Excessive Alcohol Use

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Problem Introduction

What is our business problem?

Excessive alcohol use can have severe effects on an individual's health.

To further understand the problem:

- Analyze the effects of excessive alcohol consumption in the U.S.
- Understand the health influences and risks
- Understand how different groups and demographics' drinking habits differ

Why is it worth further research?

Purpose

- Public health purposes
- Education
- Healthcare support

How could we solve this problem?

Create a dashboard that

- Shows the relationships between demographics and drinking habits
- Visualizes overall drinking habits in the US
- Shows causes of death due to excessive drinking

Datasets Used

Datasets

1) **US Binge Drinking Frequency by State - CDC**
https://www.cdc.gov/alcohol/data-stats.htm

2) **Alcohol Drinking Status Among Adults (Age 18+) in the US by Selected Characteristics, 2015 to 2019 - CDC**
https://www.cdc.gov/nchs/nhis/SHS/tables.htm

3) **US Mortality Rates by Cause (Filtered for Alcohol-Related Causes), 1990 to 2020 - IHME**
https://ghdx.healthdata.org/record/ihme-data/united-states-life-expectancy-by-state-white-black-hispanic-race-ethnicity-1990-2019

Methods Used

Methods

- Dashboard - R and RShiny
- Data Analysis
  - Data cleaning/tidying
  - Exploratory Analysis
    - Relationships between variables
    - Understand the data tables
  - Visualizations
    - Static and Interactive
    - Clear and Digestible

Functions - Create Visualizations

```r
#' @title: PieChart
#' @example createPieChart(subsetEdu, "Some college")

#' Function to create a pie chart based on the demographic subset
#' that the user chooses to examine.

library(ggplot2)

# Function of Pie Chart
createPieChart <- function(df, colName) {
  ggplot(data = df) +
    geom_col(mapping = aes(x = "", y = .data[[colName]], fill = Type)) +
    coord_polar(theta = "y") +
    theme_bw() +
    labs(title = paste0("Pie Chart of ", colName), y = "Frequency")
}
```

```r
library(ggplot2)
library(maps)
library(RColorBrewer)
library(dplyr)
library(plotly)

create_fresh_map <- function(data, var) {
  # Get US map data
  us_map <- map_data("state")

  # Assign a color ID to each state
  unique_states <- unique(us_map$region)
  color_ids <- 1:length(unique_states)
  names(color_ids) <- unique_states
  us_map$color_id <- color_ids[us_map$region]

  # Create a color palette with 50 colors
  pastel_colors <- colorRampPalette(brewer.pal(9, "Pastel1"))(50)

  # Merge map data and input data
  data$region <- tolower(data$state)
  merged_data <- us_map %>%
    left_join(data, by = "region")

  # Create a map of the United States
  p <- ggplot() +
    geom_polygon(data = merged_data, aes(x = long, y = lat, group = group, fill = as.factor(color_id), text = paste( state, "<br>", round(alcoholConsumptionGallons,
    coord_fixed(1.3) +
    scale_fill_manual(values = pastel_colors) +
    theme_minimal() +
    theme(
      legend.position = "none",
      plot.title = element_text(hjust = 0.5)
    ) +
    labs(x = "Latitude", y = "Longitud ")

  # Using plotly to make graphs interactive
  p <- ggplotly(p, tooltip = "text")
  # Set the height of the plot to be 2 times the default height
  #p <- p %>% layout(height = 2 * 450) # 450 is the default height, you can adjust the number based on your requirement

  return(p)
}

# Example usage
#data <- alcoholByStateGallons
#var <- "alcoholConsumptionGallons"
#create_fresh_map(data, var)
```

UI - Categories

```
######## First tab content#################################################

      tabItem(tabName = "maps",
        h2("U.S. Drinking Habits Overall"),
        # alcohol gallon consumption map Tab Box
        fluidRow(
          box(
            title = "Gallons Consumed per Person per Year", status = "danger", solidHeader = TRUE,
            collapsible = TRUE,
            tabBox(
              title = NULL,
              # The id lets us use input$tabset4 on the server to find the current tab
              id = "tabset4", height = "250px", width = 1100,
              #New Map
              tabPanel("Interactive US Drinking Map", " ",
                       plotlyOutput("interactive_map_home", height = 300, width = 1100)
              ),
              #Map function
              tabPanel("Static US Drinking Map", " ",
                       plotOutput("usPlot", height = 300, width = 1100)
              )
            ),
            width = 1100,
            style = "margin-bottom: 250px;", # Move the next row down by 250px
          )
        ),

        # region pie chart
        fluidRow(
          column(width = 6,
                 box(
                   title = "Drinking Habits by U.S. Region", status = "warning", solidHeader = TRUE,
                   selectInput("category", "Select a category: Region", c("West", "Midwest", "South", "Northeast")),
                   collapsible = TRUE,
                   plotOutput("regionChart", height = 300, width = 400),
                   width = 600
                 )
          ),
          column(width = 6,
            box(
              title = "U.S. Regional Frequency by Drinking Habit", status = "warning", solidHeader = TRUE,
              selectInput("category8", "Select a category: Drinking Frequency", c("Lifetime Abstainer", "Former Infreq
              collapsible = TRUE,
              plotOutput("regionChart2", height = 300, width = 400),
              width = 600
            )
          )
        )
      ), # First page end
```

```
######## Second page#########################################################################

      tabItem(tabName = "demographics",
        h2("Drinking Habit Data by Demographic"),

        #Education tab Box
        fluidRow(
          navbarPage(title = "",
                     #tab panel: Education levrl
                     tabPanel("Education Level",
                              box(
                                title = "Drinking Habits by Education Level", status = "primary", solidHeader = TRUE,
                                collapsible = TRUE,
                                column(width = 6,
                                       tabBox(
                                         title = NULL,
                                         # The id lets us use input$tabset1 on the server to find the current tab
                                         id = "tabset1", height = "500px",width = 500,
                                         # Education bar chart
                                         tabPanel("Status", " ",
                                                  selectInput("category1", "Select a category: Education", c("Less than a H
                                                  plotOutput("educationChart", height = 300, width = 500)
                                         ),
                                         # Education bar chart2
                                         tabPanel("Frequency", " ",
                                                  selectInput("category7", "Select a category:Drinking Frequency", c("Lifet
                                                  plotOutput("Education2", height = 300, width = 500)
                                         )
                                       )
                                )
                              ),
                     ),
                     #tab panel : Family income
                     tabPanel("Family Income Level",
                              box(
                                title = "Drinking Habits by Family Income Level", status = "success", solidHeader = TRUE,
                                collapsible = TRUE,
                                column(width = 6,
                                       tabBox(
                                         title = NULL,
                                         # The id lets us use input$tabset2 on the server to find the current tab
                                         id = "tabset2", height = "250px",width = 500,
                                         # Family income bar chart
                                         tabPanel("Status", " ",
                                                  selectInput("category5", "Select a category: Family income", c("Less thar
                                                  plotOutput("FamIncome", height = 300, width = 500)
                                         ),
                                         # Family income bar chart2
                                         tabPanel("Frequency", " ",
                                                  selectInput("category9", "Select a category: Drinking Frequency", c("Life
                                                  plotOutput("FamIncome2", height = 300, width = 500)
                                         )
```

UI - Categories

```
######## Third page#########################################################################
      tabItem(tabName = "effects",
        h2("Effects of Excessive Drinking in the U.S."),

        fluidRow(
          column(width = 6,
            box(
              title = "Alcohol-Related Deaths Over Time", status = "primary", solidHeader = TRUE,
              selectInput("chooseState3", "Select a state: ", c("Alabama", "Alaska","Arizona",
                                                                "Arkansas", "California","Colorado",
                                                                "Connecticut","Delaware","Florida",
                                                                "Georgia","Hawaii","Idaho", "Illinois",
                                                                "Indiana","Iowa","Kansas","Kentucky",
                                                                "Louisiana","Maine","Maryland",
                                                                "Massachusetts","Michigan","Minnesota",
                                                                "Mississippi","Missouri",'Montana',
                                                                'Nebraska','Nevada','New Hampshire',
                                                                'New Jersey','New Mexico','New York',
                                                                'North Carolina','North Dakota','Ohio',
                                                                'Oklahoma','Oregon','Pennsylvania',
                                                                'Rhode Island','South Carolina',
                                                                'South Dakota','Tennessee','Texas','Utah',
                                                                'Vermont','Virginia','Washington',
                                                                'West Virginia','Wisconsin','Wyoming')),
              collapsible = TRUE,
              plotOutput("lineCauses", height = 300, width = 550),
              width = 550
            )
          ),
          column(width = 6,
            box(
              title = "Density for Causes of Alcohol-Related Deaths", status = "warning", solidHeader = TRUE,
              selectInput("chooseState2", "Select a state: ", c("Alabama", "Alaska","Arizona",
                                                                "Arkansas", "California","Colorado",
                                                                "Connecticut","Delaware","Florida",
                                                                "Georgia","Hawaii","Idaho", "Illinois",
                                                                "Indiana","Iowa","Kansas","Kentucky",
                                                                "Louisiana","Maine","Maryland",
                                                                "Massachusetts","Michigan","Minnesota",
                                                                "Mississippi","Missouri",'Montana',
                                                                'Nebraska','Nevada','New Hampshire',
                                                                'New Jersey','New Mexico','New York',
                                                                'North Carolina','North Dakota','Ohio',
                                                                'Oklahoma','Oregon','Pennsylvania',
                                                                'Rhode Island','South Carolina',
                                                                'South Dakota','Tennessee','Texas','Utah',
                                                                'Vermont','Virginia','Washington',
                                                                'West Virginia','Wisconsin','Wyoming')),
              collapsible = TRUE,
              plotOutput("densityCauses", height = 300, width = 550),
              width = 550
            )
```

Server

```
######## Server ###########################################################

# Define server input and output
server <- function(input, output, session) {
  # Home page
  output$interactive_map_home <- renderPlotly({
    data <-alcoholByStateGallons
    var <- "alcoholConsumptionGallons"
    create_fresh_map(data, var)
  })
  #Second page alcohol consumption map tab box 4
  output$tabset4Selected <- renderText({
    input$tabset4
  })

  # First page alcohol consumption map
  output$usPlot <- renderPlot({
    choropleth_map(alcoholByStateGallons, "alcoholConsumptionGallons")
  })



  # First page region pie chart
  output$regionChart <- renderPlot({
    createPieChart(subsetRegion, input$category)
  })

  # First page region bar chart
  output$regionChart2 <- renderPlot({
    regionHabits(input$category8)
  })

  #Second page education status tabbox
  output$tabset1Selected <- renderText({
    input$tabset1
  })

  # Second page education status bar chart2
  output$EducationChart <- renderPlot({
    chooseSub(subsetEdu, input$category1)
  })

  # Second page education bar chart2
  output$Education2 <- renderPlot({
    eduHabits(input$category7)
  })

  #Second page Family income tab box 2
  output$tabset2Selected <- renderText({
    input$tabset2
  })
```

Results

Results & Conclusions

- For most demographics, individuals identified most with the “Current Regular” drinking habit, followed by “Lifetime Abstainer”

- As a general trend, causes of death due to excessive alcohol use have steadily increased from 1990 to 2020

RShiny App Demo