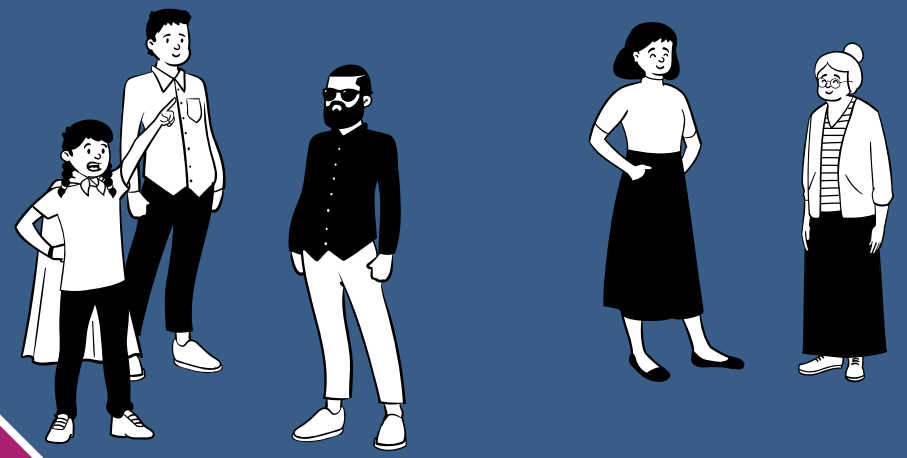
FINANCE AND INSURANCE

Will Stearns, Yansong Tang, Isaac Lee, and Alex Mora



HEALTH AND LIFE INSURANCE

Reasons for Topic:

- Health insurance is well-known
- Curious about life insurance
- Life insurance contains financial interest

Initial Focus:

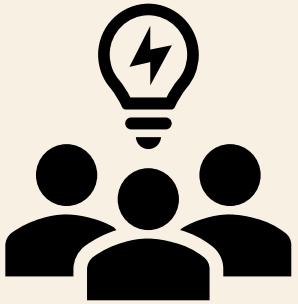
- Compare life insurance to health insurance
- Population of life and health insurance users in the U.S.
- Reasons for purchasing or not
- The cost and factors that affect price

EXPLORATORY QUESTIONS

Dashboard

- What are the main reasons for purchasing life insurance or not?
- What is the population for those who think they should have life insurance but do not?
- How does coverage of life and health insurance match up?
- What categories do companies generally payout to?
- Can life insurance rates differ by demographic?
- How do life expectancies differ by state?

EXPLORATORY QUESTIONS



ML Model

- How well are we able to predict life expectancy based on demographic factors?
- What factors, if any, influence life expectancy?

After Research and Implementation

- Did we find a factor that was not accounted for?
- Does it show importance to the data?

DIFFERENCE

Life Insurance

- Legally binding contract that pays out a benefit after the insured individual has passed.
- The benefits will be received by the named beneficiaries of the insured.
- Optional.

Health Insurance

- Covers medical and surgical expenses for the insured.
- Allows for preventative check-ups.
- Generally, it is recommended to have a health insurance plan.

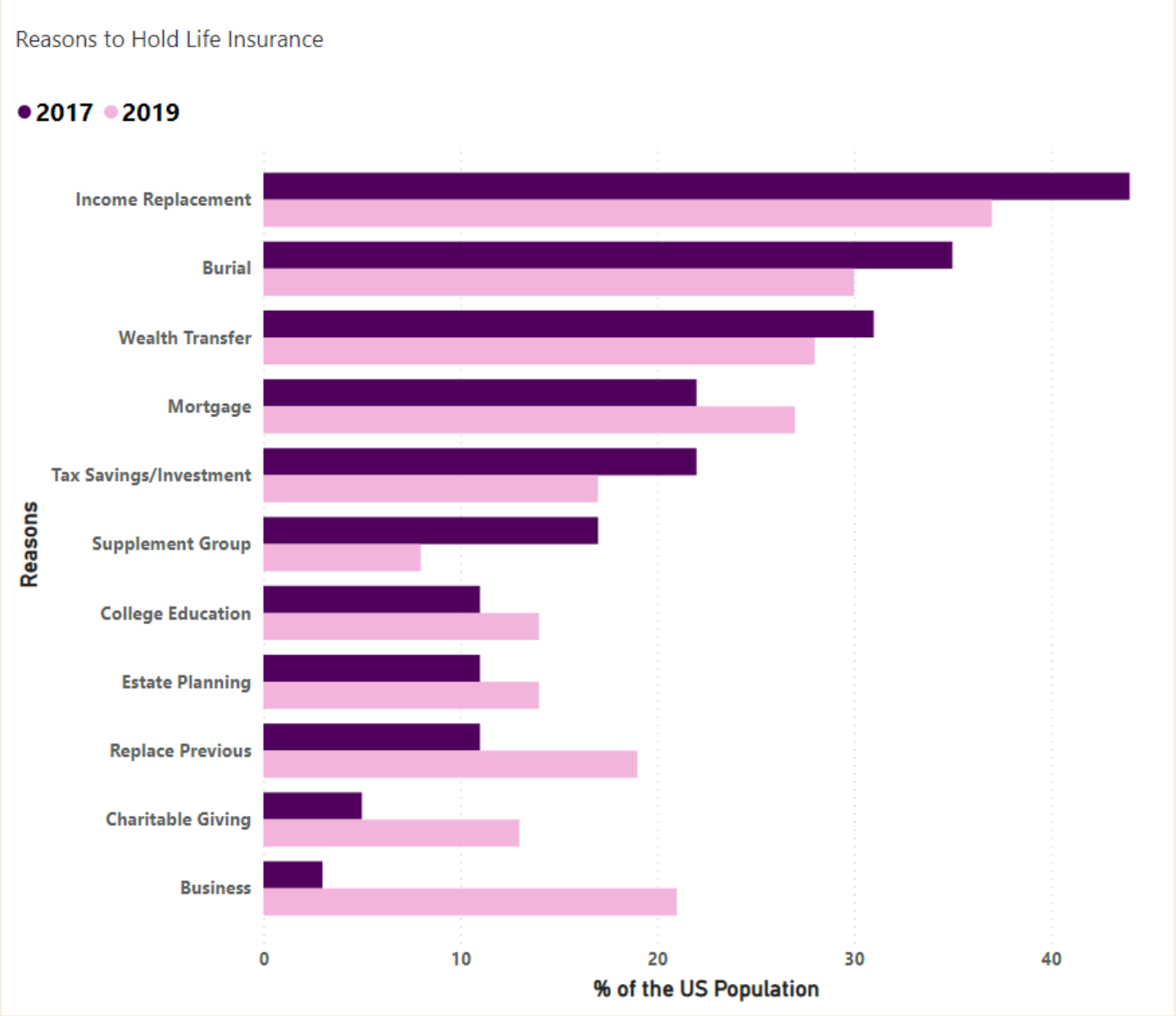
WHY IS LIFE INSURANCE IMPORTANT?

NOT MY PROBLEM? NOT QUITE

- Funerals upwards of $10,000
- Other expenses $20,000
- Taking care of loved ones
  - Children
  - Spouse
- More reliable than assets

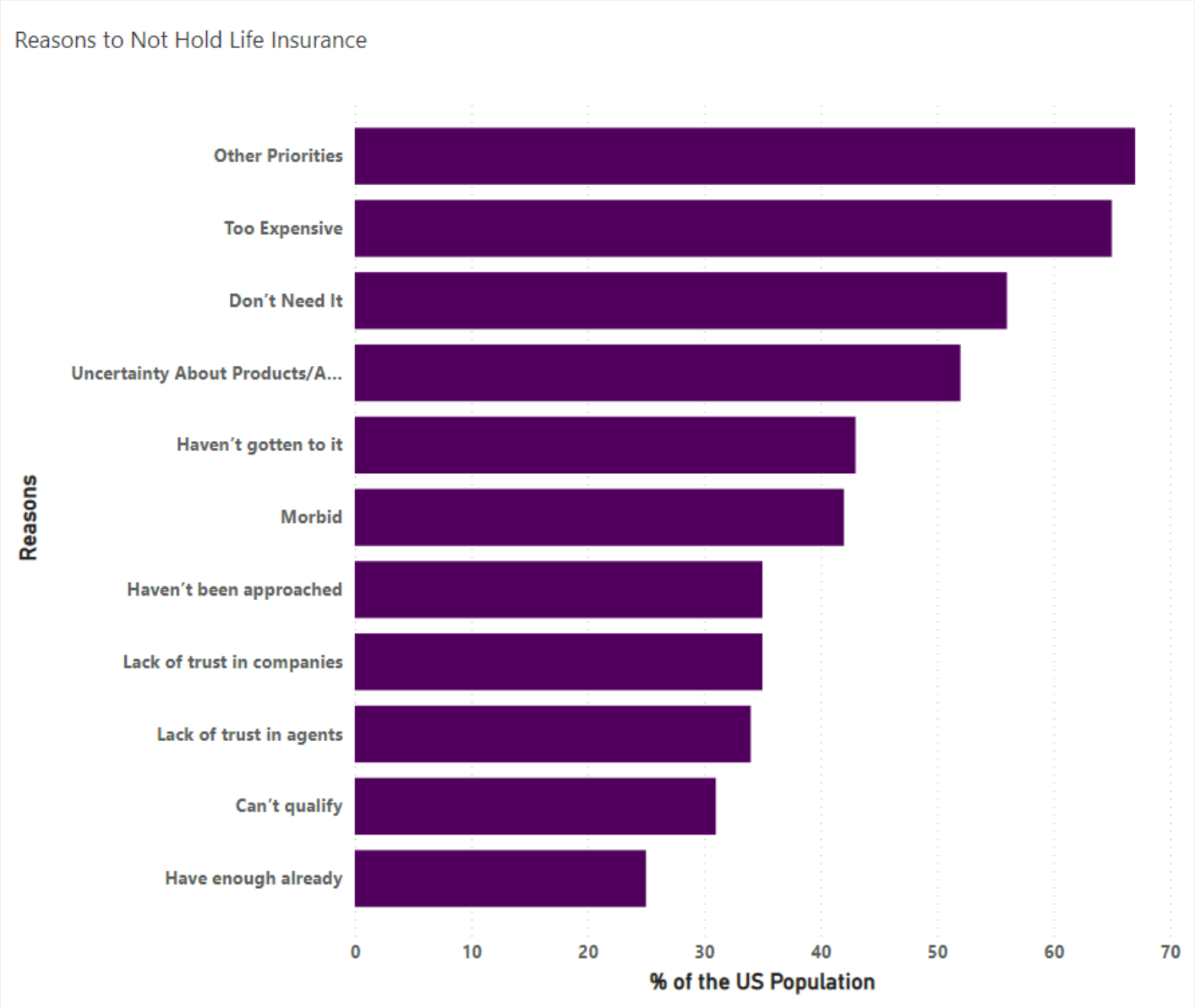
WHY DO PEOPLE BUY LIFE INSURANCE?

- Top Reasons:
  - Income Replacement
  - Burial
  - Wealth Transfer
- Shift between 2017-2019
  - Business especially

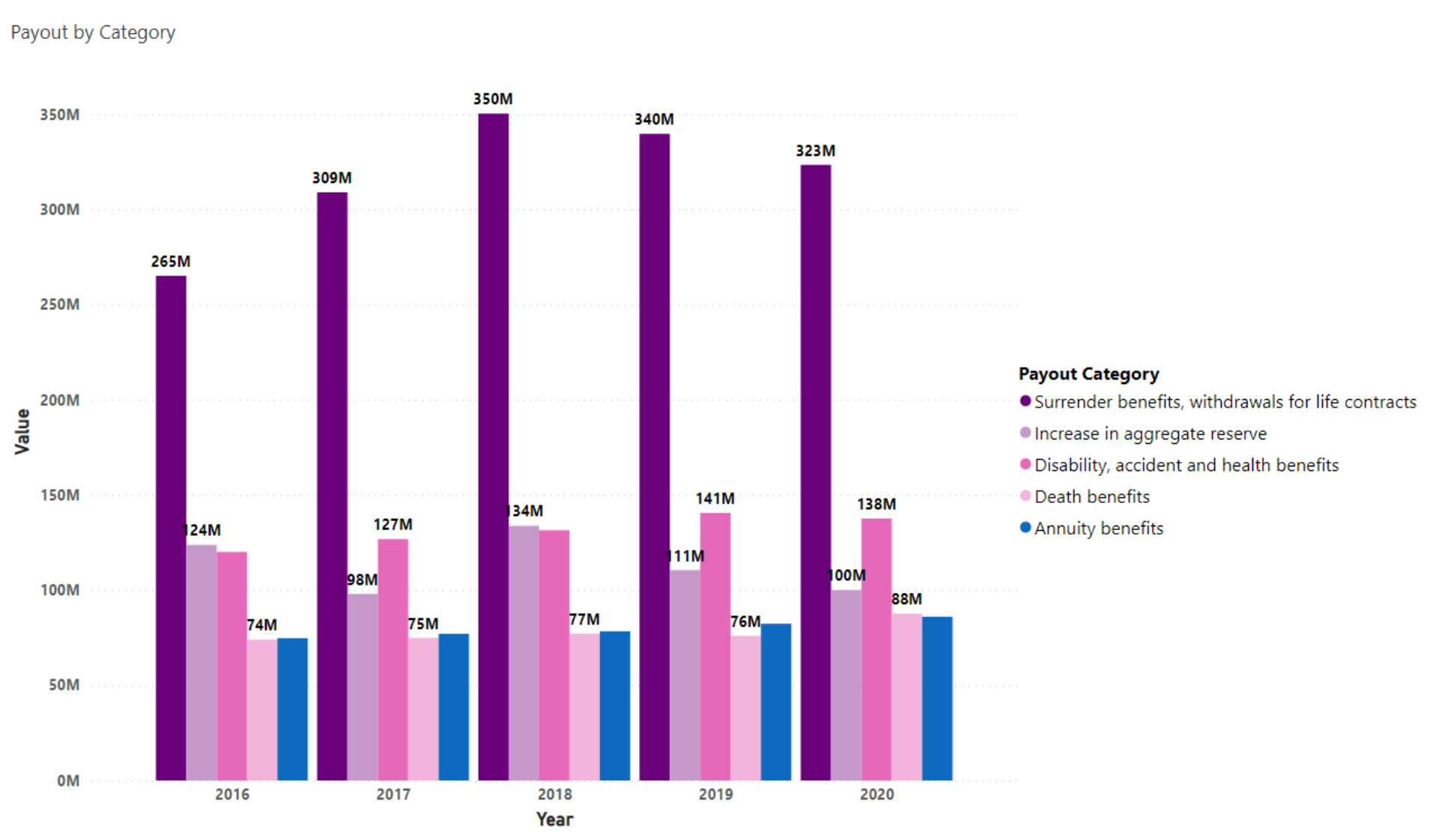


WHY DO PEOPLE NOT BUY LIFE INSURANCE?

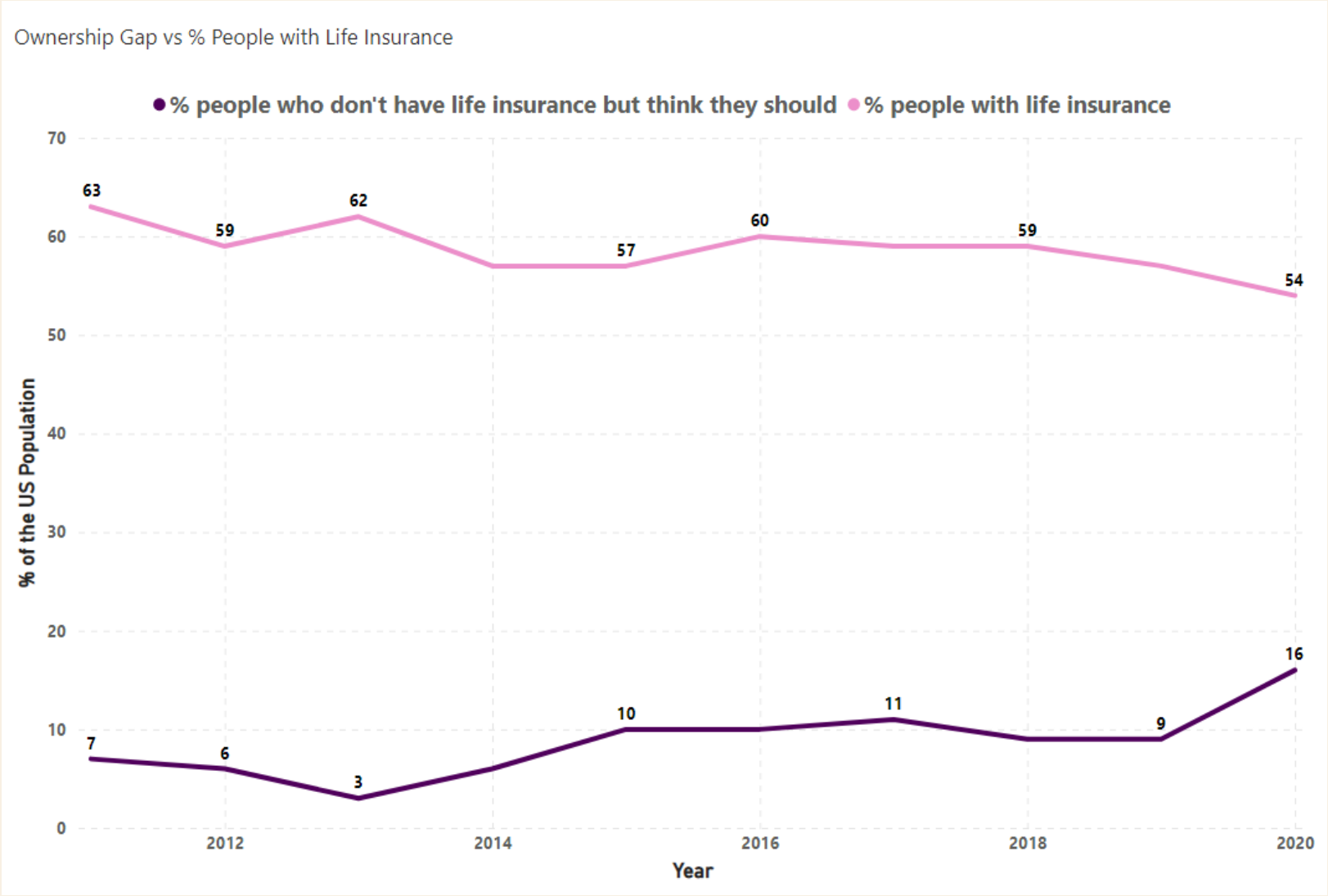
- Comes down to value
  - Time
  - Money



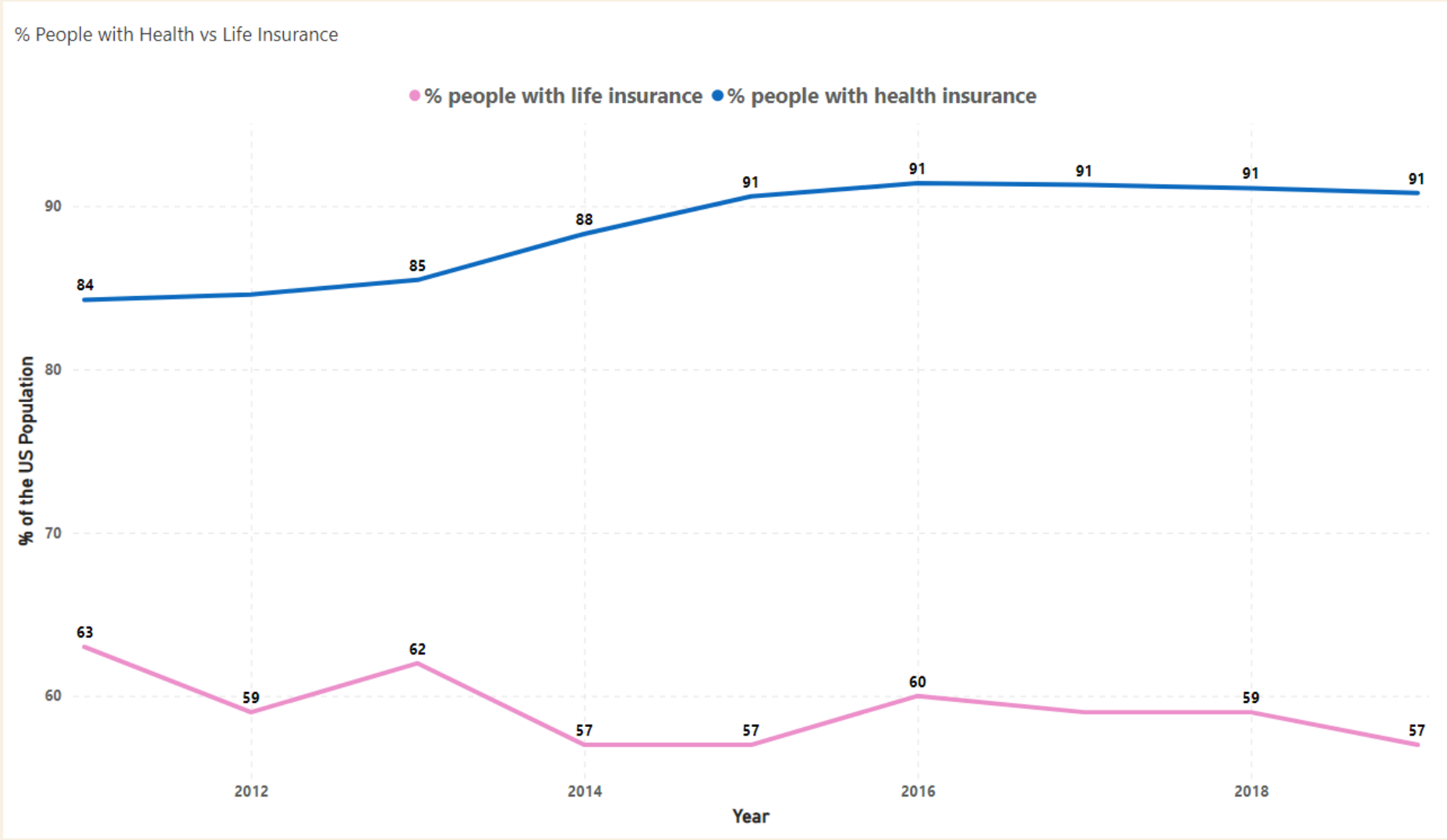
WHAT ARE THE MOST PAYOUTS BY CATEGORY?



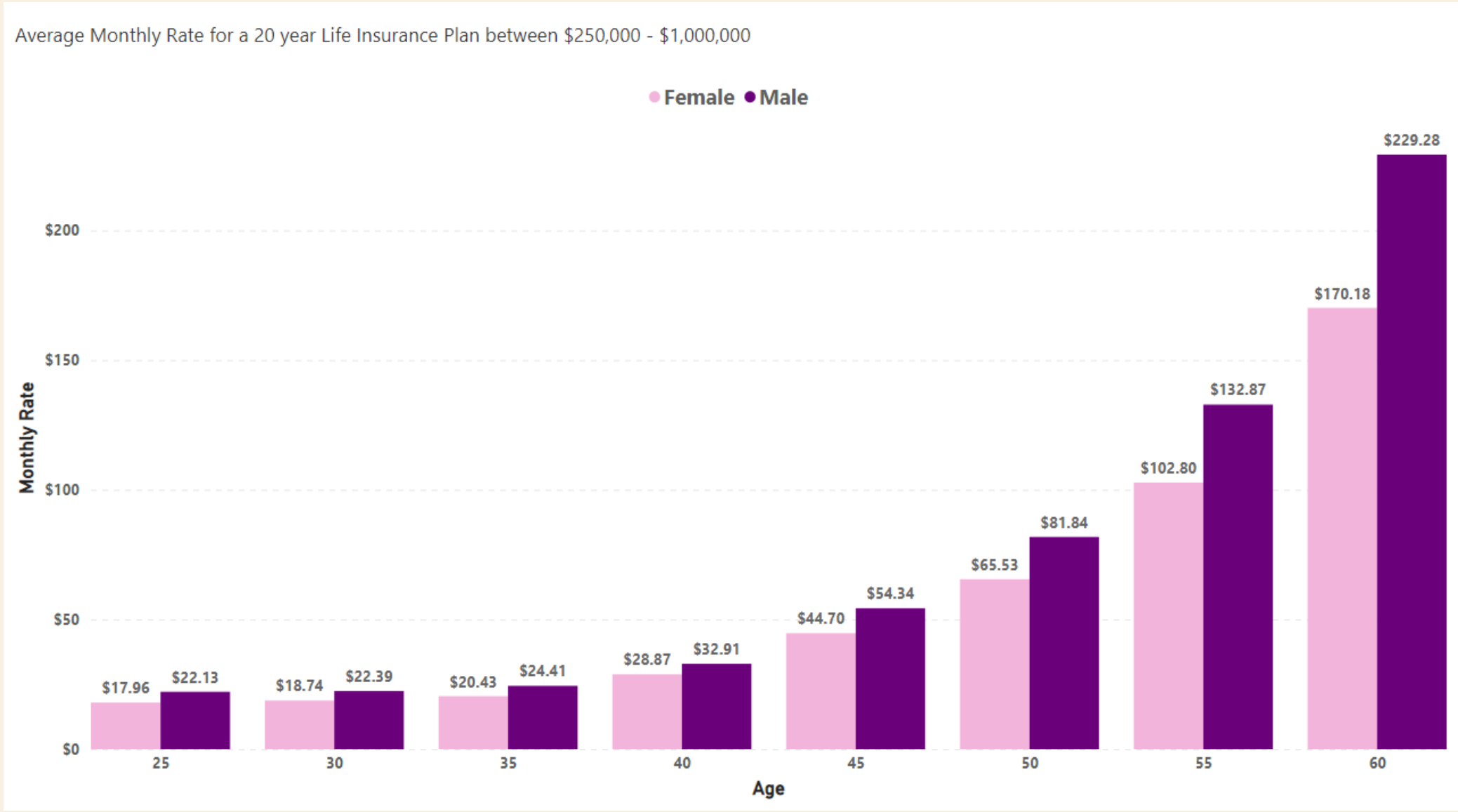
HOW MANY PEOPLE ARE/WANT TO BE INSURED?



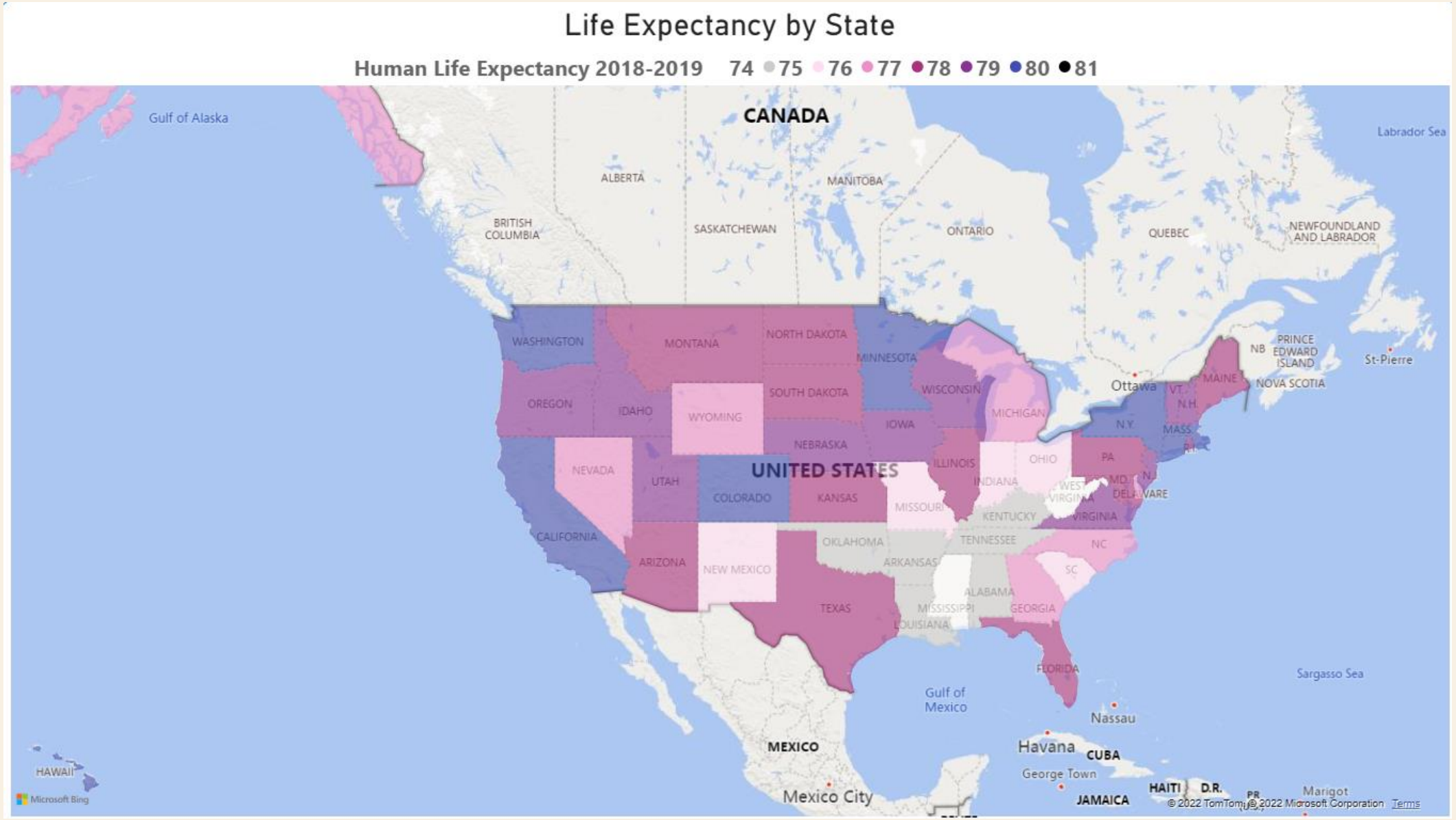
HOW DOES THIS COMPARE TO HEALTH INSURANCE?



HOW MUCH WILL IT COST ME?



LIFE EXPECTANCIES BY STATE



ML MODELS

PURPOSE

Build a Life Expectancy Predictor Model for a population given certain demographic information.

DATA

- Demographic Data from US Census Bureau
- Life Expectancy Data from CDC

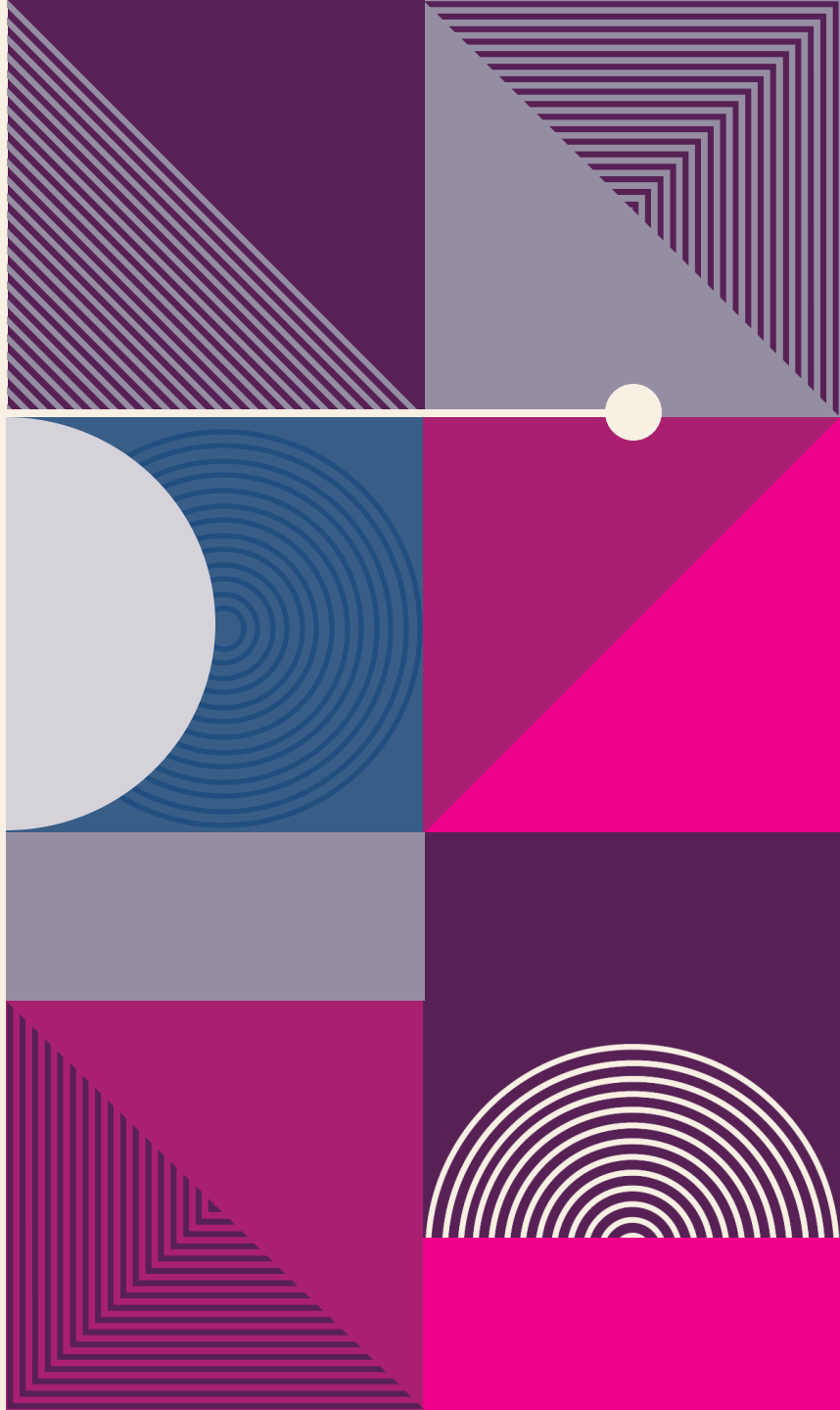
METHOD

Using CDC Life Expectancy projections as goal, build our own replica model.

MODELS BUILT

- Linear Regression
- Default SVR
- Tuned SVR

(for both the whole data set and a reduced subset)



FIRST LINEAR REGRESSION MODEL

MODEL COEFFICIENTS

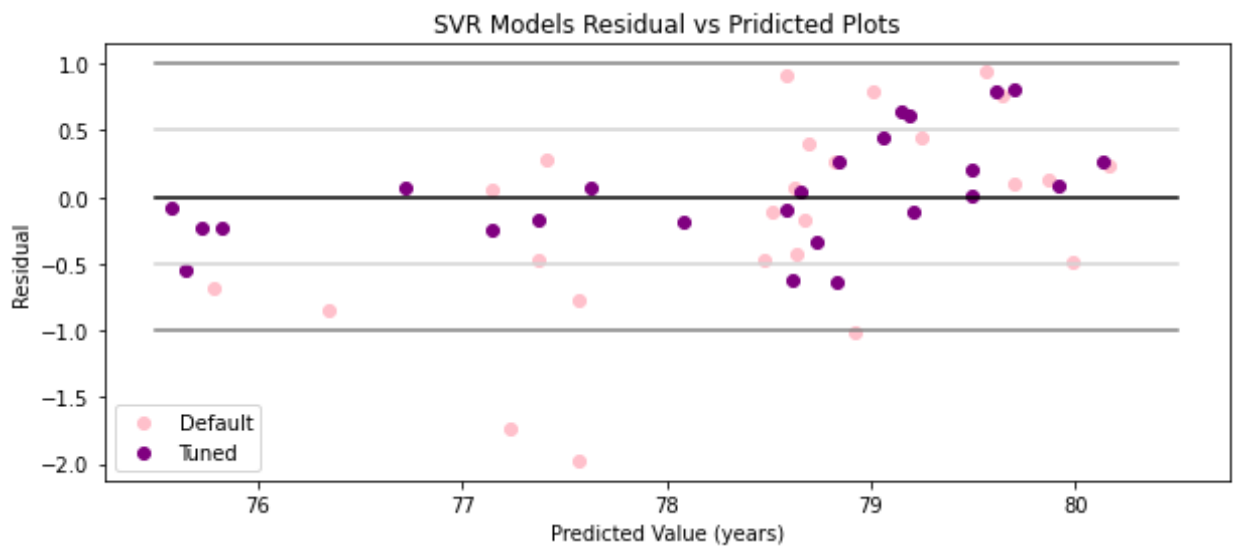
Variables	Coefficients
Male	0.1313349
White	0.1281162
Black or African American	-0.3636552
American Indian and Alaska Native	-0.1584682
Asian	0.7366583
Native Hawaiian and other Pacific Islander	-0.0274978
Other	-0.0529579
Multiracial	-0.5206292
Hispanic or Latino	0.3411264
Median Household Income	0.9106875
Percent Insured	0.1225619

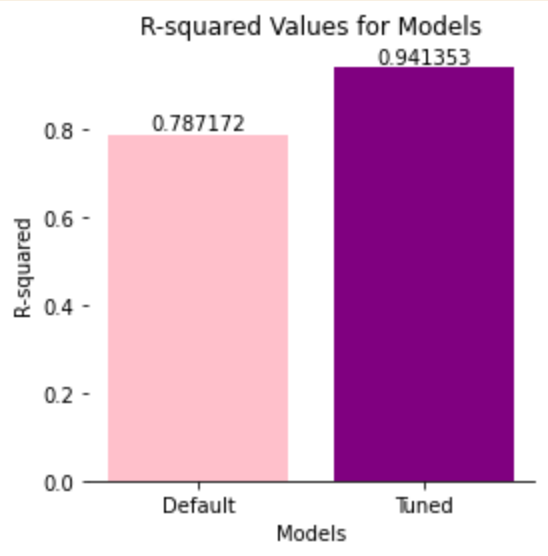
CORRELATIONS WITH LIFE EXPECTANCY

Variables	Correlation Coefficients
Male	0.300603
White	-0.024882
Black or African American	-0.464772
American Indian and Alaska Native	-0.075283
Asian	0.456682
Native Hawaiian and other Pacific Islander	0.248467
Other	0.379231
Multiracial	0.282104
Hispanic or Latino	0.310126
Median Household Income	0.76506
Percent Insured	0.405851

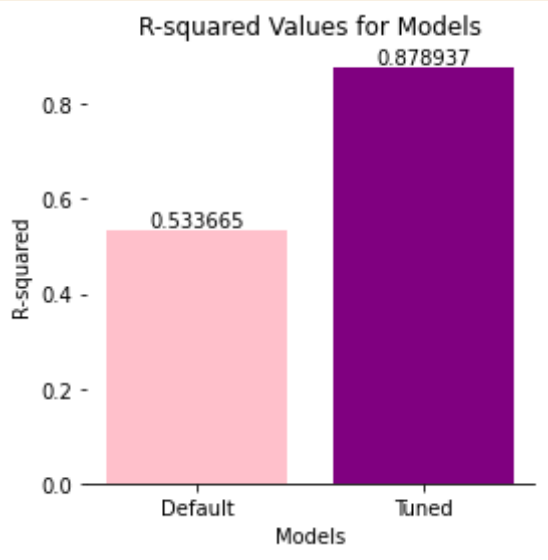
MODEL ANALYSIS VISUALS

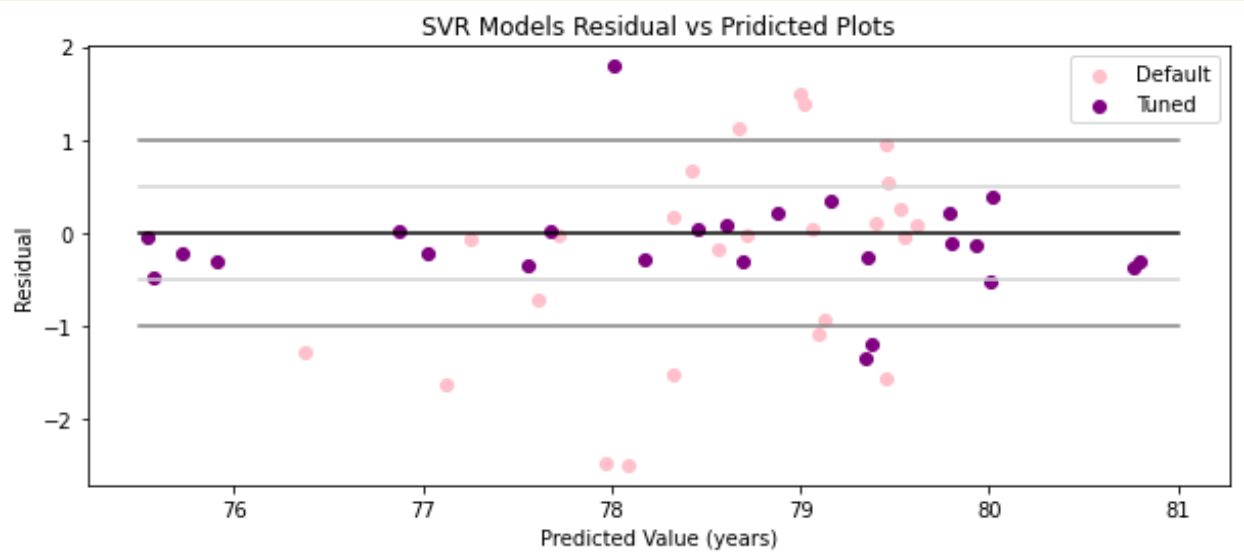
ALL DATA





ONLY SEX, RACE, & ETHNICITY DATA





MODEL SHORTCOMINGS

UNDERFITTING

- Not built on a large sample space, almost assuredly underfit

PERSISTENT RESIDUAL TRENDS

- Positive correlation between Residuals and Predicted Values
- Could be an artifact of the underfitting, or something greater

TOO WEAK FOR APPLICATION

- 94% accuracy too low for real world application

Dashboard Link

CONCLUSION

- Successfully answered our initial questions
- Learned more about the industry
- Limited by lack of proprietary data
- Little/no data past 2020, many things may have changed

QUESTIONS ?

DATA SOURCES

- Funeral Costs
- https://www.policygenius.com/life-insurance/how-much-does-a-funeral-cost/
- Life Insurance Data
- https://www.bestliferates.org/statistics
- https://www.investopedia.com/articles/personal-finance/022615/how-age-affects-life-insurance-rates.asp
- https://www.iii.org/table-archive/22403
- https://www.cdc.gov/nchs/pressroom/sosmap/life_expectancy/life_expectancy.htm
- Census Data
- https://data.census.gov/cedsci/
- https://api.census.gov/data/2020/acs/acs5/subject/variables.html
- https://www.census.gov/data/tables/time-series/demo/health-insurance/acs-hi.html
- Abbreviation Table
- https://worldpopulationreview.com/states/state-abbreviations