

Probability

Binomial Distribution – Wal-Mart Gender Discrimination lawsuit

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| Gender Discrimination

- A 2001 **lawsuit*** by **seven female** employees claimed that **Wal-Mart Stores, Inc.** promoted female workers less frequently than male workers
 - 1.5 million current and former female
 - eventually decided, in 2011, in favor of Wal-Mart by the Supreme Court

* http://edition.cnn.com/2011/US/06/20/scotus.wal.mart.discrimination/index.html?hpt=hp_t1

| Gender Discrimination

- Suppose that **10 individuals** are chosen from a large pool of qualifying employees for a **promotion** program, and the pool has an **equal number** of female and male employees.
- When all **10 individuals** chosen for promotion are **male**, the **female employees claim** that the program is **gender-biased**.
- How can we **investigate statistically** the validity of the women's claim?

| Gender Discrimination

- **Other factors being equal**, the probability of selecting a female for promotion is 0.50, as is the probability of selecting a male.
- If the employees are **selected randomly** in terms of gender, **about half** of the employees picked should be **females** and about half should be **male**.
- Due to ordinary **sampling variation**, however, it need not happen that exactly 50% of those selected are female.

| Example

- Suppose the **large employee pool** that can be tapped for management training is half female and half male. In a group recently selected for promotion, **none of the 10 individuals chosen were female.**
- What would be the **probability of 0 females in 10 selections**, if there truly were no gender bias?

| Gender Bias in Promotions

- The **probability that no females are chosen** is:

$$P(0) = \frac{10!}{0!10!} (0.50)^0 (0.50)^{10} = 0.001$$

- It is very unlikely (one chance in a thousand) that none of the 10 selected for management training would be female if the employees were chosen randomly.
- In summary, because this **probability is so small**, seeing no women chosen would make us highly **skeptical** that the choices were random with respect to gender.

| References

- Statistics for Engineers and Scientists, Fourth Edition, William Navidi
Colorado School of Mines
- Agresti, A., Franklin, C. and Klingenberg, B., 2017. Statistics: The art and science of learning from data (Fourth Edi).
- Khan Academy