

We live in a time with incredible advances in technology, medicine, and health care. Cloning is no longer science fiction. We have iPods, iPads, iPhones, and 3-D televisions. We carry calculators that can instantly execute many complex statistical calculations. Heart pacemakers have defibrillators capable of shocking and restarting stopped hearts. Couples use procedures that are claimed to greatly increase the chance of having a baby with a desired gender.

Some people argue that gender-selection methods should be banned, regardless of the reason, while others enthusiastically support the use of such methods. Lisa Belkin asked in the *New York Times Magazine*, "If we allow parents to choose the sex of their child today, how long will it be before they order up eye color, hair color, personality traits, and IQ?" There are some convincing arguments in favor of at least limited use of gender selection. One such argument involves couples carrying X-linked recessive genes. For some of those couples, any male children have a 50% chance of inheriting a serious disorder, but none of the female children will inherit the disorder. Those couples may want to use gender selection as a way to ensure that they have baby girls, thereby guaranteeing that a serious disorder will not be inherited by any of their children.

The Genetics and IVF Institute in Fairfax, Virginia developed a technique called MicroSort that it claims increases the chances of a couple having a baby with a desired gender. The MicroSort XSORT method is claimed to increase the chances of a couple having a baby girl, and the MicroSort YSORT method is claimed to increase the chances of a baby boy. Current results for the XSORT method consist of 945 couples who wanted to have baby girls. After using the XSORT technique, 879 of those couples had baby girls. (See Figure 5-1 for a bar graph illustrating these results.) We usually expect that in 945 births, the number of girls should be somewhere around 472 or 473. Given that 879 out of 945 couples had girls, can we conclude that the XSORT technique is effective, or might we explain the outcome as just a chance sample result? In answering that question, we will use principles of probability to determine whether the

observed birth results differ significantly from results that we would expect from random chance. This is a common goal of inferential statistics: Determine whether results can be reasonably explained by random chance or whether random chance doesn't appear to be a feasible explanation, so that other factors are influencing results. In

this chapter we present methods that allow us to find the probabilities we need for determining whether the XSORT results are significant, suggesting that the method is effective.

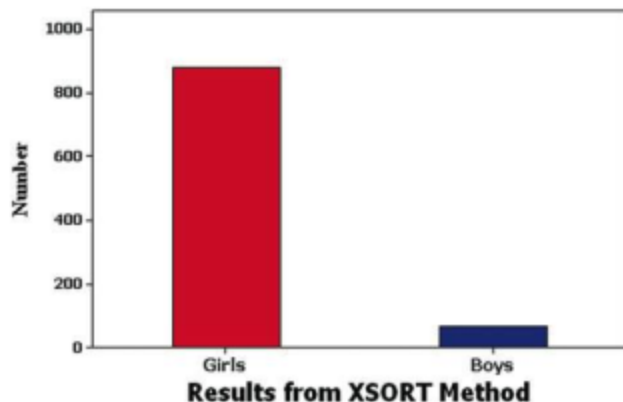


Figure 5-1 Current Results from the XSORT Method of Gender Selection

- 5-1** Review and Preview
- 5-2** Probability Distributions
- 5-3** Binomial Probability Distributions
- 5-4** Parameters for Binomial Distributions
- 5-5** Poisson Probability Distributions