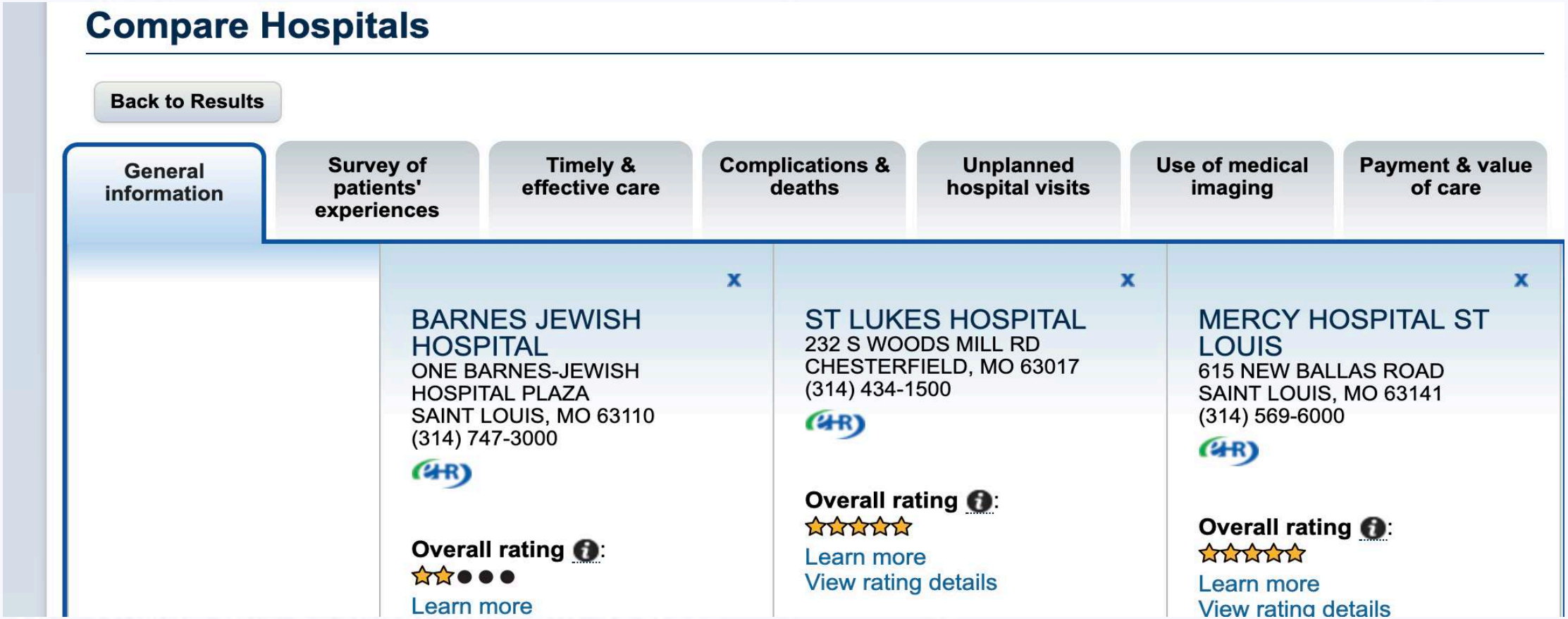
Hospital Compare data in partially flipped Statistics classes for Healthcare majors.

Kim Druschel, Mike May, SJ, Katie Radler, Sadita Salihovic
Department of Mathematics and Statistics
Saint Louis University
IRB's: 29889, 29829

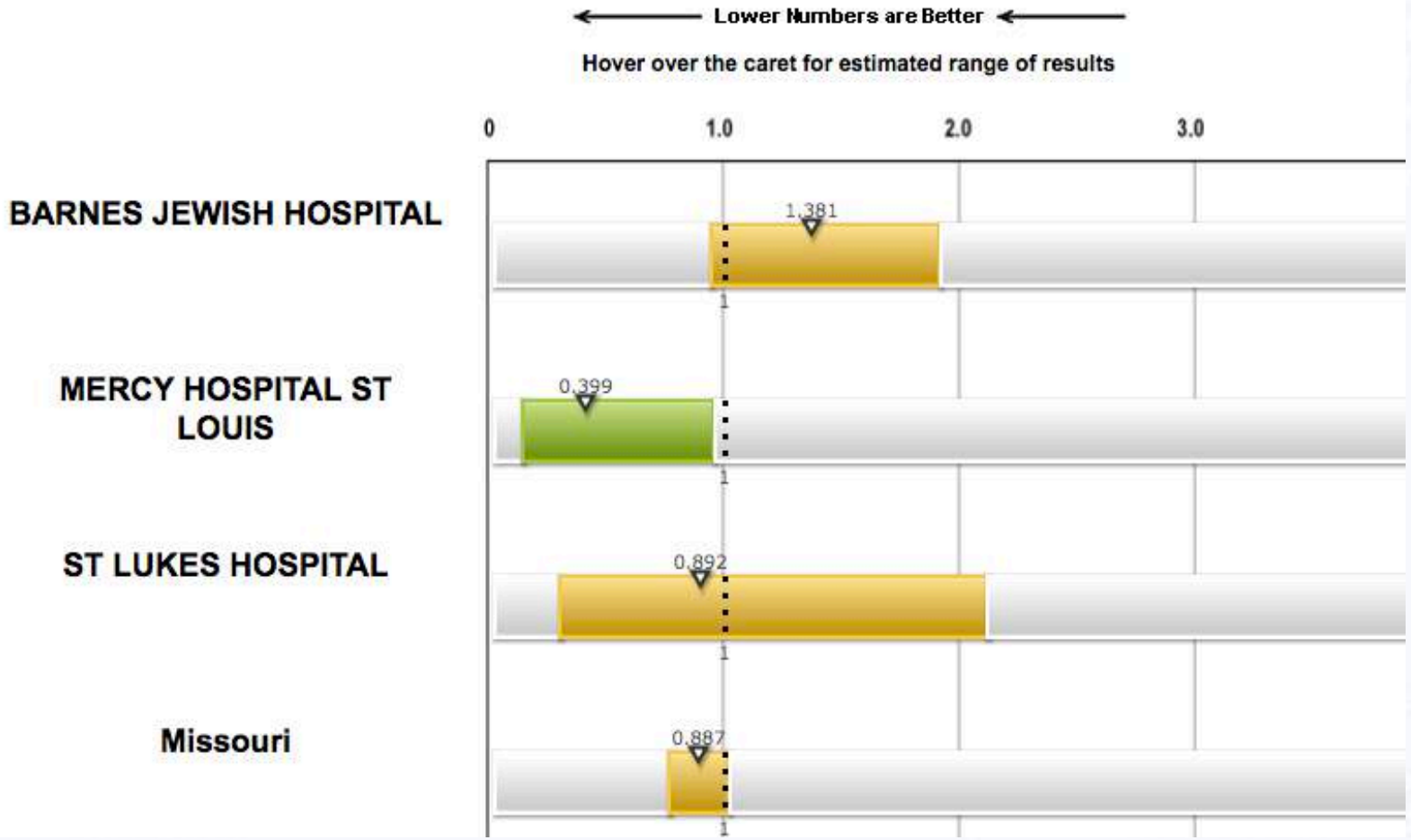
Examples from Hospital Compare website/datasets

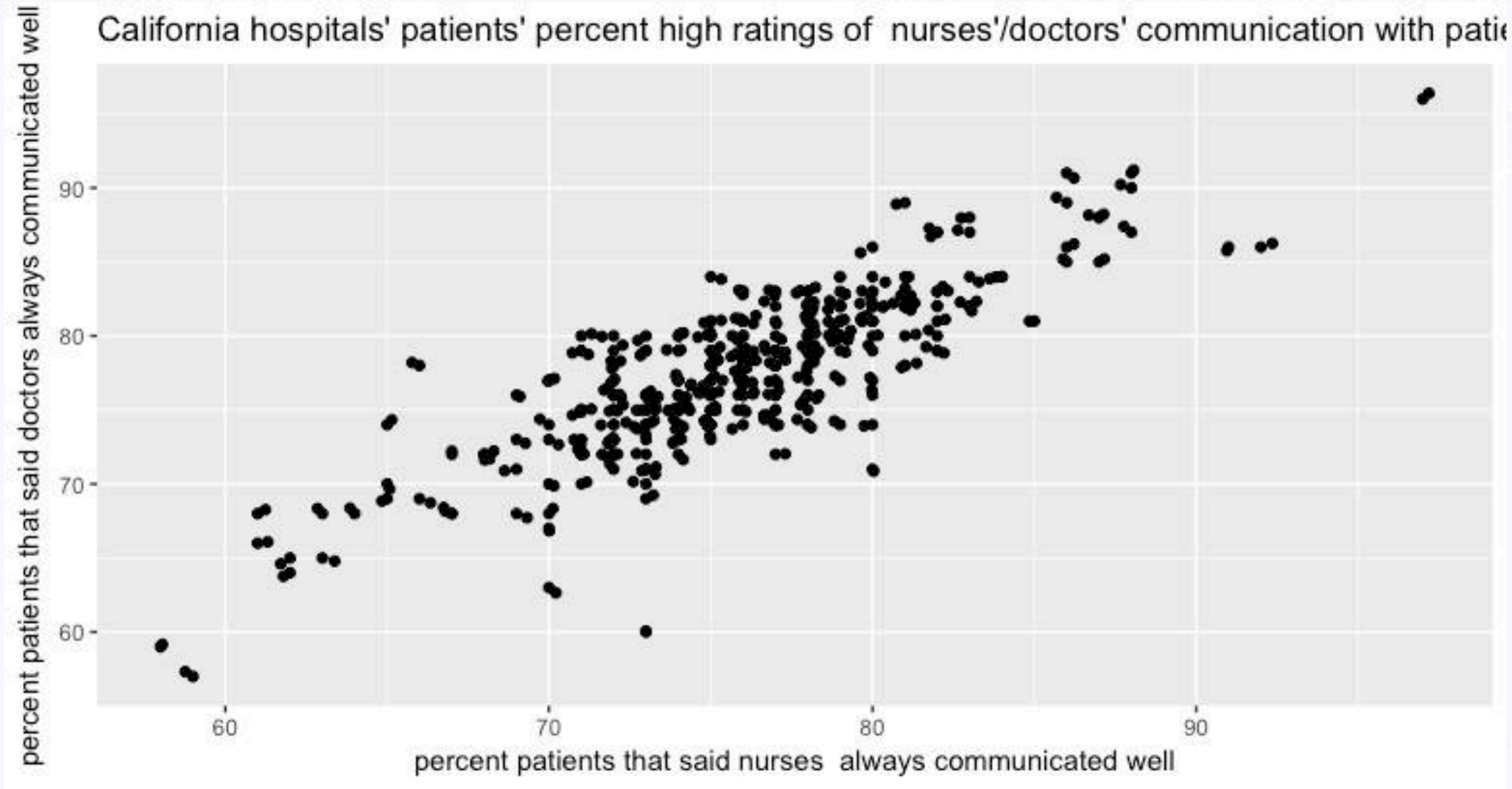


Surgical site infections (SSI) from colon surgery

Why is this important?

Hide Graph




California hospitals' patients' percent high ratings of nurses'/doctors' communication with patie
percent patients that said doctors always communicated well
90
80
70
60
60
70
80
90
percent patients that said nurses always communicated well

Rationale/ background for this approach

Guidelines for Assessment and Instruction in Statistics Education (GAISE) College Report 2016 basic recommendations include:

- Active learning
- Using real data of interest to the student
- The use of technology, including the the internet, to illustrate concepts in statistics

Additional recommendations from ASA that a (rich) dataset be used throughout a statistics course, in addition to other examples.

Pilot course results and consultation with client disciplines

- **STAT 1100** -a freshman, sophomore level consumer -based statistics
- Taken primarily by physical therapy and nursing majors
- Mainly taught by adjuncts and graduate teaching assistants
- Students do well, but weren't engaging during class
- Questions about retention and assessment
- No one was thrilled about teaching this course. They thought the course was too fluffy.
- **Could in-context group project work where students answers questions relating statistics to their major add depth and interest?**
- **Can this be done across all sections?**

Information about STAT 1100 students' perceptions and experiences –Poll at the beginning of Spring 2019 semester STAT 1100 courses. (105 students)

I believe statistics is relevant to my field of study.

Strongly agree: 11% 34% 28 % 23% Strongly disagree: 4%

I believe in my ability to learn and master quantitative skills and concepts.

Strongly agree: 32% 35% 13 % 11% Strongly disagree: 8%

I can communicate in written form about quantitative concepts.

Strongly agree: 18% 27% 35 % 16% Strongly disagree: 4%

I can communicate verbally about quantitative concepts.

Strongly agree: 15% 32% 32 % 18% Strongly disagree: 3%

I feel that in-class activities involving statistics related to my major will help me understand statistics.

Strongly agree: 24% 27% 26 % 15% Strongly disagree: 9%

I have done in-class activities in previous courses for my major.

Many times: 24% Sometimes: 51% Seldom: 15% Rarely: 8% Never: 2%

I have done in-class activities in previous math and statistics courses.

Many times: 29% Sometimes: 51% Seldom: 10% Rarely: 5% Never: 5%

I learn best when the instructor lectures during class and we do homework outside of class.

Strongly agree: 24% 19% 31 % 19% Strongly disagree: 7%

STAT 1100 retention assessment quiz (Spring 19- about one year after students take the course)

median score: 9/20 ;

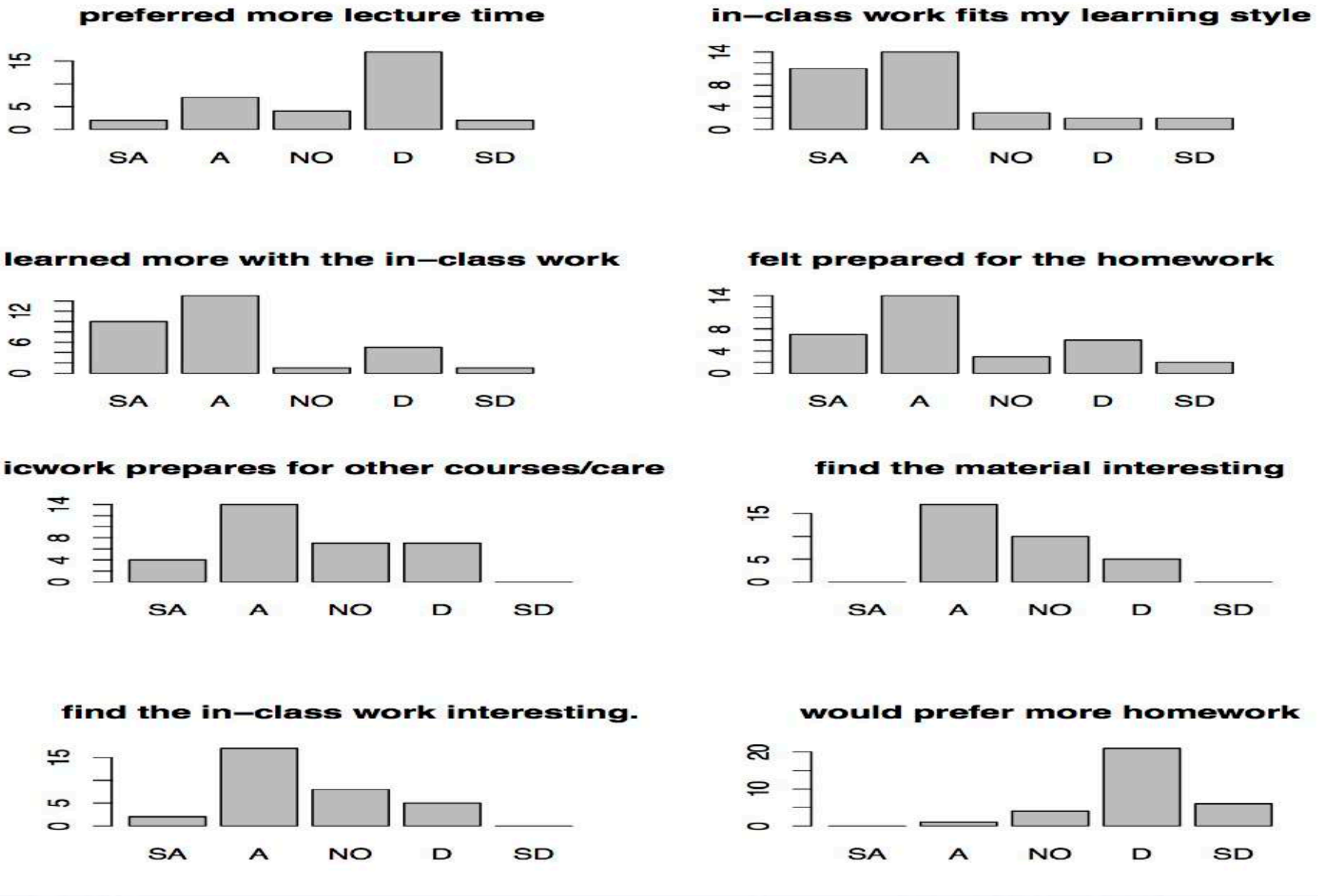
about 65% did not think STAT 1100 helped strengthen their quantitative and statistical knowledge and skills.

Fall 2017-Piloted partially flipped STAT 1100 with in-context projects

I was asked to teach and review STAT 1100, so I decided to test a partially flipped model with in-context group projects. Teams consisted 4 to 5 students who shared one or two majors. Class size was 35.

; instructor perceptions

Results/example from the pilot study

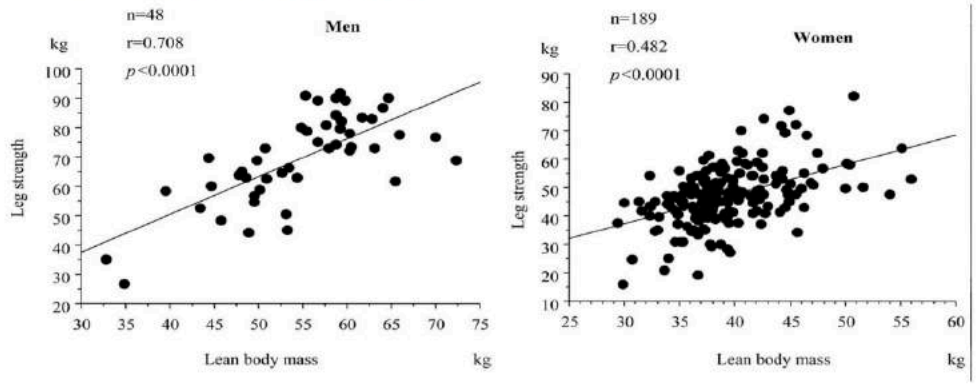


In the context of the areas of your interest:

1) **Find two examples of a scatterplot with regression lines.**

http://file.scirp.org/Html/1-8201532_16989.htm

2) **Paste- in pictures of those plots.**



3) **Explain what the explanatory and response variables are and what the units are for those.**

The explanatory variable is lean body mass (kg) and the response variable is leg strength (kg).

4) **Describe the shape of the scatter plots using adjectives we have discussed in class and in the book.**

Both plots pictured above are positive and ascending in a linear fashion. The "Men" plot has a tighter distribution while the "Women" plot appears to have more available data causing it to be more widely distributed and denser along the regression line.

5) **What is the correlation coefficient for each data set?**

For men, the correlation coefficient is r=0.708. For women, the correlation coefficient is r=0.482

6) **What does that tell you?**

It tells us that the closer they are to +1 means that there is positive association between the two variables, 0 tells us that there is no association between the two variables, and -1 tells us that there is a negative association between the two variables. So for the "Men" graph there is a strong, positive, linear association between the variables because it has a value of r=0.708. For the "Women" graph there is still a positive, linear association between the two variables due to the value of r=0.482. When the lines are positive it means that there may be a correlation equaling causation for the results.

2) Locate three articles which discuss these and which give you examples of the following: box plots, histograms, mean, median,standard deviation

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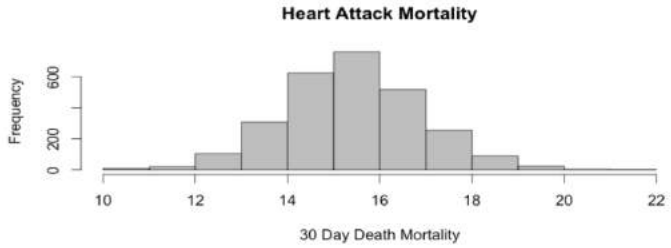
https://seer.cancer.gov/statfacts/html/all.html

https://healthmetrics.heart.org/wp-content/uploads/2017/06/Heart-Disease-and-Stroke-Statistics-2017-ucm_491265.pdf

https://www.heart.org/idc/groups/heart-public/@wcm/@sop/@smd/documents/downloadable/ucm_449846.pdf

4) Report on the examples, pasting in the box plots and histograms. Clearly explain what all the data that is summarized with the plots and statistics measure. Give units and also how the data was obtained.

HEART ATTACK HISTOGRAM:



On the "x-axis" is the 30 Day Death Mortality which are the how many days it takes for someone to pass away after having a heart attack. The "y-axis" represents the frequency of people who die after having a heart attack (in thousands). The data was obtained in a hospital setting which

Client Discipline Conversations Spring 2018:

- Agreed that we would try to deliver the course with in-context discipline-driven projects in a partially flipped classroom setting. Include hospital compare projects.
- Agreed to assess retention in follow-up course.

Summer 2018 –course set up with new textbook, online hw, reading quizzes, projects

Fall 2018:

- Two instructors agreed to try STAT 1100 partially flipped course; two others didn't.
- Poll showed students weren't very happy with having to find their own articles, other difficulties with partially flipped course. Performance remained good. Need to do better PR and revise projects

Spring 2019 (all 7 sections instructors on board)

- Hospital compare projects developed; Article projects consolidated to three projects and article sources added. Project webpage added.
- Had several meetings with instructors and more email contact with them.
- Mostly positive feedback from instructors and students so far.
- Pre-class poll given. Post-class poll to come for both students and instructors. Then retention quiz.

Demo Projects

Some next steps:

Analyze data at different levels: team members

TDA analysis of data: Project for master's student, Sadita Salihovic.

Build in more classroom feedback, discussion between groups, and group presentations.

Use students' projects to see where there are misunderstandings and change projects accordingly.

The interface in projects is still clunky. Figure that out. Make grading easier.

Websites:

STAT 1100 Projects website : https://sites.google.com/slu.edu/stat-1100-projects/home

Hospital compare data

Thank you!