only 10% of white people making over \$50,000 saw them [1]. Other income levels among whites and Hispanics fell between these two extremes, as did the data for black people of all income levels.

How can these two sets of facts about rats be reconciled?

- a) They can be reconciled if one recalls that white people and some upper-class black people have high rates of baseball bat ownership, which rats fear the most.
- b) They can be reconciled if one realizes that some people in New York live in expensive neighborhoods and others live in slums because they are victims of the rich. Since rats prefer to live in the poorer neighborhoods because the rodent controls are not as effective, it is logical that some (the poor) see rats every day while others (the rich) never see them.
- c) They can be reconciled if one recalls that averages do not apply here because rats prefer to live near people of Hispanic descent because Hispanics throw out a lot of unused vegetables, which are the favorite food of rats.
- d) The data can be reconciled because most blacks and nearly all whites will deny or minimize any rat problems in their homes.
- e) The data can be reconciled because most Hispanics will exaggerate any rat problems in their homes.

[1] A. Karpati, B. Kerker, F. Mostashari, T. Singh, A. Hajat, L. Thorpe, M. Bassett, K. Henning, T. Frieden, *Health Disparities in New York City*, NY: New York City Department of Health and Mental Hygiene, 2004, p. 23

### Answer to Question 83

This is a trick question. None of the answers are correct because the method of analysis is not consistent with the way rats live. Most rats live underground, and most are nocturnal. The method of analysis assumed that all the people and all the rats are on the surface at the same times. But most people in New York City spend some of their time well above ground in high-rise buildings, whereas most rats spend most of their time underground. It is also true that neither the people nor the rats are evenly distributed. Therefore, the mean distance between any person and any rat cannot be reliably calculated. If anything, the 28 ft. figure is low because the distance below ground is not accounted for. The data about rat sightings is not material because the question relates to distance, not necessarily clear-sight distances.

The choices given are wrong for the following reasons. Choice (a) is wrong because rats are not smart enough to perceive the threat from a baseball bat; nor are they smart enough to figure out who owns them. Choice (b) is wrong because it assumes that rats know or care about the income level of people; in reality, rats will go wherever there is food and a place to nest. Choice (c) is partly true in the sense that averages do not apply, but there is no evidence other than prejudice that rats prefer Hispanic company. There is no evidence that choices (d) or (e) are true.