

# Final Report

due November 16, 2021 by 11:59 PM

Shelby Brown, Katie Lam, Kaeden Hill

10/31/21

```
## Warning in system("timedatectl", intern = TRUE): running command 'timedatectl'
## had status 1

## -- Attaching packages ----- tidyverse 1.3.1 --

## v ggplot2 3.3.5      v purrr 0.3.4
## v tibble 3.1.5       v dplyr 1.0.7
## v tidyr 1.1.4        v stringr 1.4.0
## v readr 2.0.2        v forcats 0.5.1

## -- Conflicts ----- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()     masks stats::lag()

##
## Attaching package: 'janitor'

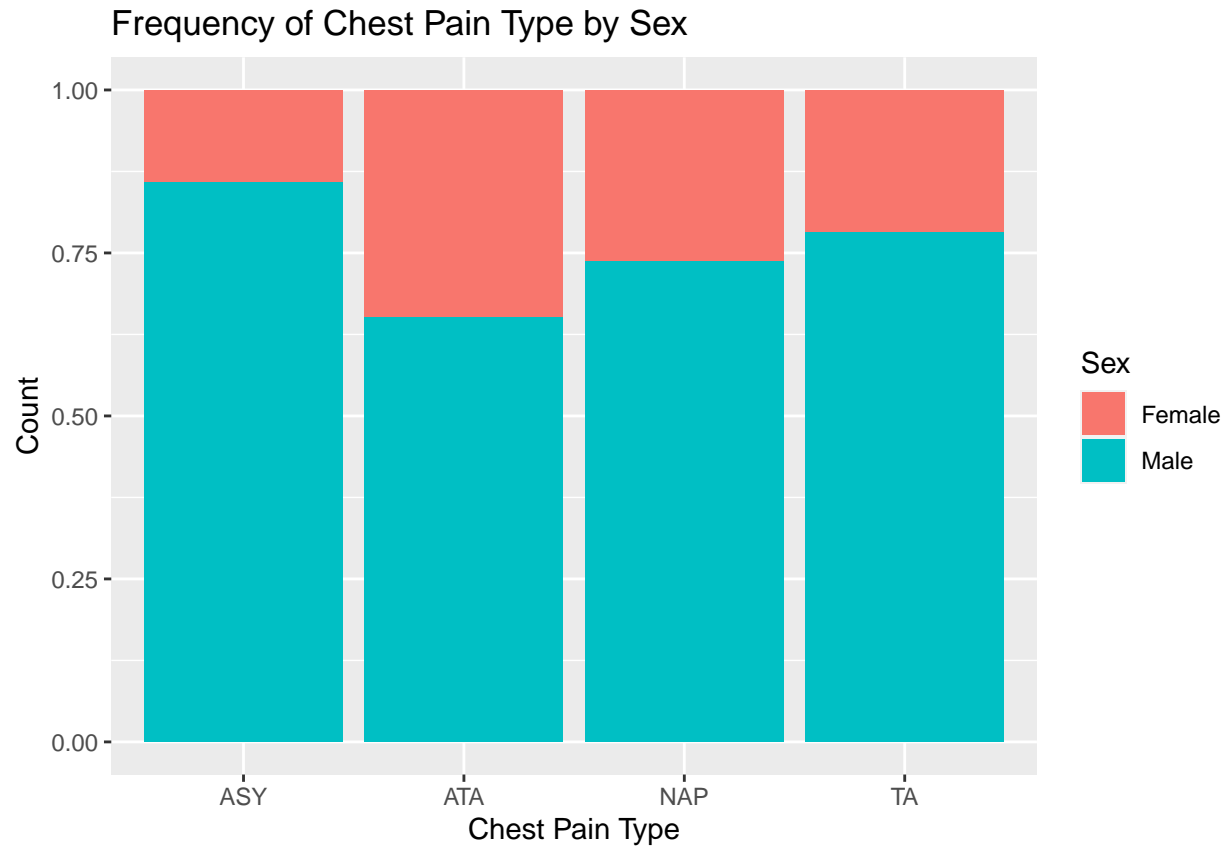
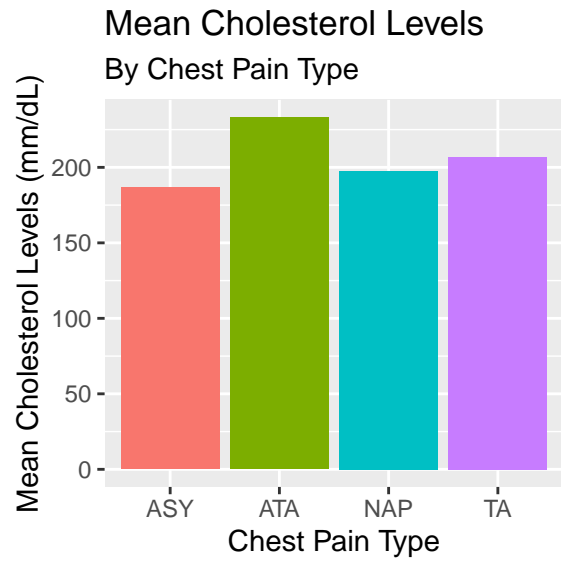
## The following objects are masked from 'package:stats':
##
##   chisq.test, fisher.test
```

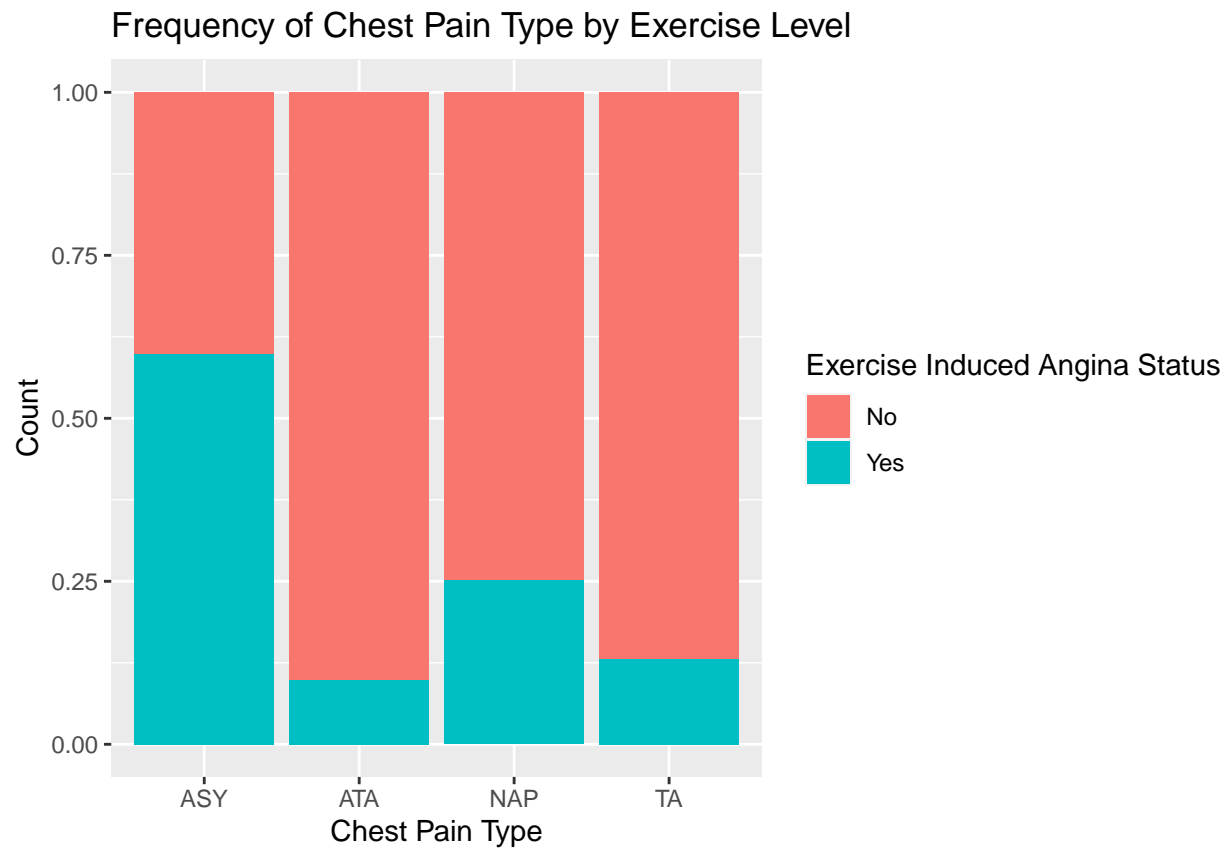
## Abstract

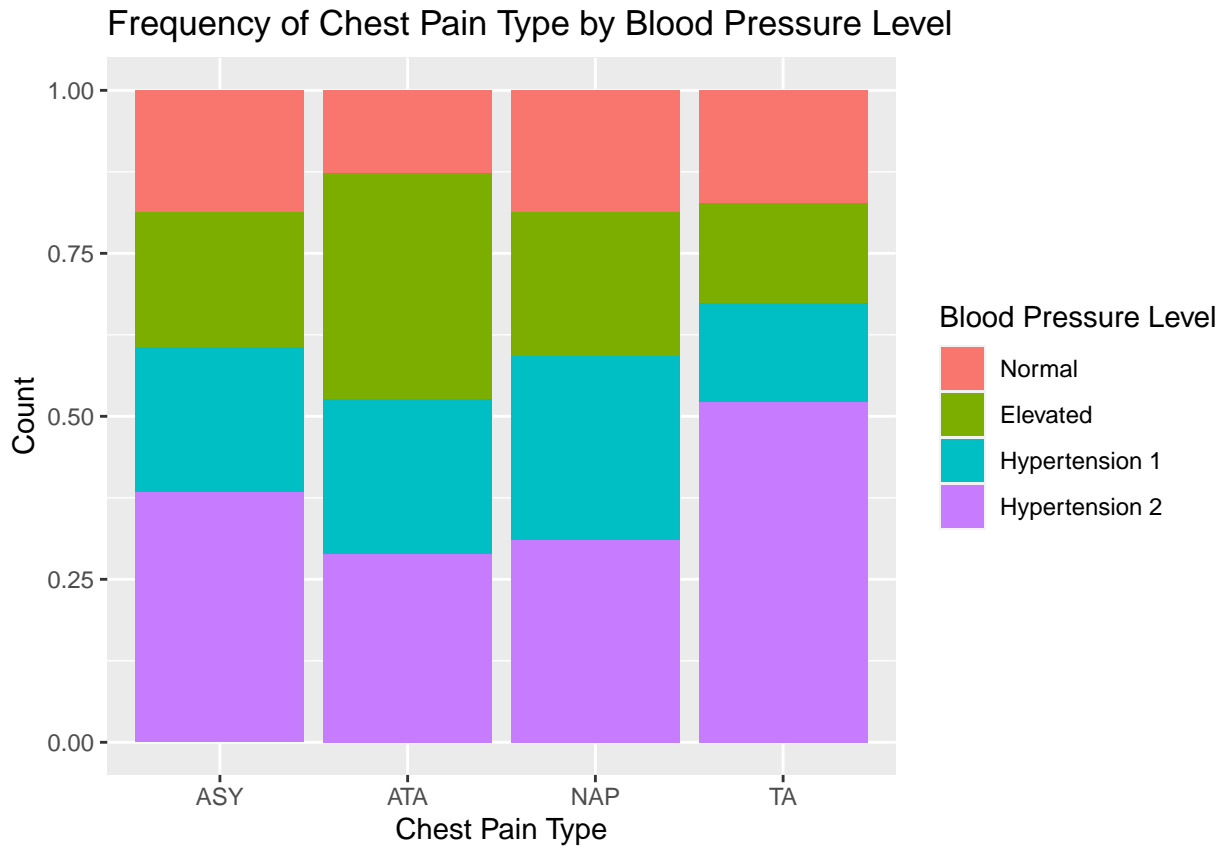
## Introduction

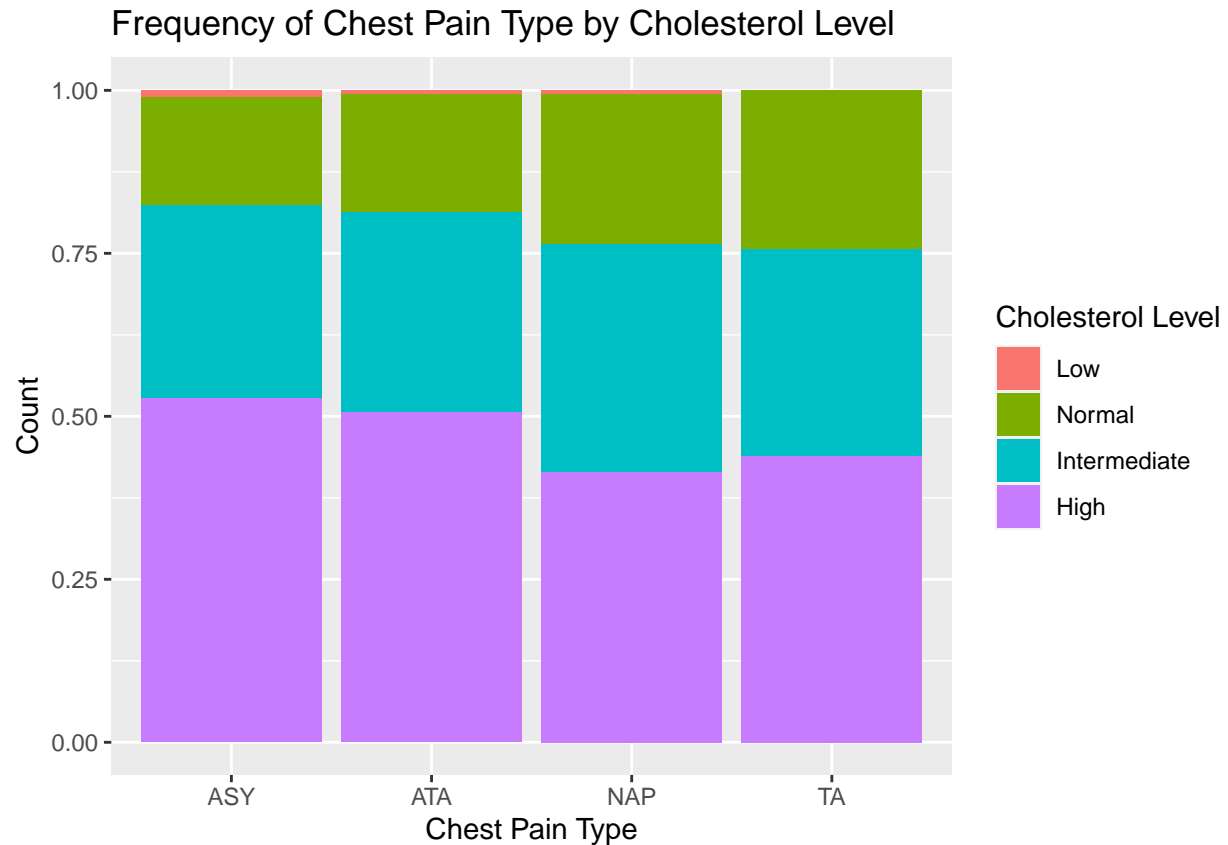
For this data visualization, chest pain types and their relation to other physiological factors were analyzed to search for an association between factors, such as blood pressure, cholesterol, and exercise, and the type of chest pain a patient experiences. The dataset being analyzed is the Heart Failure Prediction Dataset, retrieved from Kaggle, and compiled from five sets with common variables. These sources are the Hungarian Institute of Cardiology, Budapest, University Hospital, Zurich, Switzerland, University Hospital, Basel, Switzerland, the V.A. Medical Center, Long Beach, and the Cleveland Clinic Foundation. The variables of interest include gender, resting blood pressure (mm Hg), serum cholesterol (mm/d), whether or not the angina was exercise induced, and whether or not the patient was diagnosed with heart disease (\*\*diagnosis before or after the angina??). To allow for the use of statistical tests, each variable was transformed into a categorical variable.

```
## # A tibble: 4 x 2
##   ChestPainType mean_cholesterol
##   <chr>          <dbl>
## 1 ASY           187.
## 2 ATA           233.
## 3 NAP           197.
## 4 TA            207.
```









## Statistical Tests

```
##
## Pearson's Chi-squared test
##
## data:  sex_table
## X-squared = 36.879, df = 3, p-value = 4.88e-08
##
## Pearson's Chi-squared test
##
## data:  exer_table
## X-squared = 179.27, df = 3, p-value < 2.2e-16
##
## Pearson's Chi-squared test
##
## data:  chol_table
## X-squared = 8.6117, df = 9, p-value = 0.4739
##
## Pearson's Chi-squared test
##
## data:  RBP_table
## X-squared = 26.829, df = 9, p-value = 0.001493
##
```

```

## Pearson's Chi-squared test
##
## data:  disease_table
## X-squared = 268.07, df = 3, p-value < 2.2e-16

##
## Fisher's Exact Test for Count Data
##
## data:  chol_step
## p-value = 0.9297
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  chol_step2
## p-value = 0.06204
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  chol_step3
## p-value = 0.5284
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  chol_step4
## p-value = 0.3368
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  chol_step5
## p-value = 0.6594
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  chol_step6
## p-value = 0.94
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  sex_step
## p-value = 2.369e-08
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.2031800 0.4733313
## sample estimates:
## odds ratio

```

```

## 0.3100921

##
## Fisher's Exact Test for Count Data
##
## data: sex_step2
## p-value = 0.0002766
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.3054468 0.7119609
## sample estimates:
## odds ratio
## 0.4656136

##
## Fisher's Exact Test for Count Data
##
## data: sex_step3
## p-value = 0.1896
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.2722762 1.4001345
## sample estimates:
## odds ratio
## 0.5922146

##
## Fisher's Exact Test for Count Data
##
## data: sex_step4
## p-value = 0.07251
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.9418551 2.3984968
## sample estimates:
## odds ratio
## 1.501076

##
## Fisher's Exact Test for Count Data
##
## data: sex_step5
## p-value = 0.1107
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.8524745 4.6148967
## sample estimates:
## odds ratio
## 1.906248

##
## Fisher's Exact Test for Count Data
##
## data: sex_step6
## p-value = 0.7073
## alternative hypothesis: true odds ratio is not equal to 1

```

```

## 95 percent confidence interval:
## 0.5679163 3.0759273
## sample estimates:
## odds ratio
## 1.270772

##
## Fisher's Exact Test for Count Data
##
## data: exer_step
## p-value < 2.2e-16
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.04032086 0.12583163
## sample estimates:
## odds ratio
## 0.07331366

##
## Fisher's Exact Test for Count Data
##
## data: exer_step2
## p-value < 2.2e-16
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.1529646 0.3280057
## sample estimates:
## odds ratio
## 0.2253116

##
## Fisher's Exact Test for Count Data
##
## data: exer_step3
## p-value = 4.234e-10
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.03430591 0.24552456
## sample estimates:
## odds ratio
## 0.100903

##
## Fisher's Exact Test for Count Data
##
## data: exer_step4
## p-value = 0.0001411
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 1.656297 5.935882
## sample estimates:
## odds ratio
## 3.070166

##
## Fisher's Exact Test for Count Data

```



```

##
## data:  exer_step5
## p-value = 0.5883
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.4161352 3.9597702
## sample estimates:
## odds ratio
##  1.374316

##
## Fisher's Exact Test for Count Data
##
## data:  exer_step6
## p-value = 0.0836
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.1466831 1.1500616
## sample estimates:
## odds ratio
##  0.4483045

##
## Fisher's Exact Test for Count Data
##
## data:  RBP_step
## p-value = 0.001125
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  RBP_step2
## p-value = 0.2331
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  RBP_step3
## p-value = 0.34
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  RBP_step4
## p-value = 0.0436
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data:  RBP_step5
## p-value = 0.006839
## alternative hypothesis: two.sided

```

```

##
## Fisher's Exact Test for Count Data
##
## data: RBP_step6
## p-value = 0.05117
## alternative hypothesis: two.sided

##
## Fisher's Exact Test for Count Data
##
## data: disease_step
## p-value < 2.2e-16
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.02532899 0.07052378
## sample estimates:
## odds ratio
## 0.04297732

##
## Fisher's Exact Test for Count Data
##
## data: disease_step2
## p-value < 2.2e-16
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.1001099 0.2122784
## sample estimates:
## odds ratio
## 0.1463117

##
## Fisher's Exact Test for Count Data
##
## data: disease_step3
## p-value = 6.656e-07
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 0.1039251 0.3983253
## sample estimates:
## odds ratio
## 0.204859

##
## Fisher's Exact Test for Count Data
##
## data: disease_step4
## p-value = 1.618e-06
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
## 1.984092 5.990659
## sample estimates:
## odds ratio
## 3.401259
##

```

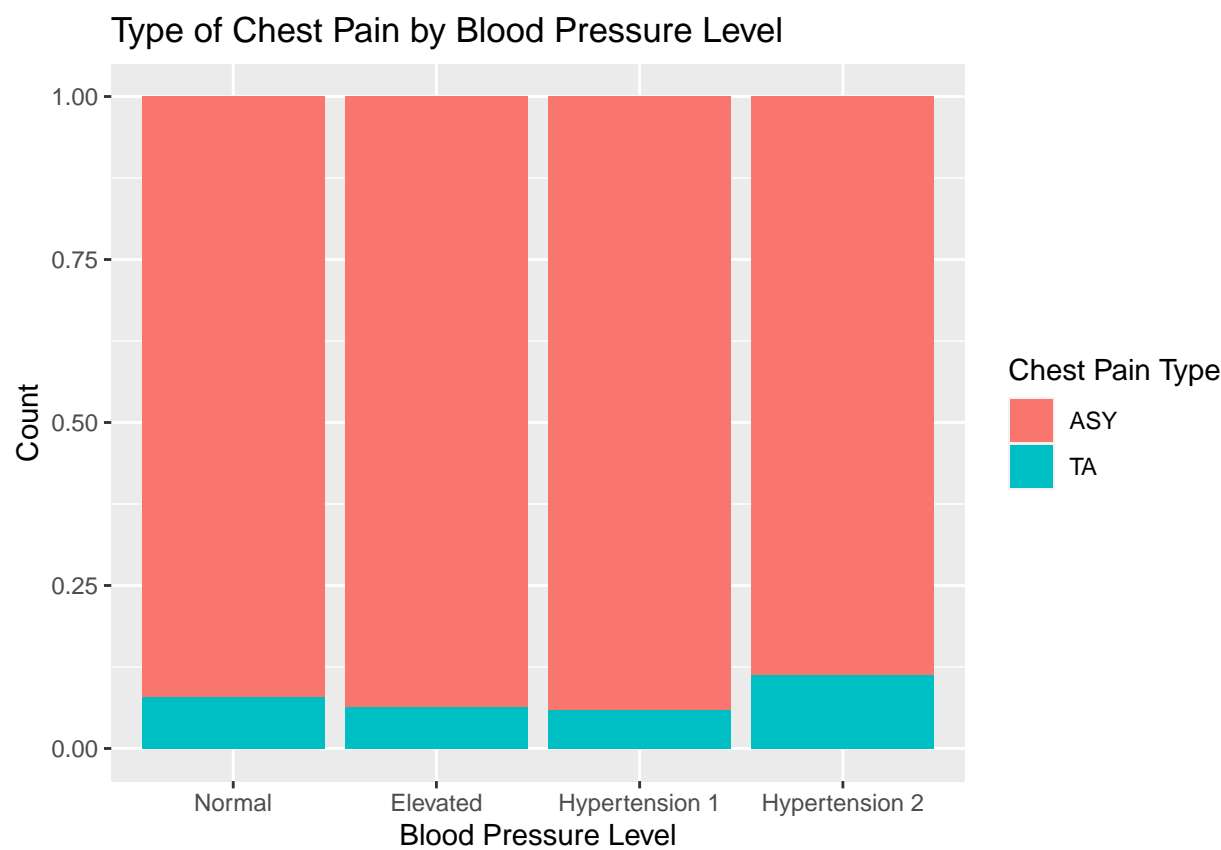
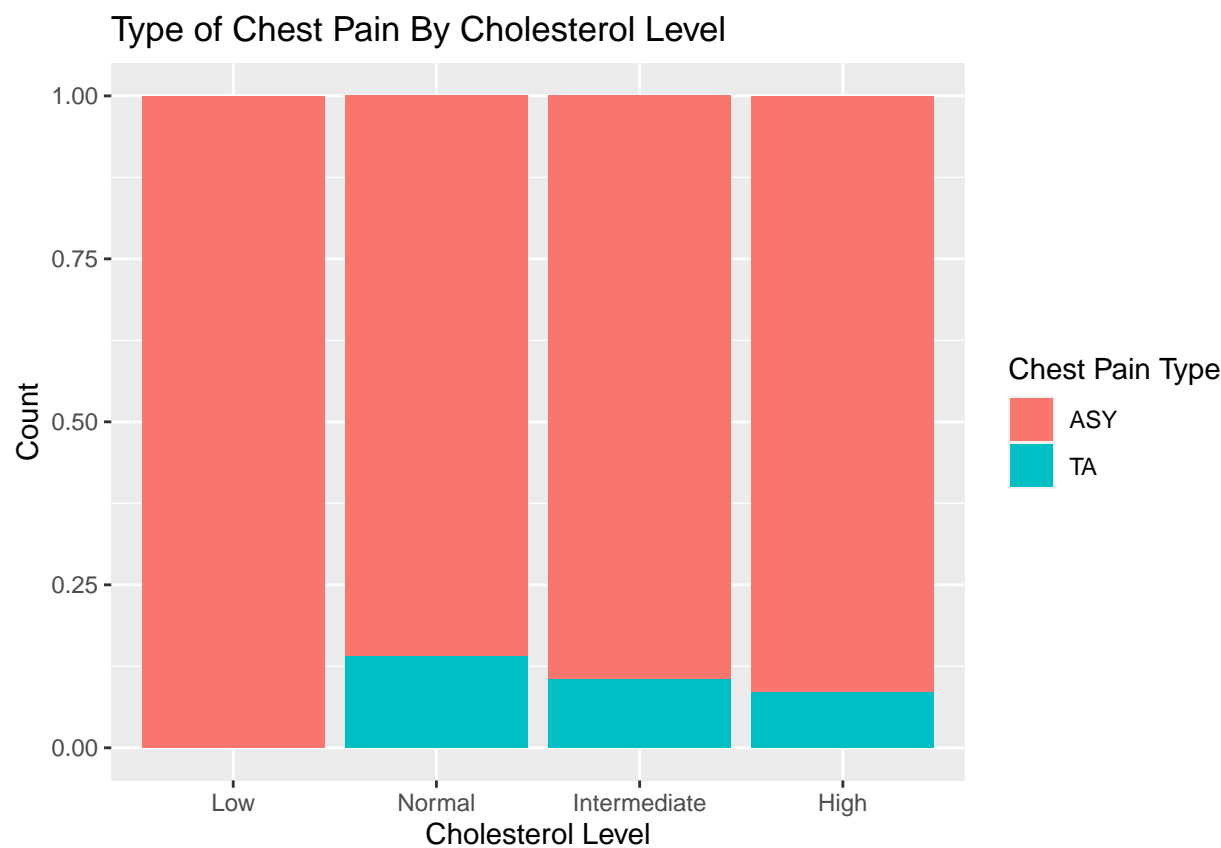
```

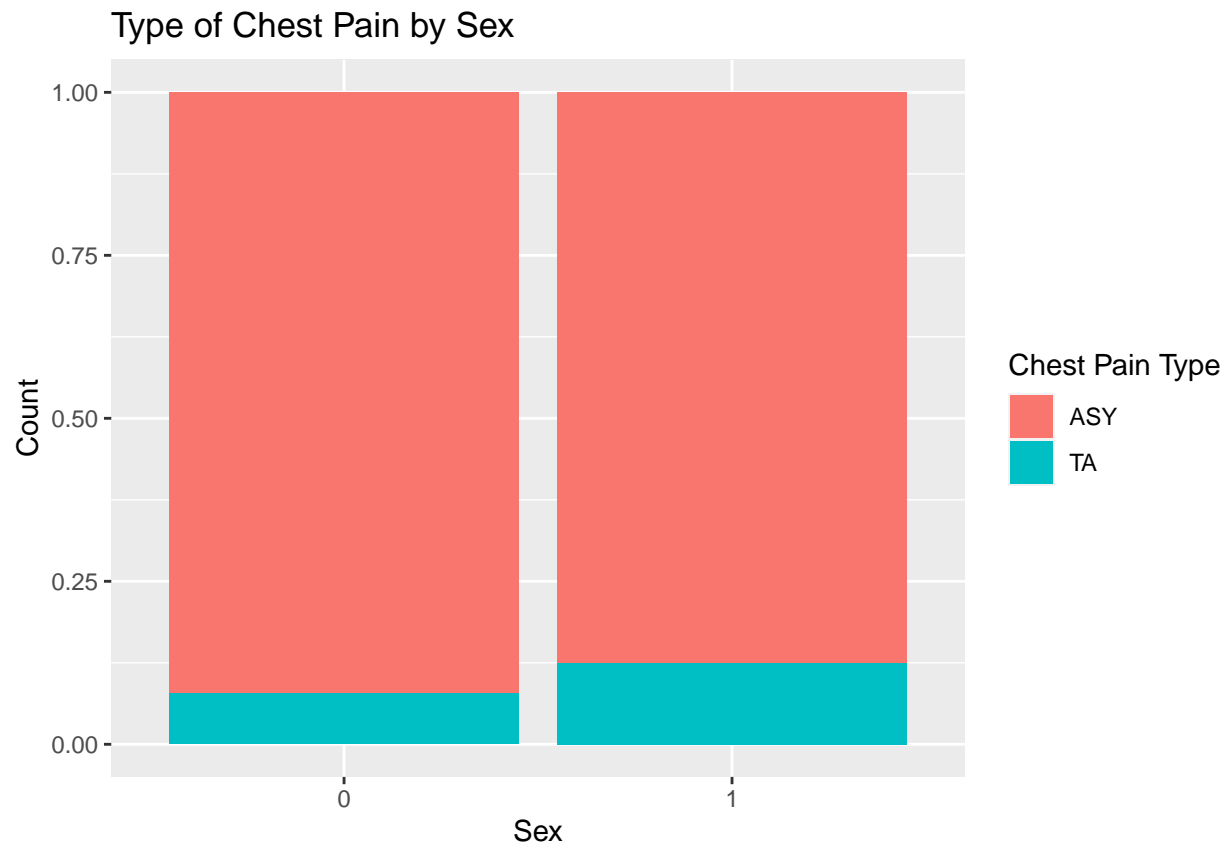
## Fisher's Exact Test for Count Data
##
## data:  disease_step5
## p-value = 3.929e-05
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  2.15486 10.44700
## sample estimates:
## odds ratio
##  4.73165

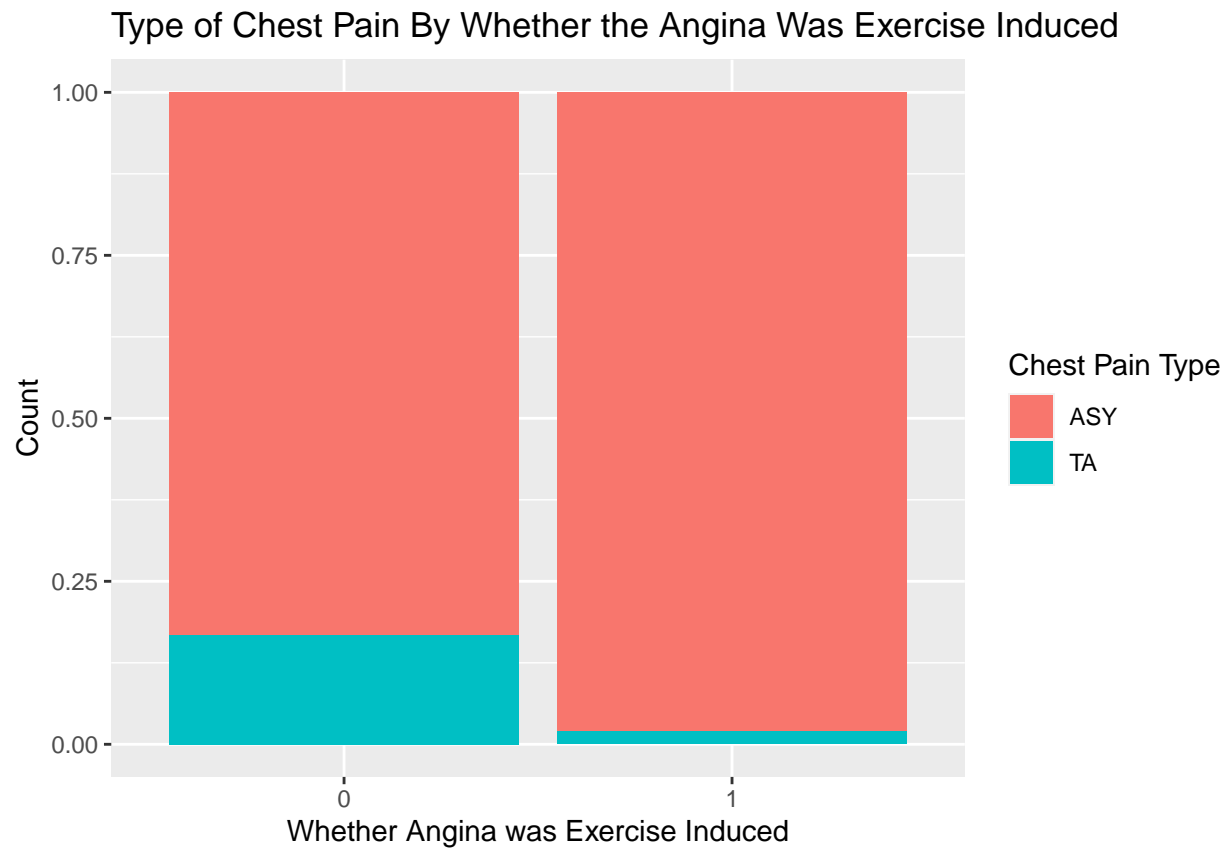
##
## Fisher's Exact Test for Count Data
##
## data:  disease_step
## p-value < 2.2e-16
## alternative hypothesis: true odds ratio is not equal to 1
## 95 percent confidence interval:
##  0.02532899 0.07052378
## sample estimates:
## odds ratio
## 0.04297732

```

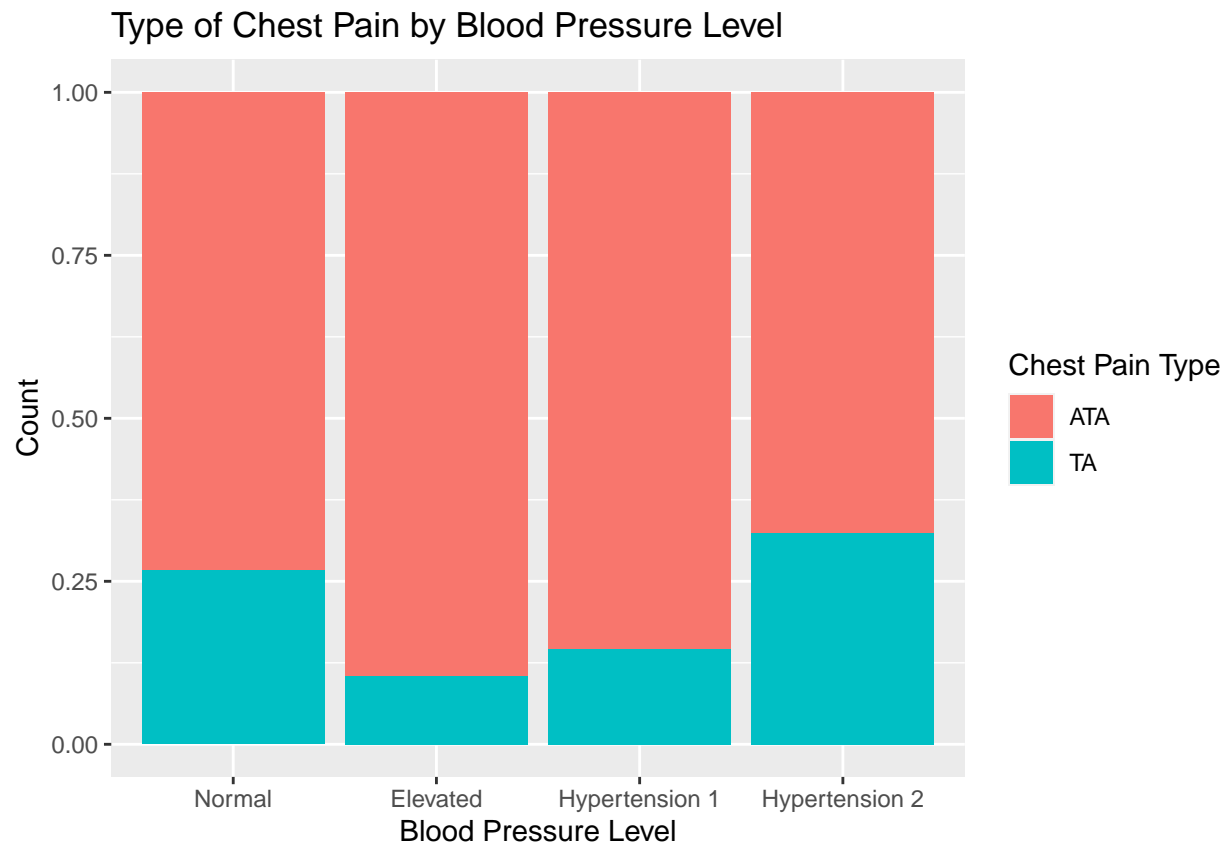
Results



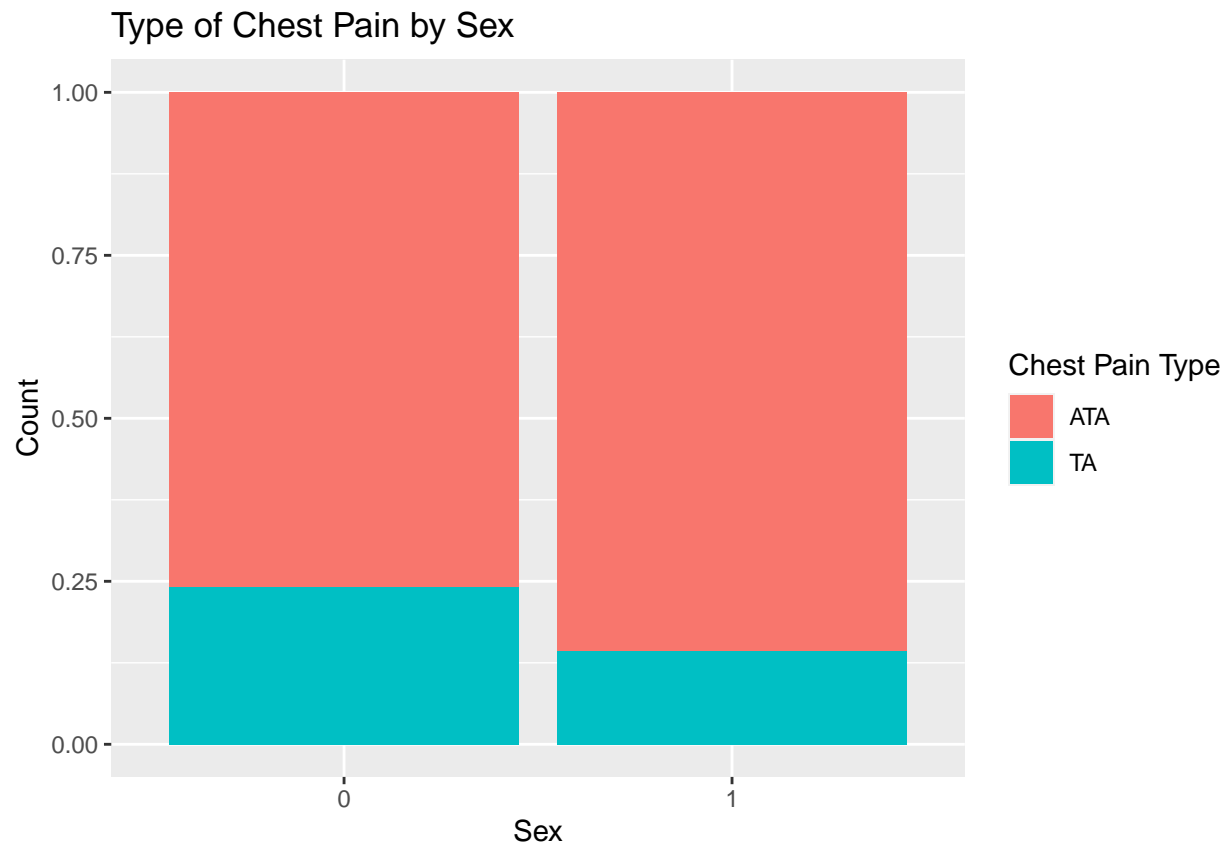


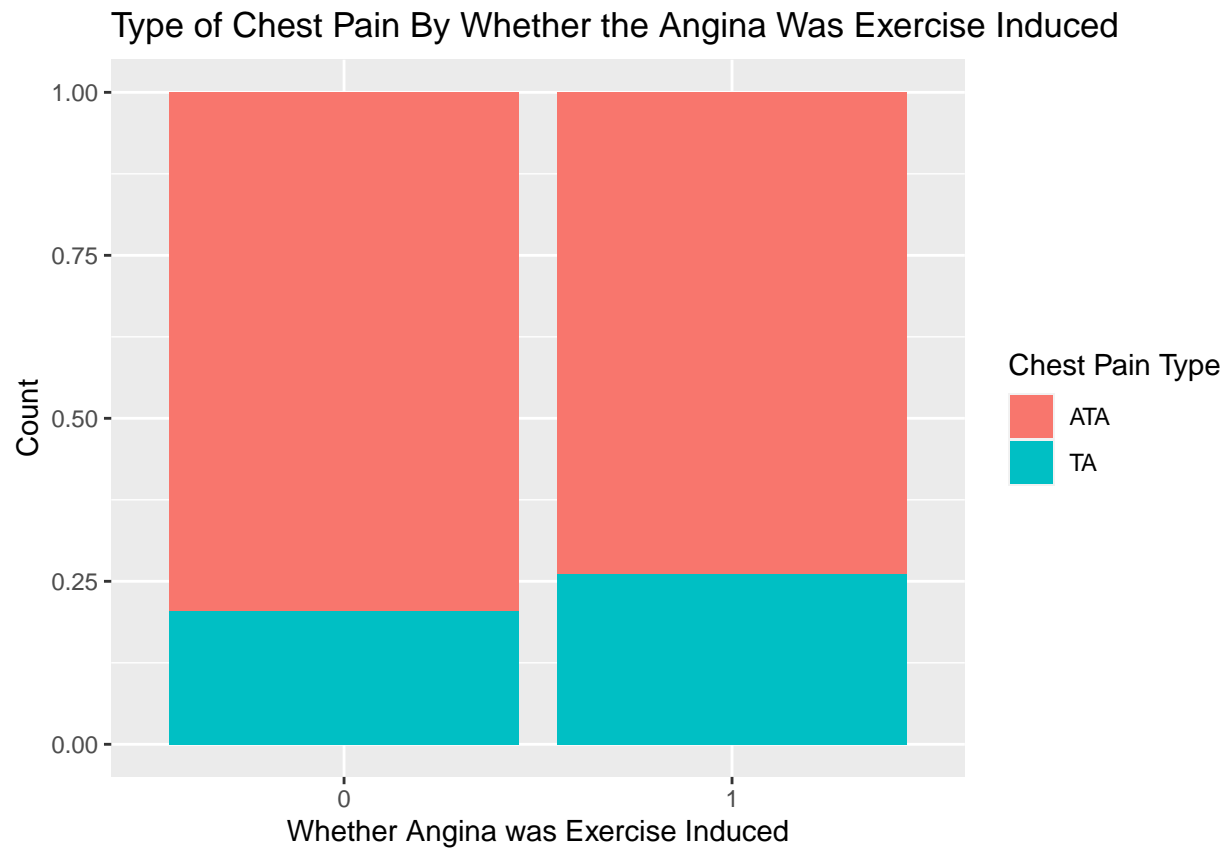


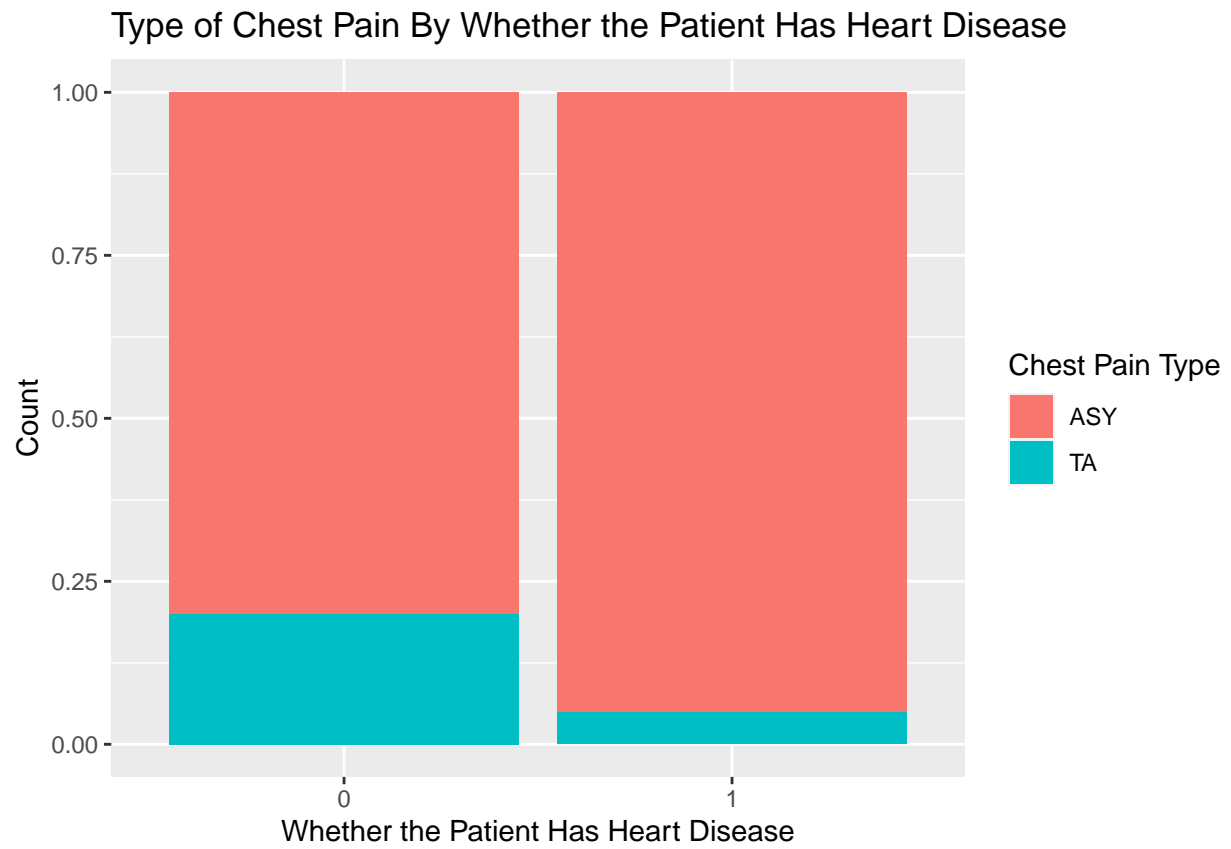


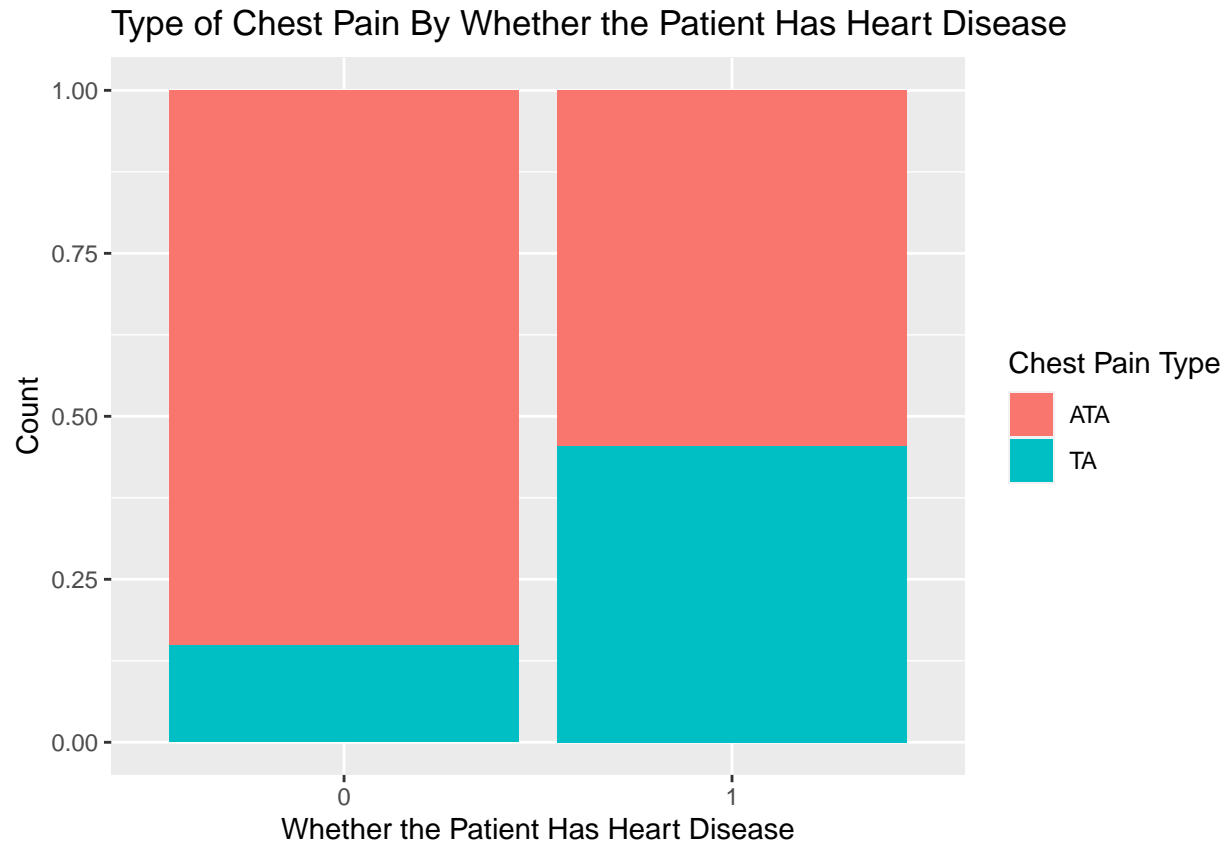












```
## # A tibble: 2 x 2
##   Sex    count
##   <chr> <int>
## 1 F      80
## 2 M     462

## # A tibble: 4 x 3
## # Groups:   Sex [2]
##   Sex ChestPainType count
##   <chr> <chr>      <int>
## 1 F    ASY         70
## 2 F    TA          10
## 3 M    ASY        426
## 4 M    TA          36

## # A tibble: 2 x 2
##   Sex    count
##   <chr> <int>
## 1 F      70
## 2 M     149

## # A tibble: 4 x 3
## # Groups:   Sex [2]
##   Sex ChestPainType count
##   <chr> <chr>      <int>
## 1 F    ATA         60
## 2 F    TA          10
## 3 M    ATA        113
```

```
## 4 M      TA      36

## # A tibble: 2 x 2
##   ExerciseAngina count
##   <chr>          <int>
## 1 N              239
## 2 Y              303

## # A tibble: 4 x 3
## # Groups:   ExerciseAngina [2]
##   ExerciseAngina ChestPainType count
##   <chr>          <chr>          <int>
## 1 N              ASY              199
## 2 N              TA               40
## 3 Y              ASY              297
## 4 Y              TA               6

## # A tibble: 2 x 2
##   ExerciseAngina count
##   <chr>          <int>
## 1 N              196
## 2 Y              23

## # A tibble: 4 x 3
## # Groups:   ExerciseAngina [2]
##   ExerciseAngina ChestPainType count
##   <chr>          <chr>          <int>
## 1 N              ATA              156
## 2 N              TA               40
## 3 Y              ATA              17
## 4 Y              TA               6
```

## Discussion