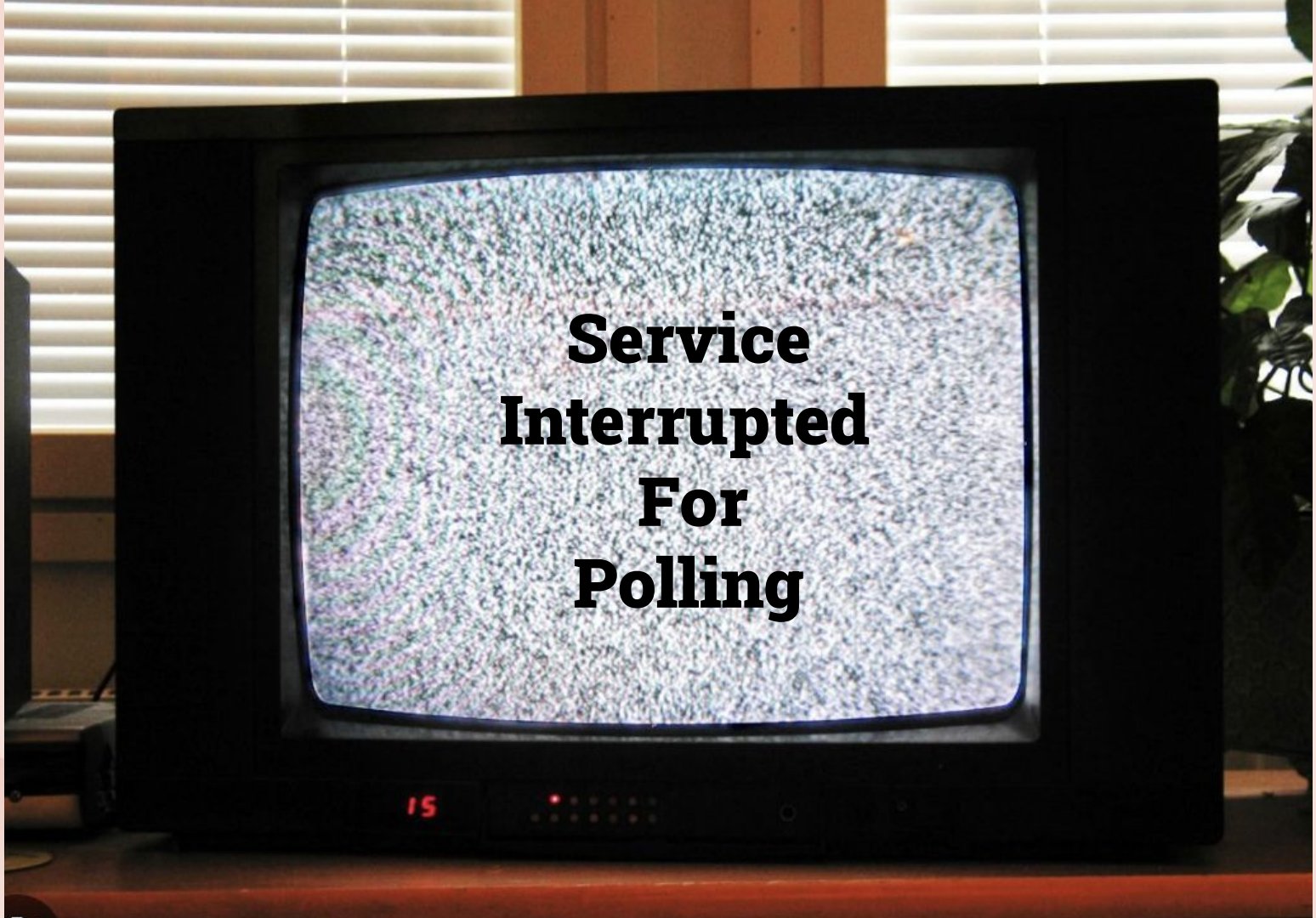
POLL

Please arrange the following causes of death by your guess of highest to lowest:

A) Stroke

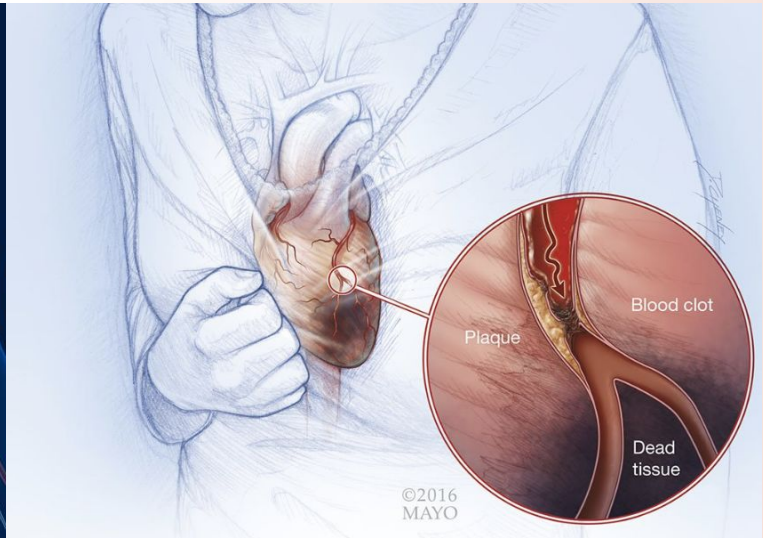
B) Cancer

C) Heart Disease

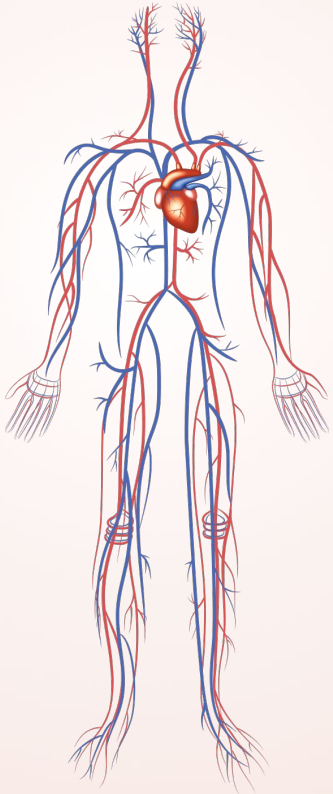

Service
Interrupted
For
Polling

CHD

#1 Cause of Death in U.S.



Analysis of Framingham 10-Year CHD Prediction



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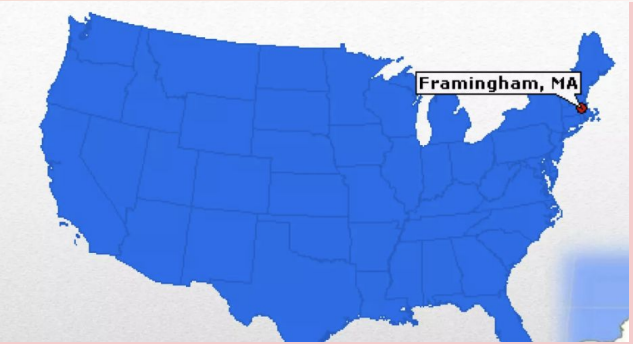
Stat 630, Fall 2024

Guiding Questions

Relationship between age & CHD?

Relationship between smoking & CHD?

Framingham Dataset



Age	Current CHD
30-62yrs	NO

Sampling Method Issues and Ethical Concerns

Issues with Independence

Resorted to Snowball Sampling

Biases Due to Voluntary Participation

Not Necessarily Representative

Some Summary Statistics

Characteristic	NoFutureCHD N = 3,596[1]	FutureCHD N = 644[1]
Age	48.76 (8.41)	54.15 (8.01)
Smoking Status		
NonSmoker	1,834 (51%)	311 (48%)
Smoker	1,762 (49%)	333 (52%)
Gender		
female	2,119 (59%)	301 (47%)
male	1,477 (41%)	343 (53%)

[1] Mean (SD); n (%)

CHD Risk and Age

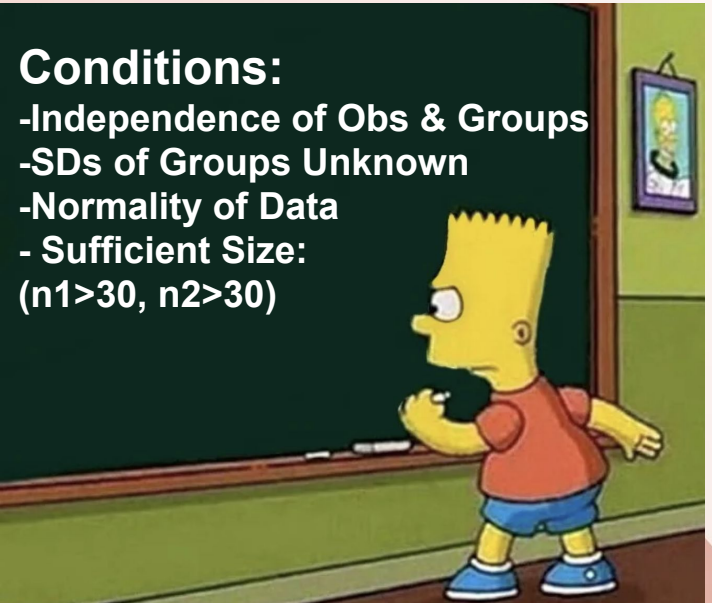
Unpaired Difference of Means T-test

H0 : μ1 - μ2 = 0

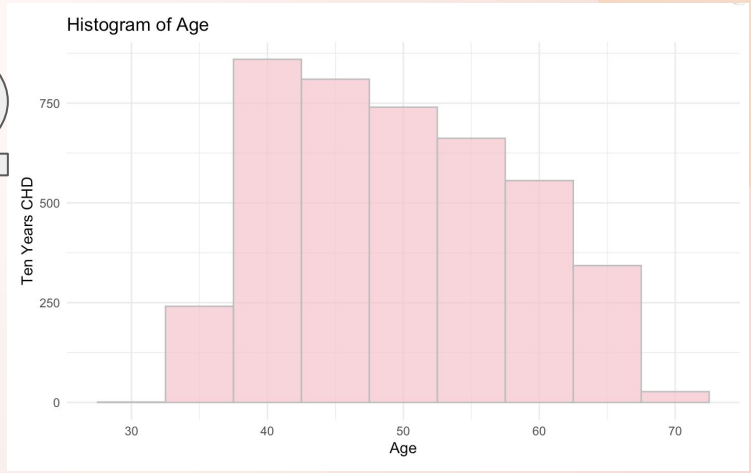
Ha : μ1 - μ2 >0

μ1=Mean Age of those with Future CHD

μ2 = Mean Age of those without Future CHD



Normality ✓



n1 sample size: 644

n2 sample size: 3,596 ✓

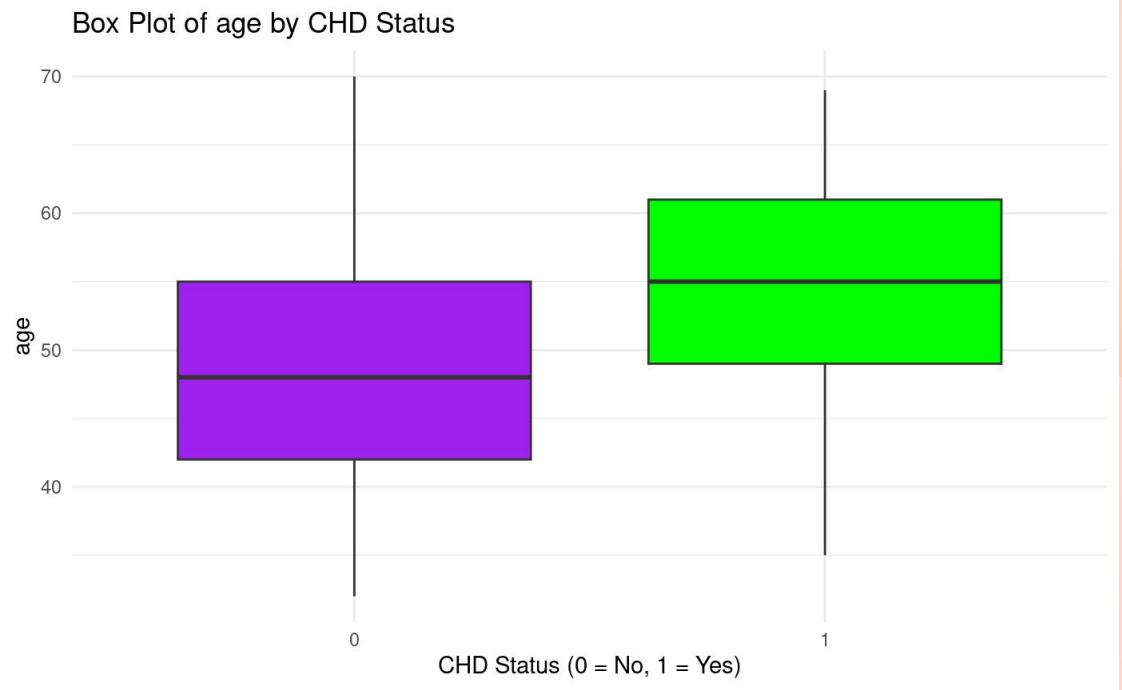
CHD Risk and Age

Test T-Statistic: -15.592

P-Value: 0.0001

Conclusion: P-value < significance level: reject the null hypothesis.

Have evidence that there is significant difference in the average age of individuals predicted to develop CHD in 10 years vs. those not predicted to develop CHD.

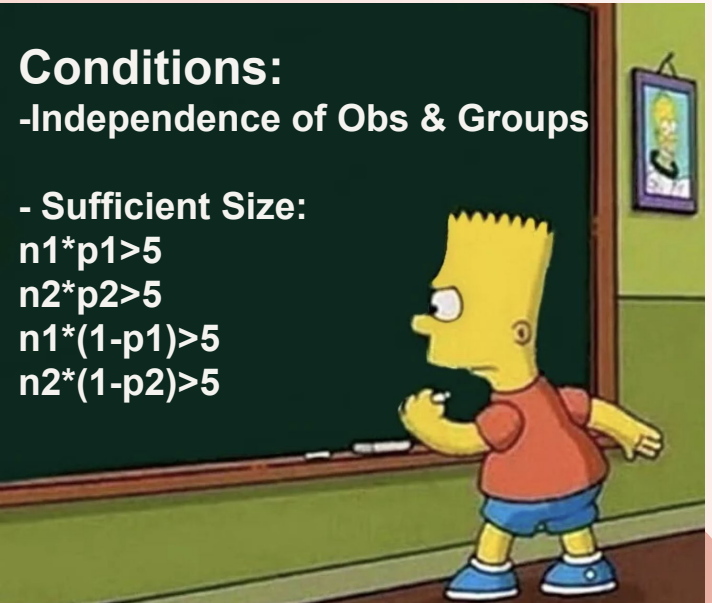


CHD Risk and Smoking

Two Proportion Z-test

H0: $p_{(\text{smokers with CHD})} - p_{(\text{non-smokers with CHD})} = 0$

Ha: $p_{(\text{smokers with CHD})} - p_{(\text{non-smokers with CHD})} > 0$



Independence:
Questionable for observations in general.
Met for independence of groups.

Sufficient Size:

n1*p1= 333 **n1*(1-p1)=**1762

n2*p2=311 **n2*(1-p2)=**1834

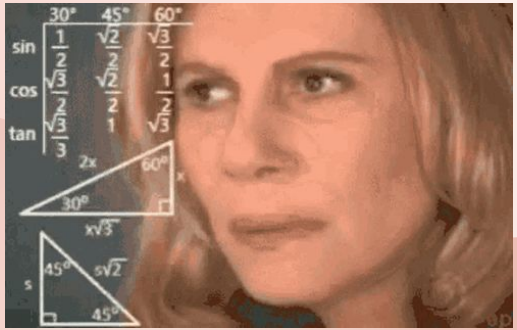
CHD Risk and Smoking

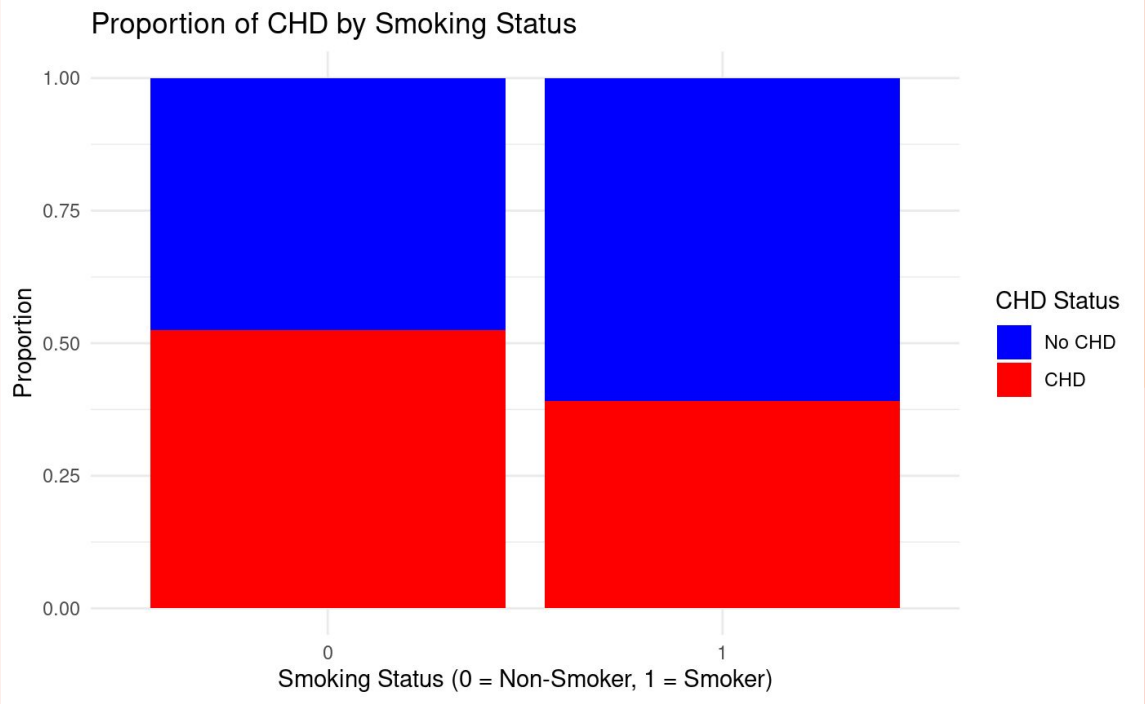
Test Z-Statistic: 1.2236

P-Value: 0.1106

Conclusion: Fail to Reject H0

We do not have evidence to support a difference in proportions of CHD between smokers and non-smokers.





Conclusion

- ★ Average age increases with CHD risk status.
- ★ We cannot say smoking status has a significant correlation with CHD risk.

Future Research Directions

- ★ Explore additional confounding variables for smokers with CHD.
- ★ Consider using different models that can account for multiple factors simultaneously.
- ★ Consider studying novel risk factors for smokers with CHD

References:

https://www.kaggle.com/datasets/aasheesh200/framingham-heart-study-dataset

https://pmc.ncbi.nlm.nih.gov/articles/PMC4159698/

Questions?

& We Thank You For Your Time!