

# GRADUATE STUDIES IN BIOSTATISTICS

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# SITTING IN YOUR SHOES

- What to do with undergraduate degrees in Math and Economics?
  - Straight to workforce?
  - Actuarial studies?
  - Graduate school?
- What field in graduate school?
  - Law?
  - Statistics?
- Summer Institute in Biostatistics (SIBS)
  - Many participating universities around the country
  - More info:

<https://www.nhlbi.nih.gov/research/training/summer-institute-biostatistics-t15>

# WHAT IS BIOSTATISTICS?

- Application and development of statistical theory for use in biological, medical, and public health research
  - Rich application opportunities
  - Application-driven theoretical research and education
    - Ex. Survival analysis
- Versus statistics?
  - Less theoretical education, 'theory for the sake and interest of theory'
- Versus bioinformatics?
  - More focus on statistical theory in methods development
  - Less focus on straight computational research
- Extensive computer programming
  - R, Python, C+
  - Data visualization, simulation, "Big Data" and algorithm development

# WHAT DO BIOSTATISTICIANS DO?

- Lead Statistician (PhD, Master's with many years of experience)
  - ▣ Suppose you are scientist or policy maker and you have a question you want to answer with data. What do you do?
  - ▣ Design studies, decide how data will be analyzed, work with investigators
  - ▣ Employers: Government, research universities, medical device companies, pharma
- Professor/Developing of statistical methods (PhD)
- Programmer (Masters)
  - ▣ Carry out the dirty work of carrying out analysis plan, creating presentation of results (tables, graphs, etc.)
- General statistics
  - ▣ For strong programs, not limited to bio- fields
  - ▣ Ex. At UNC have had PhD grads at Apple, Google, AIG



National Institutes  
of Health



**Medtronic**

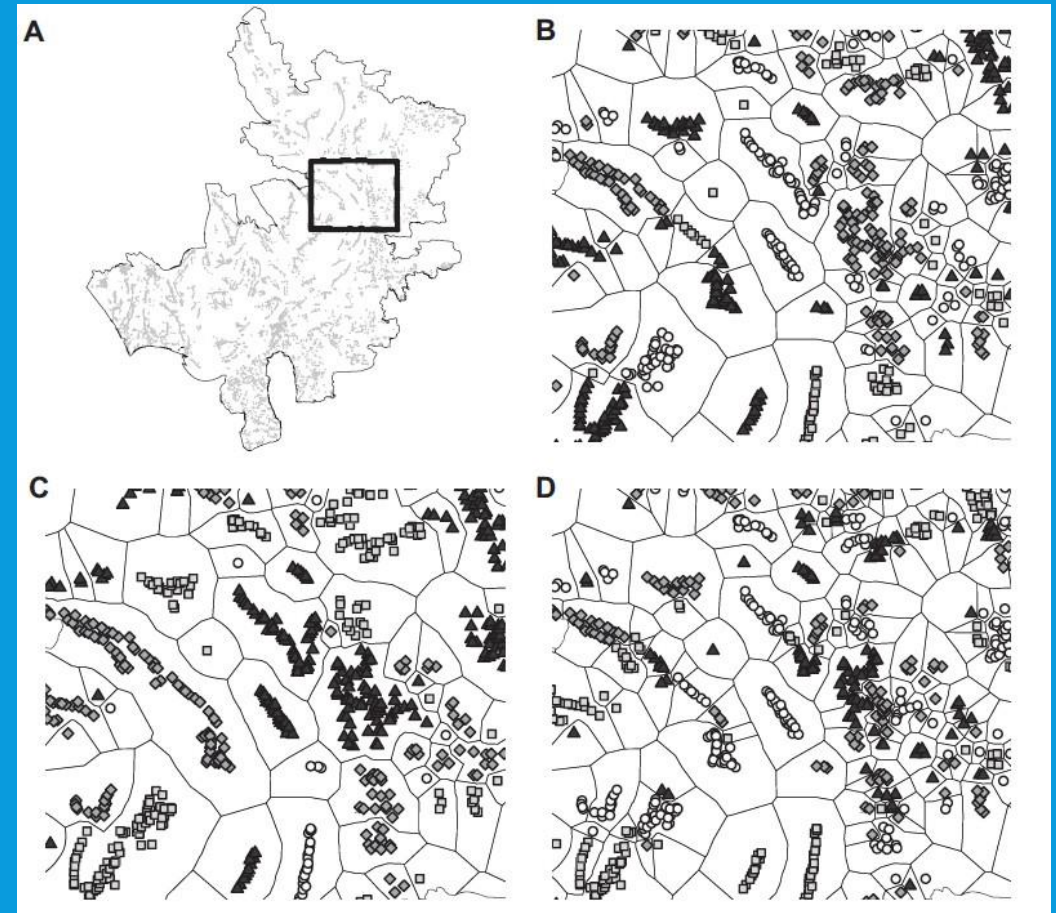
# EXAMPLES OF BIOSTATISTICS

## ▣ Subfields

- Clinical trials
- Genetics
  - Precision medicine
- Causal inference
- Imaging, spatial statistics, time series analysis

## ▣ Assessing the effects of Cholera vaccination

- Want to separate out and quantify effects due to
  - Person being vaccinated
  - People around you being vaccinated
    - Incorporate spatial relationships



# EDUCATION IN BIOSTATISTICS

## □ Different degrees

- Master's
  - Less theory, focused on learning methods currently used in research
  - General structure: coursework (1 year), comprehensive exam (end of 1st year), thesis and coursework (2nd year)
  - Time duration: 2 years
- Doctorate
  - More theoretical education (level of theory depends on institution), goal is to train student to lead research studies and develop new statistical methods to address scientific questions
  - Can apply and enter program with undergraduate degree only
  - General structure: Master's coursework (1 year), PhD coursework (1 year), Qualifying exam (end of 2nd year), finish coursework and begin dissertation (3 year), complete dissertation
  - Time duration (usual): 5-6 years

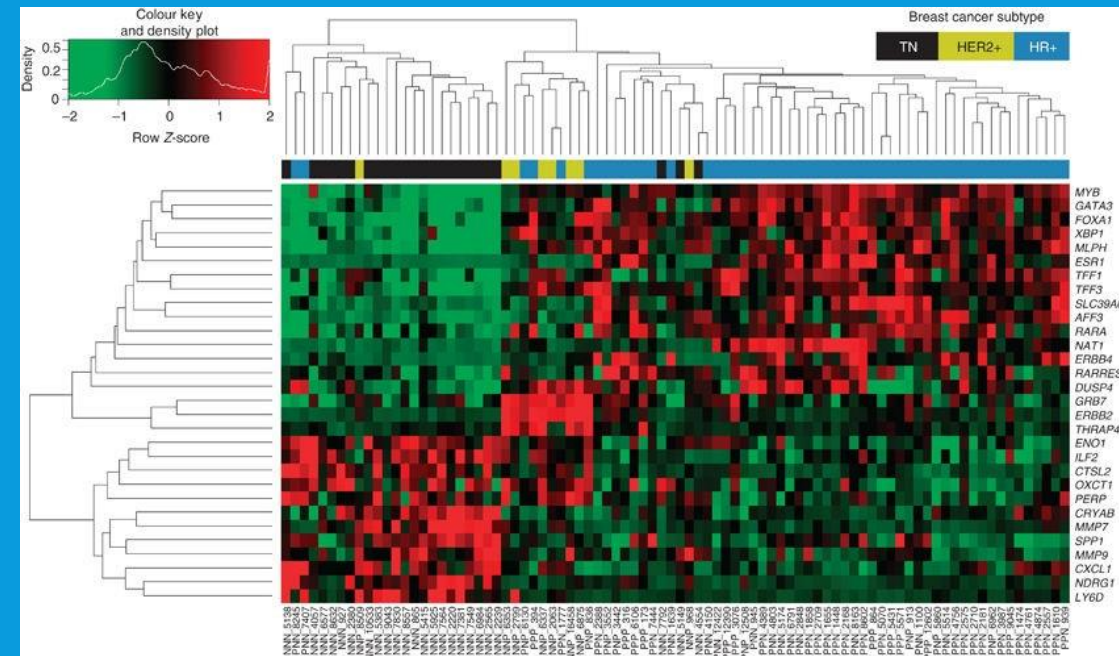
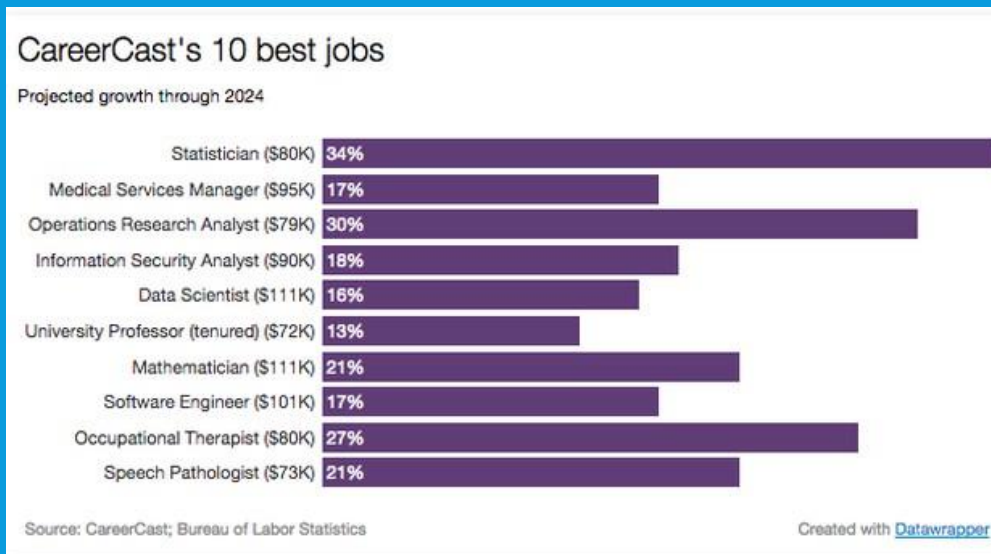
# DIFFERENT PROGRAMS

- ▣ Programs range in level of theory required for degree (especially PhD)
  - Generally top programs have extensive theoretical preparation
- ▣ Different programs generally have different research strengths
  - Clinical trials: UNC-CH, UWash, UMinnesota
  - Genetics: UNC-CH, UMichigan



# WHY DID I CHOOSE BIOSTATISTICS?

- Allows a continuation in learning mathematical theory while learning how to analyze real data
- Focuses education on questions I find important to society
- Plentiful job opportunities globally, forward thinking employers



Abramovitz et al. *British Journal of Cancer*. 2011.



# PAYING FOR EDUCATION

- ❑ Many post-graduate degrees are extremely expensive
  - ❑ Many Master's degrees, Law degrees require six figure debt
  - ❑ Applied nature of program => funding opportunities for Master's degrees
  - ❑ PhD degree => Funding
- ❑ Funding duties
  - ❑ Research assistant
  - ❑ Teaching assistant
- ❑ Funding amount
  - ❑ Tuition, stipend, health insurance

# MY EXPERIENCES AND GENERALADVICE

## 📌 Tips for choosing a program

### 📌 For Master's, focus on program quality and financial cost

- Look at time to completion and job placement results
- If potentially interested in PhD, program rigor and quality is very important

### 📌 For PhD, take all factors into account and don't focus the 'ranking number'

- You will be living there for 5+ years, your JOB is to be a student and treat it as such
- Program prestige is important, but only to a certain extent
- Look at research opportunities, auxiliary departments, and research expertise of professors

## 📌 My experience

### 📌 Difficult but very rewarding

### 📌 Unique opportunity to live in a college atmosphere

- Many people around you of similar age
- Part of graduate student community

