Good morning, I hope you’re all doing well! Before I begin, I do want to apologize in advance if my connection isn’t very good. Tropical Storm Isiah made landfall in the east coast a few days ago, so I actually haven’t had Internet or power since. Right now, I’m on my phone’s hot-spot, and the reception here isn’t the best, so please interrupt me if I go out or you need me to repeat anything.

So for just a quick introduction, my name is Dileka, and I’m an incoming junior at Rice University studying statistics. My CPRIT mentor this summer has been Dr. Cici Bauer, and I’ve been working on a project to better understand lung cancer trends over the last 20 years across different counties in Texas. In addition, I looked at the relationships between lung cancer and county-level traits like poverty rates. I’m also finishing up an interactive website that basically displays all of the results of my analysis for Texas officials to, hopefully use, to help decide how to appropriately allocate cancer funds and diagnostic resources to the counties that most need it. Lung cancer is very serious, and actually has the highest mortality rate and second-highest incidence rate of any cancer in the world.

Part of the CPRIT program involved weekly creativity training where all the interns practiced implementing various innovation tools in our own research projects. For example, I used the mind maps technique while defining the main problem at hand, which was better understanding lung cancer and branched it into sub-problems like better-understanding early diagnosis options and dividing lung cancer into its histologic types.

Histologic types are basically the different types of lung cancer that exist. The histologic type is determined by a pathologist who looks at the cancer cell under a microscope. Each lung cancer histologic type affects people differently and has different causes, so it’s important to investigate each individually. If you zoom into the diagram under the “methods of analysis” section of my poster, I have shown the relative prevalence of the four histologic types of lung cancer that I studied.

For the first component of my analysis, I collected lung cancer data from the Texas Cancer Registry and census data to calculate an expected number of lung cancer cases for each county in Texas. I calculated this expected number of cases by first determining the state-wide rate of lung cancer for every age, sex, and race group. Then, I multiplied the relative rate of lung cancer for each demographic group by the number of people of that respective demographic group in that county. Then, I calculated each county’s, what’s called SIR, by dividing that county’s true number of cases by its expected cases. An SIR above 1 suggests that a county has an abnormally high rate of lung cancer compared to the rest of the state.

The second component of my analysis involved modeling the SIR data to take into account uncertainty and unnecessary noise. This modeled version of SIR is called “relative risk” and is what is in the plots below.

If you scroll to the top right portion of the “results” section, you will see two sets of 5 maps of Texas. These 5 maps are the relative risk for each county in Texas in 1995, 2000, 2005, 2010, and 2015. The set of maps on the left is for all lung cancer types, while the set on the right is for a specific lung cancer histologic type called Adenocarcinoma. Essentially, the darker the blue, the lower the risk, while the redder the red is, the higher that county’s risk to lung cancer.

If you scroll to the left of the results section, there are three time plots, all showing the rate of lung cancer per 100 thousand Texans between 1995 and 2015. The topmost plot is the rate of all lung cancer histologic types, the second one for the histologic type Adenocarcinoma, and the bottom for the histologic type squamous cell carcinoma, which is most associated with cigarette smoking and is likely why its rates have decreased. It’s notable that adenocarcinoma lung cancer has been increasing, the rise being mainly driven by women. No one has quite been able to pinpoint what has been causing this recent increase. Some say it’s because of better diagnostic tools while others have considered farming pesticides, mining, radon, and pollution.

The bottom half of the results section shows the spatial trends of county-level poverty rate and rurality across Texas. I found that, the more metropolitan a county is, the higher its relative risk for lung cancer tends to be. In the future, future, I would like to do a point-level analysis of specific lung cancer cases or neighborhoods as opposed to county-level rates because two people with very different lifestyles and socioeconomic backgrounds can, technically, live in the same county.