



# Statistics for Health Care

("Statistics in Medicine" Kristin Sainani @ Stanford University)

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## Overview/Teasers



# Have you seen this before?

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- Moon's rating further gains amid growing N. Korea tension...
- ...approval rating on his job performance came to 83 percent....
- The poll was conducted on 1,004 adults from Tuesday to Thursday, with a margin of error of 3.1 percentage points and a 95 percent confidence level.

(<http://english.yonhapnews.co.kr/news/2017/07/07/0200000000AEN20170707004700315.html>)



# Have you seen this before?

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- 여론조사전문기관 '리서치뷰'가 지난달 27일부터 31일까지 5일간 정기조사를 실시한 결과 문재인 대통령 직무수행 평가는 ▲잘함 73%....
- ... 표본오차는 95%신뢰수준에  $\pm 2.9\%$ p...  
(<http://www.segyelocalnews.com/news/newsview.php?ncode=1065601087900216>)



# What is Health(Medical) Statistics?

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- Medical statistics deals with applications of statistics to medicine and the health sciences, including epidemiology, public health, forensic medicine, and clinical research.
- Medical Statistics are a sub discipline of Statistics. "It is the science of summarizing, collecting, presenting and interpreting data in medical practice, and using them to estimate the magnitude of associations and test hypotheses." (Wikipedia)



# What you will learn in this class

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- 1. Descriptive statistics and looking at data
  2. Review of study designs; measures of disease risk and association
  3. Probability, Bayes' Rule, Diagnostic Testing
  4. Probability distributions
  5. Statistical inference (confidence intervals and hypothesis testing)
  6. P-value pitfalls; types I and type II error; statistical power; overview of statistical tests
  7. Tests for comparing groups (unadjusted); introduction to survival analysis
  8. Regression analysis; linear correlation and regression
  9. Logistic regression and Cox regression
- At the end of this course, you will know how to read (understand) the basic concepts behind common statistical concepts; further courses will be required to actually use the statistical software.



# Teaser

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- Hypothetical randomized trial comparing two diets:
- Those on diet 1 ( $n=10$ ) lost an average of 34.5 lbs.
- Those on diet 2 ( $n=10$ ) lost an average of 18.5 lbs.
- Conclusion: diet 1 is better?

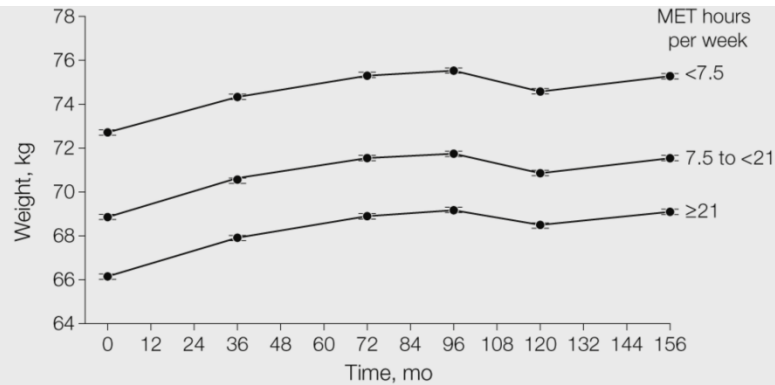


# Teaser

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- “400 shades of lipstick found to contain lead”, FDA says” *Washington Post*, Feb. 14, 2012
- “What’s in Your Lipstick? FDA Finds Lead in 400 Shades,” *Time.com* February 15, 2012
- How worried should women who use lipstick be?

# Teaser



No. by MET hours per week						
<7.5	16856	15634	15153	15661	13779	13353
7.5 to <21	9819	9171	9005	9260	8336	8106
≥21	7404	6924	6808	6992	6264	6107

Do the three groups differ meaningfully in weight change over time?





# Quiz: What's wrong with this?

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- Study with sample size of 10 ( $N=10$ )
- Results: "Objective scoring by blinded investigators indicated that the treatment resulted in improvement in all (100%) of the subjects. Of patients showing overall improvement, 78% were graded as having either excellent or moderate improvement."