

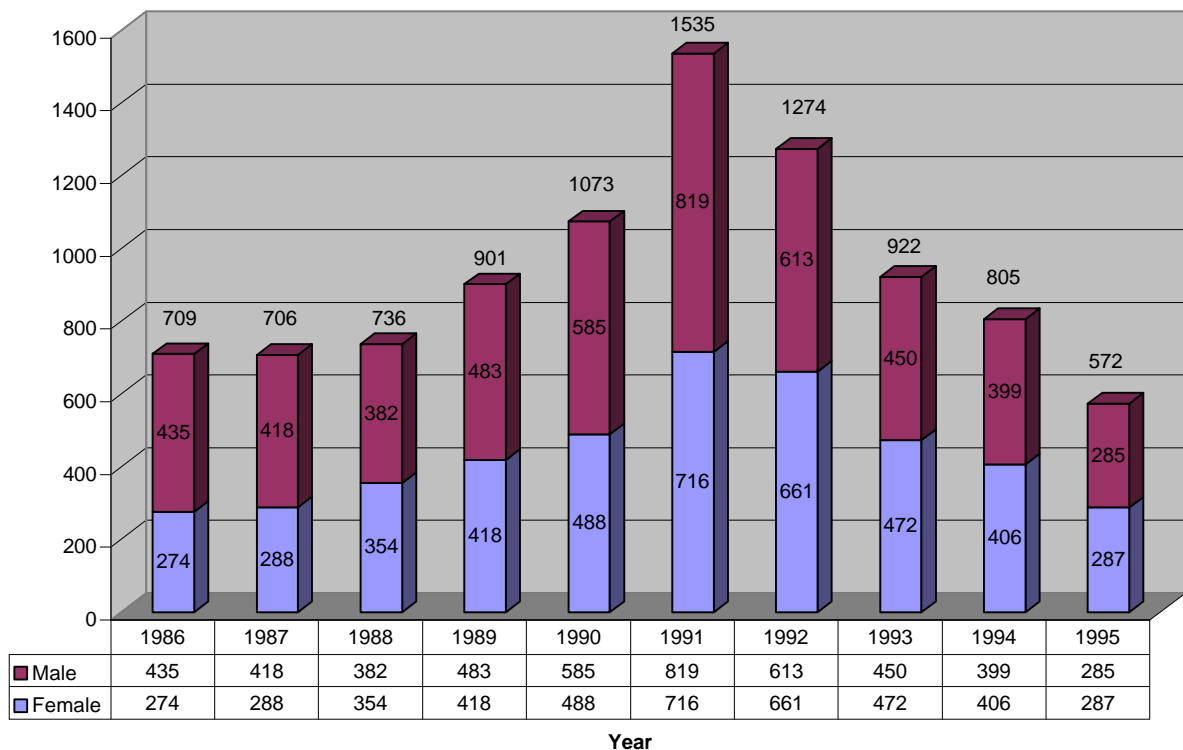
The Rise and Fall of Infectious Syphilis in South Carolina

Tim Lindman of the Center for Disease Control who is, at this writing, assigned to the South Carolina Department of Health and Environmental Control (DHEC) has discussed the following:

In the late eighties, escalating use of crack cocaine, prostitution and other high risk behaviors contributed to a dramatic increase in reported cases of infectious syphilis (IS) in South Carolina. (See the accompanying graph for the actual data.) To address the problem, DHEC expanded existing clinics, assigned additional staff to identify contacts of victims and began new educational initiatives. Our campus and others began a massive distribution of condoms as part of that initiative and law enforcement agencies stepped up efforts to lock up drug offenders - many of whom were carriers of the disease.

South Carolina citizens in the critical 19-32 year old age group began to make better decisions. In 1991, a significant turn-around occurred in the number of reported cases, and each year from that point through the mid 1990's saw a decrease in the number of reported cases of IS.

South Carolina Infectious Syphilis Cases Reported by Year and Sex



Source of Data: SC STD Register

Look at the graph and answer the following questions:

1. A quadratic function seems to be a good model to describe the number of reported cases of IS from 1986 through 1991. Why do you think this is a good choice? [This is a judgment call. If you think another model is appropriate, state which model and justify your choice.] Use a separate sheet for your response(s).
2. Use the model you chose in question 1, along with your regression tool, to produce a function describing the data from 1986 through 1991. Call it Y_1 .

$$Y_1 = \underline{\hspace{10cm}}$$

3. The logistic function seems to be a good model for the number of cases of IS after the combined initiatives discussed above [1991 - 1995]. Why do you think this is a good choice? [Again, the model selection is a judgment. If you disagree or if you do not have the regression tools needed to produce a logistic function, pick an appropriate non-linear model and justify your choice.]
4. Use the model you chose in question 3 to produce a function Y_2 describing the data from 1991 through 1995.

$$Y_2 = \underline{\hspace{10cm}}$$

5. Using the models you produced in questions 2 and 4 above, answer the following:
 - a. If the initiatives had not been put into place (meaning your function Y_1 would have been a good predictor of the number of cases after 1991) how many cases would have been reported in
 - i) 1992 _____
 - ii) 1993 _____
 - iii) How many people were spared the trauma of IS in each of these years? '92: _____ '93: _____

- b. According to your models, how many people were spared the trauma of IS last year? Assume that Y_1 is a good predictor for what would have happened without the initiatives and Y_2 is a good predictor for all subsequent years after the initiatives were put in place. _____.
6. (Term Project Possibility) Write a report justifying or opposing the state's expenditure of public funds for this initiative. Base your report on a comparison of the costs associated with the initiative versus the costs to the health care and other public systems. Include all assumptions and calculations. State no unsupported opinions.