

Syphilis “The Silent Intruder”

New Mexico Adventures in SuperComputing Challenge

Final Report

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Team 072

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Executive Summary

We decided to explore the topic Syphilis because this ordinary disease is affecting the people of the Navajo Nation. Our purpose is to give a better understanding and inform the public of what the symptoms are. Our main concern was the public awareness of what this disease is and how it transforms.

Now, it is impossible to keep track of what people do, so all we ask is people being safe and staying healthy. Everyone should have an understanding of how to prevent sexual disease and beware of his or her symptoms. We searched the web and found the number of cases increasing yearly, and in the future, it may increase dramatically. Our research shows the symptoms, stages, treatments, preventions, etc., which provide valuable information, especially for teenagers and young adults.

What we really wanted to glean from this project is just a description and give people an idea of other related sexual diseases. We gathered statistics showing the total number of cases increasing by year. We used that data to program it, using Star Logo to estimate the chances of developing this disease, treating it, and recovering from it.

Introduction

Syphilis is a sexually transmitted disease that has been known since 1500s, and is caused by the bacterium *Treponema pallidum*. Otherwise known as “the great imitator” because so many of the signs and symptoms are identical to other chronic, infectious, sexually transmitted disease, it begins in the mucous membranes and quickly becomes systemic, meaning it spreads in the bloodstream. If it is untreated, it progresses into four stages: *Primary, Secondary, Latent, and Late*. Occurrences of syphilis is on the rise, especially in people between the ages of fifteen and thirty-nine, drug users, and people with HIV, (the virus that causes AIDS).

Rates have been on a steady decline in the U.S. for the last fifty years. However, despite being very easily and cheaply curable, syphilis has yet to be eliminated. And people who get the disease, and don't get treated, not only continue to put their partner at high risk of catching this disease, but they put themselves at a higher risk of damaging their heart, spine, brain, and ultimately death.

The research shows that most of the people who catch this disease are unaware of it at first, but later discover the damage done to their body. Then they go to the hospital for a check-up and find that they are diagnosed with syphilis or other sexual transmitted disease.

The research shows that syphilis is increasing rapidly because most Navajos leave the reservation and go into the city, and then return to the reservation not knowing they have the disease.

Hypothesis

If we inform the general public about the common effects of syphilis, then we might be able to at least slow down the rapid spread of the disease within our community, if not the entire Navajo Nation. Another goal we wish to achieve is to design a program, using Starlogo, to enhance our project even more towards self-awareness of syphilis. We want to design a program showing the rapid movement of the syphilis virus throughout the Navajo Nation by first designing characters (termites) as the carriers of the syphilis virus forming yellow patches that will be an example of the flow of the disease. If we successfully accomplish this project, then we will be able to have a clear view of how long this virus will take before it “wipes-out” the entire Navajo Nation.

Project Description

Syphilis, a sexually transmitted disease, has been around since the early 1500s. Dr. John Iralu, who works at the Gallup Indian Medical Center, says that since the late 1980s, only about two cases a year of syphilis have been seen on the Navajo Reservation. However, in 1999 rates started to rise. In 2001, they realized there was a significant problem revolving around the Navajo Reservation when they started counting up to thirty-four cases that year and in 2002 that figure was repeated. Thirty-four cases a year isn't a huge number, but considering that the total Navajo population is about 250,000, its enough to equal a rate of infection seven times that of the United States as a whole. About a quarter of these cases are in teens ages fifteen to nineteen meaning that one out of every eight adolescents contracts an STD.

Syphilis is also spread from mother to child during pregnancy if the woman has not yet been treated for that disease. In addition, miscarriage may occur in as many as twenty to fifty percent of women acutely infected with syphilis during pregnancy. Between forty to seventy percent of women with active syphilis will give birth to a syphilis-infected infant.

The goal of our project is to develop a program discussing the rapid movement of Syphilis in the Navajo Reservation. The process involves the carriers spreading the disease syphilis throughout the reservation seven times greater than that of the United States. In due process, the disease will spread through the whole reservation and in time wipe out the entire Navajo population.

Results

We found out that not many people are aware of syphilis and the effects it has on their health and daily lifestyle. Many teenagers are sexually active and at a higher risk for the disease (and any other STD for that matter). Due to the rise of syphilis on the Navajo Reservation, not many people are aware of the disease and do not care to use any sort of contraceptives that will help prevent this disease and protect their partner's health and their health.

Unfortunately, we haven't yet pulled to the full extent of our accomplishments for our program, although we do have some clear idea of how fast this virus can move and how long it might take to "wipe-out" the Navajo population. The program does show the red termites as being the carriers of the disease, and the yellow patches representing the disease taking affect.

Conclusion

In conclusion, we are still determined to help the Navajo Nation with the spread of syphilis. We are doing our part by talking to our siblings, and relatives about the issue of syphilis our race is facing and how it affects the Navajo Reservation. From the data and information we have obtained about syphilis, we are now fully aware of the disease's symptoms and have a better understanding about syphilis and other STDs. As for informing the public, we are now developing a strategy of trying to talk to the parents first, and then from there they can talk to their own children. Most teens are sexually active from ages fifteen to nineteen and may not know about STDs, so what we would like to do is inform our peers as well as other teens in the Navajo Nation about the most common STDs, including syphilis, and how it will affect their health. We would also like to inform the general public, by issuing a self-awareness project for our community and if possible other communities within the Navajo Nation.

Recommendations

- ❖ Protect yourself and your partner by being tested before sexual intercourse.
- ❖ Beware of the symptoms and be informed of any sexual disease.
- ❖ Understand and know the cause of this silent-intruder
- ❖ Protect yourself by using contraceptives – (condoms) (birth control pills)
- ❖ Get tested if you notice any abnormality related to your body or your health. (Do not put others at risk, by not knowing!)
- ❖ Get a blood test, occasionally to verify your health stability.

Acknowledgements

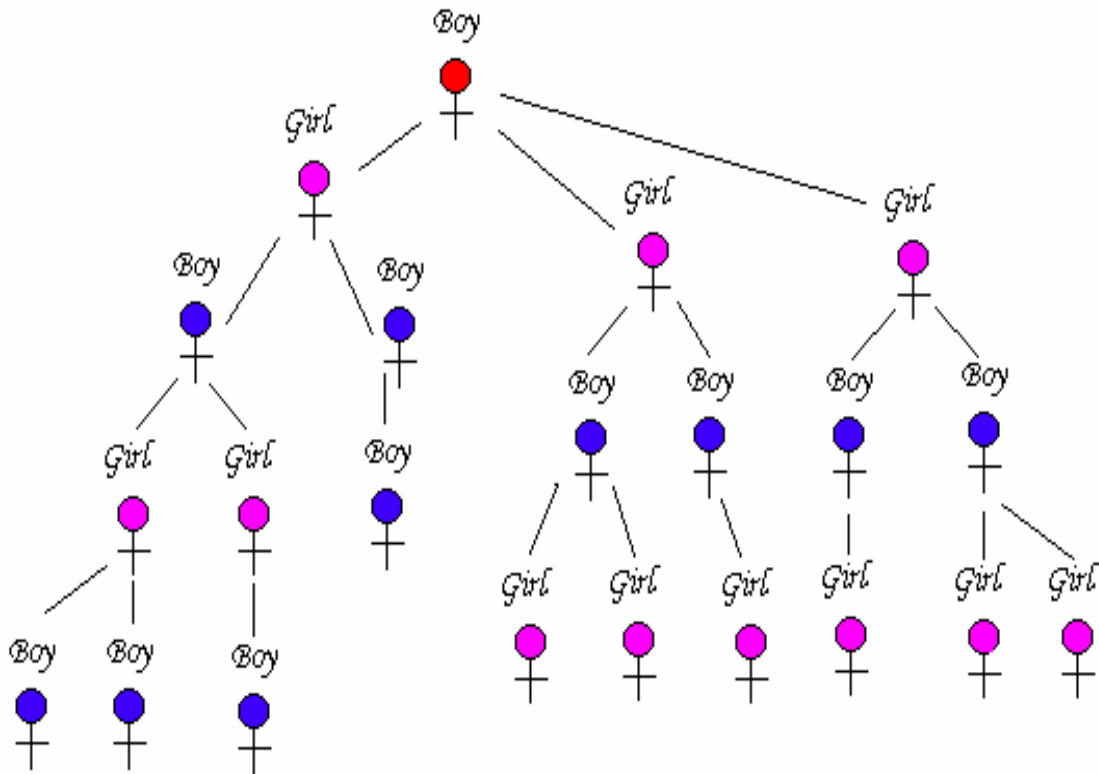
We would like to acknowledge the New Mexico Department of Health, in providing us the information on the disease syphilis and the statistics given to us for the Navajo Reservation. We also like to acknowledge our team members for their great effort and time in school and out of school. Our sponsors for their help in supercomputing and also with our project especially Mrs. Hines and Mrs. Noble who were there for us through most of the way. To the teachers who released us from class to work on our project to meet deadlines. Finally, to all the other teachers who helped chaperone for all of our excursions to Glorieta, Sandia, and Los Alamos. Thank you and we appreciate all of you for your help and effort.

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Appendix A:

THE MATH MODEL

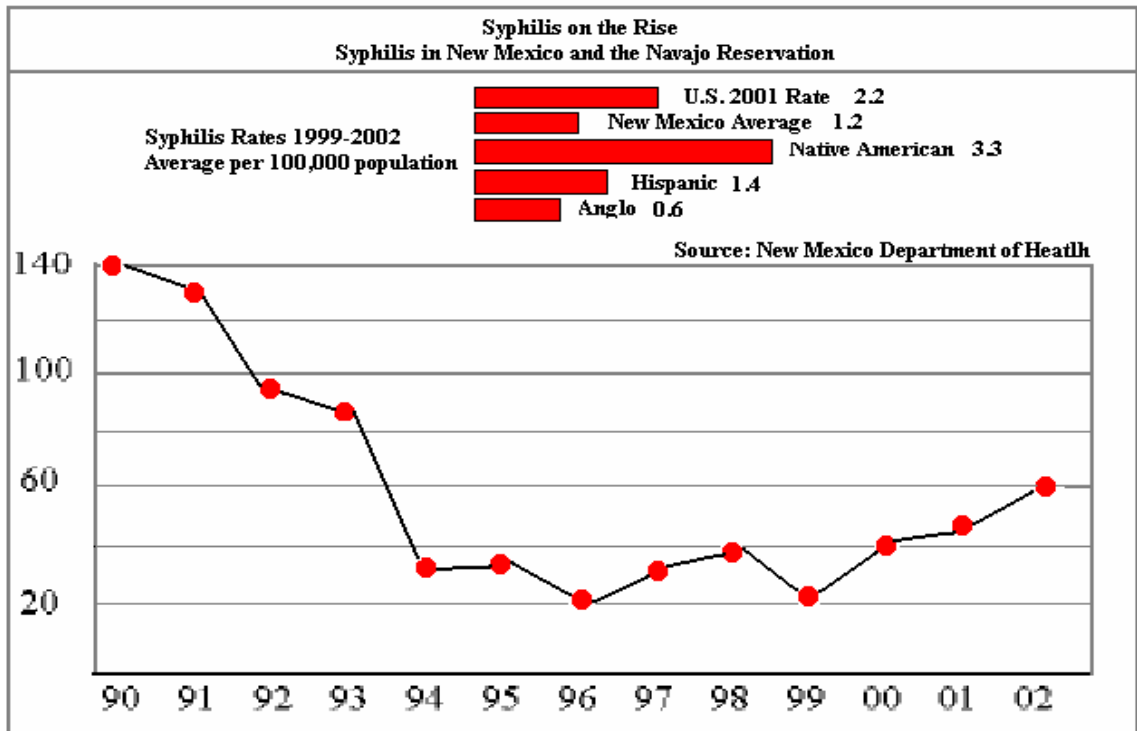


The math model above shows an example of a carrier, (red) who infects three females with the syphilis virus. Some of the symptoms of syphilis include flu like complaints, and believe this disease is the common cold, having no clue they ended up catching the disease syphilis. By getting no treatment, and the victim believing it's a cold that would eventually go away, they end up in the late stages of syphilis where the disease isn't curable, therefore, spreading the disease to others. It then repeats itself, as seen in the model above, developing the same symptoms. This diagram then shows an example of how people of our society tend to ignore the symptoms of syphilis and, therefore, are not aware of the disease.

Appendix B:

A Graph of the Syphilis Outbreak in the Navajo Nation

This graph shows the Syphilis outbreak in New Mexico and on the Navajo Reservation. The U.S. Total Rate in 2001 was 2.2 an average per 100,000 people in the U.S. As you can tell the highest total rate in the U.S. are the Native Americans with an average of 3.3. This source was taken from the New Mexico Department of Health and it shows that syphilis is on the rise.



Appendix C:

Starlogo Code

Turtle Procedure:

```
setup
ct
crt 30
ask-turtles [setshape termite-shape setc red fd 10]
end

to patch-setup
repeat 100 [seth random 260 jump random 100 stamp yellow]
repeat 100 [seth random 100
jump random 50 stamp yellow]
end

to wiggle
fd 3
rt random 50
lt random 50
end

to search for victim
if pc = yellow
[stamp red jump 15 stop]
wiggle
end
```

Observer Procedure:

```
to setup
```

```
  ct
```

```
  cp
```

```
  crt 30
```

```
  ask-turtles [setc red fd 10]
```

```
  ask-turtles [patch-setup]
```

```
end
```

```
to patch-setup
```

```
  ask-turtles [setheading random 200 jump random 300 stamp yellow]
```

```
  ask-turtles [setheading random 150 jump random 100 stamp yellow]
```

```
end
```