Social Dynamics Lab Project

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November 28, 2023

1 Introduction

In this research, we delve into social dynamics by exploiting a complete dataset provided by the University of Trento. The dataset at our disposal includes many columns, each of which offers a perspective on the daily activities of the people who participated in the study.

Our main investigative objective is the domain of eating habits, trying to understand what and when people choose to consume their meals.

By examining the dataset, we seek to find patterns, trends and correlations that identify the multifaceted landscape of human food choices. The temporal dimension takes on meaning as we examine not only the what but also the when, revealing the temporal rhythms that govern people's eating habits.

2 Preprocessing

Preprocessing is a crucial step in the analysis of any dataset, ensuring that the data is appropriately cleaned, filtered, and structured for meaningful insights. In this section, we outline the preprocessing steps undertaken on a dataset focused on individuals' daily activities, with a specific emphasis on meals and snacks. The analysis utilizes R libraries such as `dplyr`, `tidyr`, `ggplot2`, `gplots`, and `igraph` for data manipulation and visualization.

The preprocessing pipeline consists of several key stages:

1. Data Loading and Joining: Essential datasets, encompassing static user information and details on daily activities, are loaded and merged using a left join operation. This creates a unified dataset for comprehensive analysis.

2. Filtering Data for Analysis: The dataset is filtered to include individuals meeting specific response criteria.

3. Calculating New Timestamps: Custom functions are defined and applied to calculate new timestamps, adjusting for a daily time window from 5:00 AM to 4:30 AM of the next day. This adjustment reflects the nature of a study on daily habits, particularly eating habits.

4. Extracting Snack Dataset: A focused dataset centered around snack-related activities is extracted. Timestamps and attributes are adjusted, ensuring accuracy in capturing snack consumption details.

5. Extracting Main Meal Dataset: Another dataset is extracted, specifically focusing on main meals. Consecutive meal entries are consolidated, and labels are added to distinguish between breakfast, lunch, and dinner entries.

6. Dividing Meals: The dataset is divided based on the first and second weeks, weekdays and weekends, creating subsets that will be useful for further analysis.

7. Processing Food Data: The food data is processed for each meal category (breakfast, lunch, dinner, and snacks) using defined functions. Food categories are created based on the food pyramid, facilitating a detailed analysis of dietary habits.

The resulting datasets, refined and structured through these preprocessing stages, provide a solid basis for subsequent exploration and interpretation of the data.

2.1 Data Loading

The code begins by loading essential R libraries necessary for the analysis. The libraries cover data manipulation (`dplyr`, `tidyr`), visualization (`ggplot2`, `gplots`, `patchwork`), and network analysis (`igraph`).

```
# Load data
td_ita = read_dta("C:/Users/ricca/Documents/social_dynamics/td_ita.dta")
data4diarynew_ITA = read_dta("C:/Users/ricca/Documents/social_dynamics/
data4diarynew_ITA.dta")

# Perform left join
tdita_data4diary = left_join(td_ita, data4diarynew_ITA, by = c("id" = "userid"))
```

The dataset "td_ita" encompasses static and personal information for each user, while "data4diarynew_ITA" provides details on users' daily activities. We are consolidating these two datasets through a join operation to create a unified dataset for analysis. Additionally, we are excluding columns that are not pertinent to our study to streamline the dataset.

2.2 Filtering Data for Analysis

The next step is filtering the dataset (`tdita_data4diary`) to identify individuals suitable for analysis. The criteria for selection include:

- Limiting the date range to before November 30, 2020, at 10:30 AM
- Filtering for individuals who responded at least 16 times per day (`response_count >= 16`)
- Further filtering to include only individuals who responded everyday

The resulting set of `id`s (`selected_ids2`) is used to filter the original dataset for subsequent analysis.

```
# Filter data for analysis
filter_data <- tdita_data4diary %>%
  filter(first2w == 1 & what != 99 & what != 98) %>%
  filter(date_not < as.POSIXct("2020-11-30 11:00:00", format = "%Y-%m-%d %H:%M")) %>%
  group_by(id, DD_not) %>%
  summarize(response_count = n()) %>%
  filter(all(response_count >= 16))

id_with_18_rows <- filter_data %>%
  group_by(id) %>%
  filter(n() == 18)

selected_ids2 <- unique(id_with_18_rows$id)

tdita_data4diary <- tdita_data4diary %>%
  filter(id %in% selected_ids2 & first2w == 1 & what != 99 & what != 98 &
           date_not < as.POSIXct("2020-11-30 11:00:00", format = "%Y-%m-%d %H:%M"))
```

This code ensures that only individuals meeting the specified response criteria are included in the analysis.

2.3 Calculating New Timestamps

In this section, the code defines three functions, `calculate_new_hh_not`, `calculate_new_DD_not`, and `calculate_new_week`, to calculate new values for `hh_not`, `DD_not`, and `week` based on the specified conditions. These functions adjust timestamps to reflect a daily time window from 5:00 AM to 4:30 AM of the next day. In a study on people's daily habits, in particular on eating habits, the classic daily time windows should not be considered as they can be misleading and lead to results that do not reflect reality.

```
# Define functions to calculate new timestamps
calculate_new_hh_not <- function(hh_not) {
#...
}

calculate_new_DD_not <- function(DD_not, hh_not) {
  #...
}

calculate_new_week <- function(week, hh_not) {
  #...
}

# Apply the functions to create new timestamps
tdita_data4diary <- tdita_data4diary %>%
  mutate(
    hh_not_new = calculate_new_hh_not(hh_not),
    week_new = calculate_new_week(week, hh_not),
    DD_not_new = calculate_new_DD_not(DD_not, hh_not),
  )
```

2.4 Extracting Snack Dataset

In this section, our focus is on preprocessing a dataset that specifically centers around snack-related activities. The code is designed to filter rows relevant to snacks, and subsequently, adjust timestamps and other attributes accordingly. To achieve this, we account for instances where individuals report consuming snacks at times earlier than the recording. In such cases, additional rows are appended to the dataset, capturing the precise time and type of snack consumed.

Moreover, in situations where an individual has eaten multiple snacks within the preceding hours, only one row retains information about the specific type of food (the most recent one), while the remaining rows are marked with "no information" in terms of the snack consumed. This adjustment ensures the accuracy and clarity of our dataset, aligning it with our specific focus on snack-related activities.

```
# Filter rows related to snacks
snacks_df_filtered <- tdita_data4diary %>%
  filter(b6_2 == 1 | b6_3 == 1 | b6_4 == 1 | b6_5 == 1) %>%
  select(id, date_not, first2w, week, DD_not, hh_not, mm_not,
         what, week_new, c6_1, c6_2, c6_3, c6_4, c6_5, c6_6, c6_7, c6_8,
         c6_9, c6_10, c6_11 , c6_12, c6_13, c6_14, c6_16, c6_17,
         c6_18, c6_19, c6_20,
         c6_21, c6_22, c6_23, c6_24, c6_25, c6_26, b6_2, b6_3,
         b6_4, b6_5 )

# Define functions to adjust snack timestamps
adjust_snack_timestamps <- function(df, minutes_shift, what_value) {
  #...
}

# Apply adjustments for each snack-related column and set 'no information'
for repeated snack lines
b6_2 <- adjust_snack_timestamps(snacks_df_filtered %>% filter(b6_2 == 1), 30, 101)
b6_3 <- ...
b6_4 <- ...
b6_5 <- ...
```

2.5 Extracting Main Meal Dataset

In this section, our objective is to extract a dataset specifically centered around main meals. The code implemented involves filtering rows based on the "what" column, focusing on entries related to meals. To consolidate consecutive meal entries, we employ a function that combines two rows only if the person is still eating in the next half hour.

The final step in this process includes the addition of labels to distinguish between breakfast, lunch, and dinner entries.

```
# Extract dataset for main meals
main_meal_df <- tdita_data4diary %>%
  filter(what == 3) %>%
  select(id, date_not, first2w, week, DD_not, hh_not, mm_not,
         what, week_new, c3_1, c3_2, c3_3, c3_4, c3_6, c3_7, c3_8,
         c3_9, c3_10, c3_11 , c3_12, c3_13, c3_14, c3_15, c3_16, c3_17,
         c3_18, c3_19, c3_20)

# Combine consecutive meal entries
total_meal_df <- ...
# Combine snack and main meal datasets
total_meal_df <- bind_rows(snacks_df, main_meal_df)

# Add labels for breakfast, lunch, and dinner
total_meal_df <- total_meal_df %>%
  mutate(
    type_meal = case_when(
      what == 3 & (hh_not >= 23 | hh_not <= 11) ~ 1,
      what == 3 & (hh_not >= 12 & hh_not <= 15) ~ 2,
      what == 3 & (hh_not >= 16 & hh_not <= 22) ~ 3
      )
  )
```

2.6 Dividing Meals

In this part of code we have divided the dataset following the first week, second week, weekdays and weekends. Datasets that will be useful in the following steps.

```
# Divide meals into first and second week, weekdays, and weekends
total_meal_df_weekdays = filter(total_meal_df, (DD_not_new >= 16 & DD_not_new <= 20) |
(DD_not_new >= 23 & DD_not_new <= 27))
total_meal_df_weekend = filter(total_meal_df, (DD_not_new >= 21 & DD_not_new <= 22) |
(DD_not_new >= 28 & DD_not_new <= 29))
total_meal_df_firstweek = ...
total_meal_df_firstweek_weekdays = ...
total_meal_df_firstweek_weekend = ...
total_meal_df_secondweek = ...
total_meal_df_secondweek_weekdays = ...
total_meal_df_secondweek_weekend = ...
```

Then we process the food data and create different data frames for breakfast, lunch, dinner, and snacks. The categories d1, d2, d3, d4, d5, and d6 were created based on the food pyramid and correspond to:

- **d1:** Fruits and Vegetables
- **d2:** Bread, Pasta, Rice, Biscuits, and Potatoes
- **d3:** Junk food

- **d4:** Milk, Yogurt, and Cheese
- **d5:** Meat, Fish, Eggs, Legumes, and Cured Meats
- **d6:** Sweets

```
# Define a function to process breakfast data
process_data <- function(df) {
  df %>%
    filter(type_meal == 1) %>%
    mutate(
      d1 = c3_3 + c3_4 + c6_12 + c6_11,
      d2 = c3_1 + c3_2 + c6_4 + c6_9 + c6_10,
      d3 = c6_6 + c6_7 + c3_11 + c3_20 + c6_26,
      d4 = c3_8 + c3_9 + c6_14 + c6_13,
      d5 = c3_6 + c3_7 + c6_5 + c6_16 + c6_17,
      d6 = c3_10 + c6_1 + c6_2 + c6_3 + c6_8,
    ) %>%
    select(-matches("c3_[0-9]+|c6_[0-9]+")) %>%
    filter(d1 != 0 | d2 != 0 | d3 != 0 | d4 != 0 | d5 != 0 | d6 != 0)
}

# Process breakfast data for different subsets
food_df_breakfast <- process_data(total_meal_df)
food_df_breakfast_firstweek_weekdays <- process_data(total_meal_df_firstweek_weekdays)
food_df_breakfast_firstweek_weekend <- ...
food_df_breakfast_secondweek_weekdays <- ...
food_df_breakfast_secondweek_weekend <- ...
food_df_breakfast_weekdays <- ...
food_df_breakfast_weekend <- ...
```

We repeat the same pattern for lunch, dinner and snacks, obtaining food_df_lunch, food_df_dinner, food_df_snack and all the other combinations.

3 Eating Habits

In this part of our study, we're looking at how people distribute their eating habits over a two-week period. We want to find out the percentage of individuals who have breakfast, lunch, dinner, and snacks on both days of the two weeks. We're also interested in those who have meals on just one of the two days, and those who don't have any of these meals on either day.

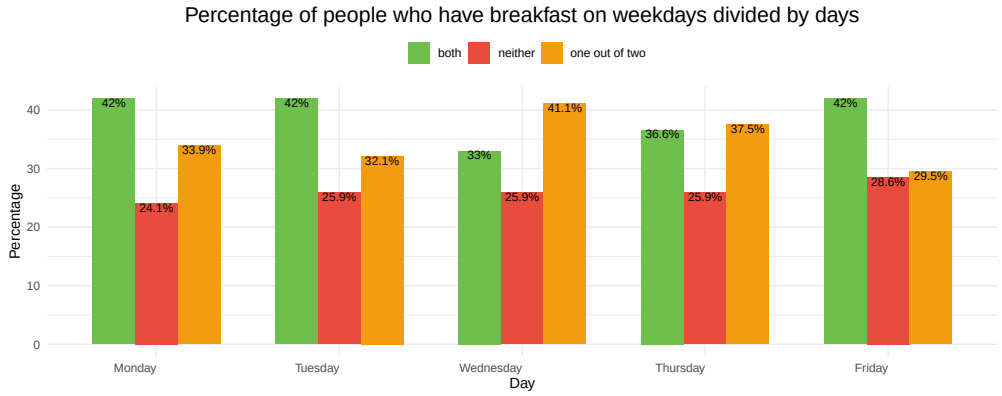
Furthermore, we're checking out how people's eating habits vary between weekdays and weekends. We're exploring the distribution of the percentage of individuals based on how often they have meals on weekdays or weekends. This helps us understand how people's eating patterns change on different days of the week.

3.1 Breakfast habits

```
# Function to create breakfast status plot
create_breakfast_status_plot <- function(data, title, weekdays = TRUE) {
    # ...
}
```

3.1.1 Breakfast Status on Weekdays

```
# Create breakfast status plots for weekdays and weekends
create_breakfast_status_plot(food_df_breakfast_weekdays,
"Percentage Breakfast Weekdays", weekdays = TRUE){
    ...
}
```

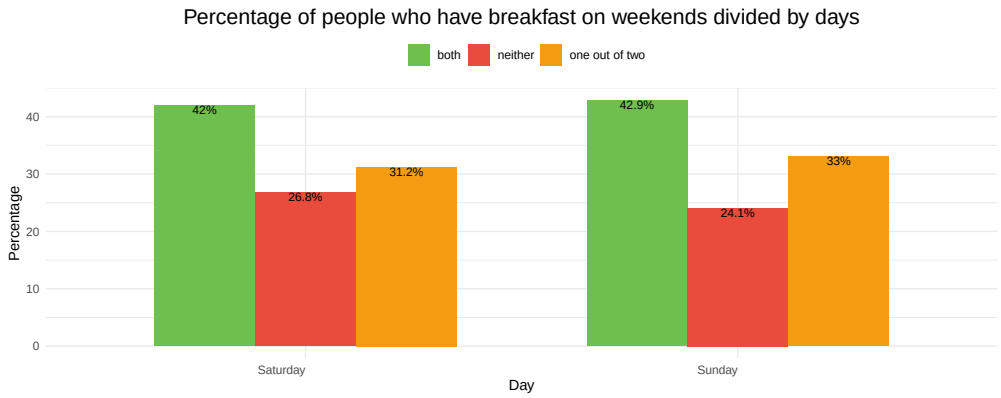


- **Regular Breakfast Eaters:** Individuals who consistently had breakfast on both Mondays, Tuesdays, etc.. throughout the two weeks. The percentage of regular breakfast eaters is notably high on Monday, Tuesday, and Friday, accounting for approximately 42.0%. This indicates a substantial number of people maintaining a consistent breakfast routine.
- **Occasional Breakfast Eaters:** This group comprises individuals who had breakfast on only one of the two days. The percentage of occasional breakfast eaters varies across the days, reaching its highest point on Wednesday at 41.1%. This suggests that a considerable number of people occasionally choose to have breakfast, possibly influenced by mid-week factors.
- **No Breakfast Habit:** Individuals falling into this category did not have breakfast on either day over the two weeks. The percentage of people with no breakfast habit is particularly notable on Friday, standing at 28.6%. This sheds light on a significant portion of the population not adhering to a breakfast routine, especially towards the end of the week.

In summary, the data suggests a diversity of breakfast habits among the surveyed population. While some individuals have a consistent daily breakfast routine, others follow an intermittent pattern, and a significant portion does not have a regular breakfast habit during the first two weeks.

3.1.2 Breakfast Status on Weekends

```
create_breakfast_status_plot(food_df_breakfast_weekend,
"Percentage Breakfast Weekend", weekdays = FALSE){
#...
}
```



- **Regular Weekend Breakfast Eaters:** These are individuals who consistently had breakfast on both weekend days (Saturday and Sunday) over the two weeks. The highest percentage of regular weekend breakfast eaters is on Sunday, reaching 42.9%. This indicates that a significant portion of the population maintains a consistent breakfast habit on weekends.
- **Occasional Weekend Breakfast Eaters:** This group comprises individuals who had breakfast on only one day. The percentage of occasional weekend breakfast eaters varies by day, with the highest percentage on Sunday at 33.0%. This suggests that a substantial number of people occasionally choose to have breakfast on the weekends.
- **No Weekend Breakfast Habit:** Individuals falling into this category did not have breakfast on either weekend day over the two weeks. The percentage of people with no weekend breakfast habit is notable on Saturday, standing at 26.8%. It appears that a significant portion of the population tends to skip breakfast on Saturdays.

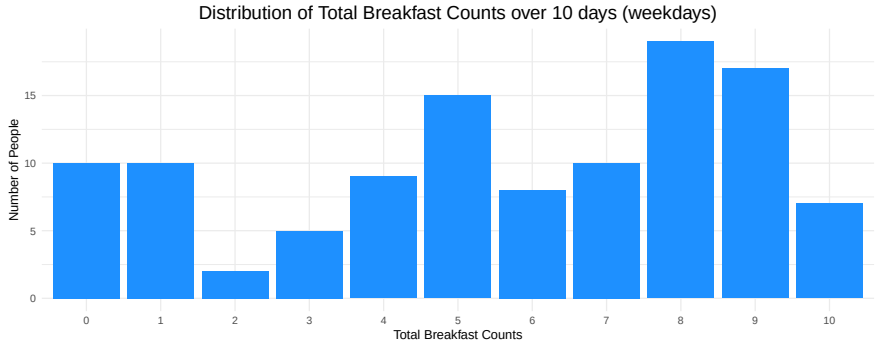
In conclusion, the analysis reveals distinct patterns in weekend breakfast consumption habits. Sunday shows a slight but more consistent pattern of breakfast consumption, while Saturday shows a higher percentage of people not having breakfast.

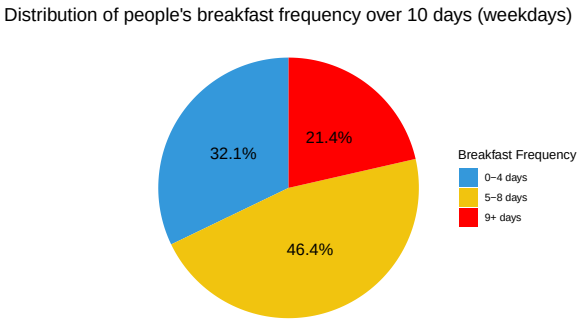
3.1.3 Total Breakfast Counts Distribution on weekdays

To visualize the distribution of breakfast counts and categorize the data, we can create specific groups based on the frequency of breakfast consumption. The following categories are defined:

- **0-4:** Individuals who have had breakfast on fewer than half of the days.
- **5-8:** Individuals who have had breakfast at least once every two days.
- **9+:** Individuals who have had breakfast practically every day.

This segmentation provides a clearer understanding of the patterns in breakfast consumption, allowing us to identify different groups of individuals based on their frequency of having breakfast. This approach makes it easier to analyze and study the various breakfast habits present in the dataset in a more detailed way.





- **0-4 Days:** Around 32.1% of people had breakfast on 0-4 days out of 10. This group includes individuals who don't have breakfast regularly, suggesting a sporadic breakfast habit.
- **5-8 Days:** A significant portion, 46.4%, had breakfast on 5-8 days. This indicates a more consistent but not daily breakfast routine. People in this category likely have a somewhat regular breakfast habit but with occasional variations.
- **9+ Days:** About 21.4% of people had breakfast on 9 or more days. This group consists of individuals who practically have breakfast every day, showing a strong and consistent breakfast habit.

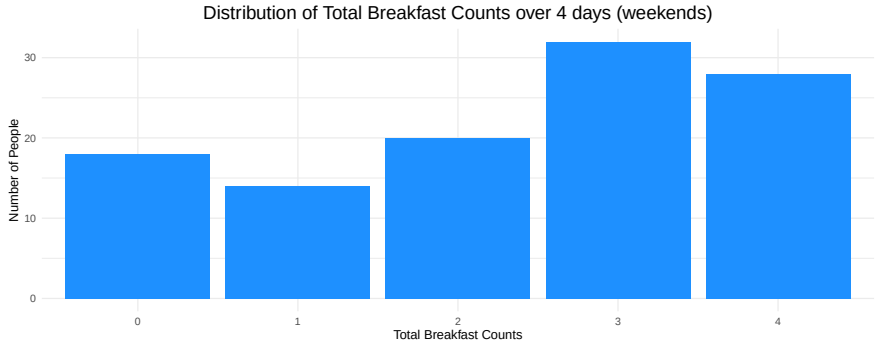
These findings provide valuable insights into the distribution of breakfast consumption patterns among the surveyed individuals, helping us understand the varied nature of their breakfast habits.

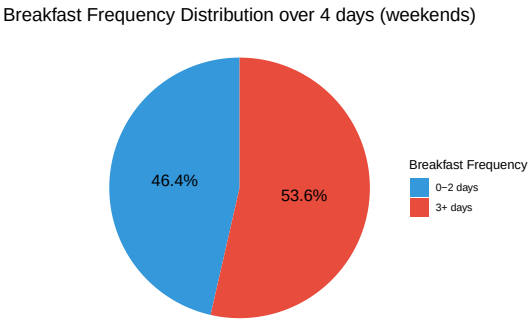
3.1.4 Total Breakfast Counts Distribution on weekends

We categorized the data into the following groups:

- **0-2:** Individuals who have had breakfast on less than half of the weekends.
- **3+:** Individuals who have had breakfast on more than half of the weekends.

This categorization allows us to distinguish between those who infrequently consume breakfast on weekends and those who do so regularly, providing perspective on weekend breakfast habits.





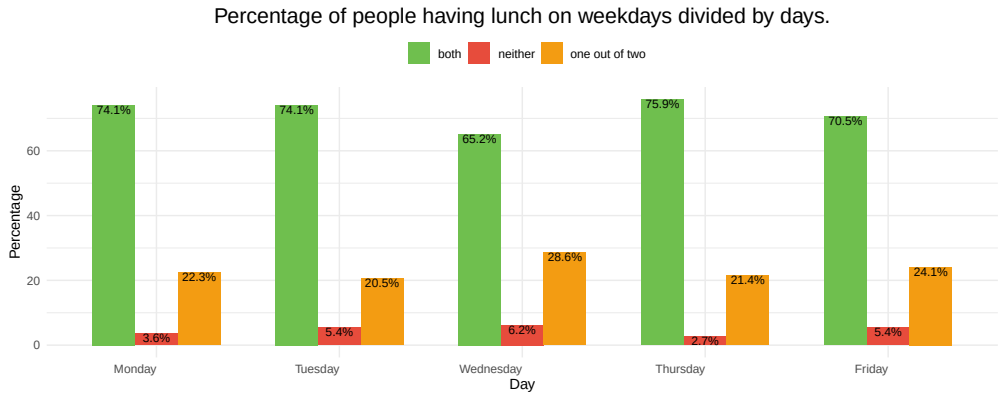
- **0-2 Days:** Approximately 46.4% of people had breakfast on 0-2 days out of 4 on weekends. This group represents individuals who infrequently consume breakfast during the weekends, indicating a less regular weekend breakfast habit.
- **3+ Days:** A majority, 53.6%, had breakfast on 3 or more days during the weekends. This suggests that a significant portion of individuals maintains a regular breakfast routine on weekends, having breakfast on more than half of the days.

3.2 Lunch Habits

```
create_lunch_status_plot <- function(data, title, weekdays = TRUE) {
# ...
}
```

3.2.1 Lunch Status on Weekdays

```
create_lunch_status_plot(food_df_lunch_weekdays,
"Percentage Lunch Weekdays", weekdays = TRUE){
#...
}
```



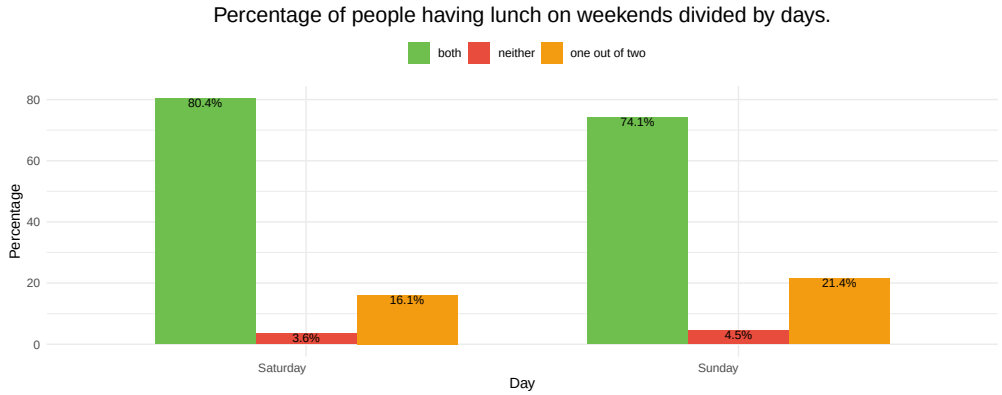
- **Consistent Lunch Eaters:** On Monday, Tuesday and Thursday seem to have relatively high percentages of consistent lunch eaters, with 74.1%, 74.1% and 75.9% of people having lunch on both days, respectively.
- **Intermittent Lunch Eaters:** Some people eat lunch only on one of the two days. The highest percentage for this is 28.6% on Wednesday, and it varies for other days.

- **No Lunch Habit:** Again Wednesday has the highest percentage, 6.25% of people don't have lunch in both Wednesday.

In summary, while Monday, Tuesday, and Thursday show a trend of consistent lunch habits, Wednesday exhibits a different dynamic, with both the highest percentage of intermittent lunch eaters and individuals abstaining from lunch.

3.2.2 Lunch Status on Weekends

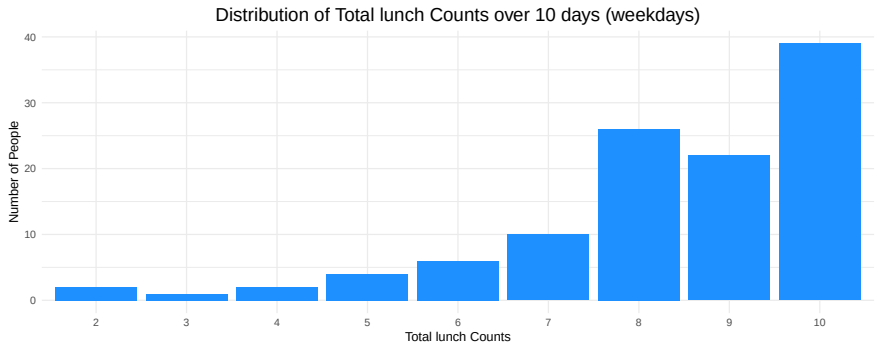
```
create_lunch_status_plot(food_df_lunch_weekend,
"Percentage Lunch Weekend", weekdays = FALSE){
#...
}
```



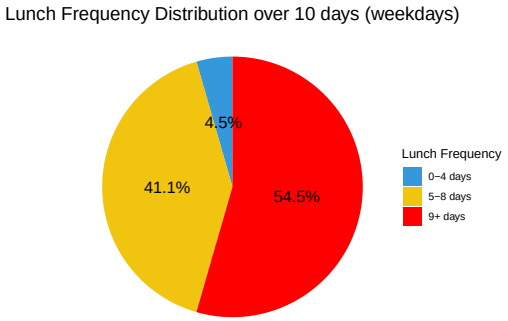
- **Consistent Lunch Eaters:** On the weekend, Saturday exhibits a high percentage of consistent lunch eaters, with 80.4% of people having lunch on both days.
- **Intermittent Lunch Eaters:** The category "One out of two" on Saturday and Sunday suggests individuals who eat lunch on only one of the two weekend days. The highest percentage is recorded on Sunday at 21.4%.
- **No Lunch Habit:** The percentage of people not having lunch is relatively low on both days, with the highest being 4.46% on Sunday.

The weekend lunch habits show a high consistency on Saturday, with a significant percentage of individuals having lunch on both weekend days. Sunday, on the other hand, demonstrates a higher variability, with a notable proportion of people having lunch on only one of the two days. The percentages of individuals abstaining from lunch on the weekend are relatively low.

3.2.3 Total Lunch Counts Distribution on weekdays

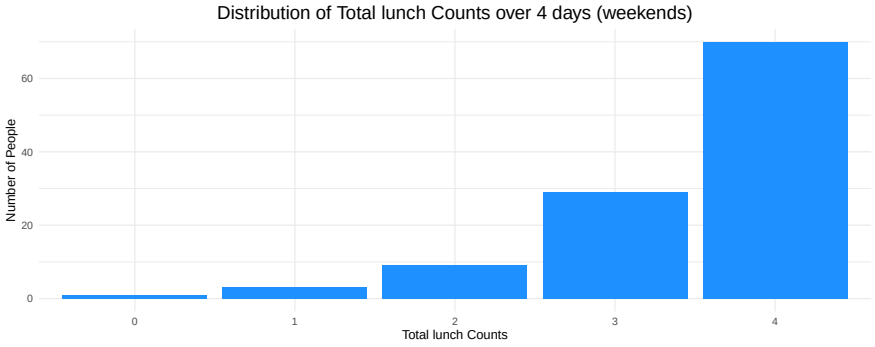


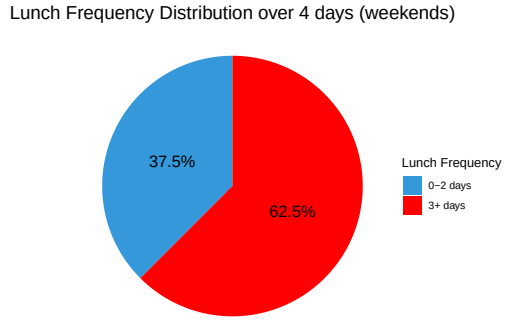
We have created the following categories:



- **0-4 Days:** About 4.46% of people had lunch only on 0-4 days out of 10. This suggests a small group having lunch sporadically, less than half of the weekdays.
- **5-8 Days:** A significant portion, 41.1%, includes people who had lunch on 5-8 days. This means a large group has a moderate and regular lunch routine, eating at least once every two days.
- **9+ Days:** Around 54.5% of individuals had lunch on 9 or more days, showing that most people have a strong and consistent habit of having lunch practically every day.

3.2.4 Total Lunch Counts Distribution on weekends





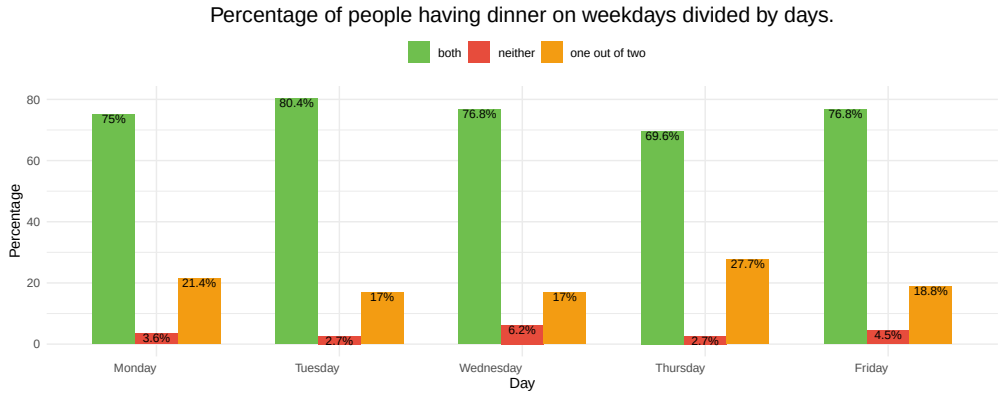
- **0-2 Days:** Around 37.5% of people had lunch only on 0-2 days out of 4 on weekends. This shows a group of individuals who don't often have lunch during the weekends.
- **3+ Days:** The majority, 62.5%, had lunch on 3 or more days during the weekends. This majority represents individuals who regularly have lunch on weekends, eating on more than half of the days.

3.3 Dinner Habits

```
create_dinner_status_plot <- function(data, title, weekdays = TRUE) {
  # ...
}
```

3.3.1 Dinner Status on weekdays

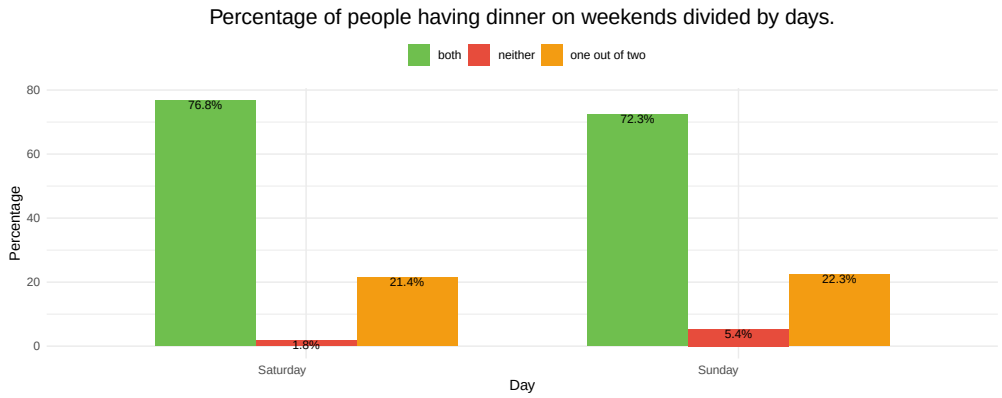
```
create_dinner_status_plot(food_df_dinner_weekdays,
"Percentage Dinner Weekdays", weekdays = TRUE){
#...
}
```



- **Consistent Dinner Eaters:** Days with a high percentage of "both" (eating dinner on both days of the two week) can be considered as consistent dinner days. For instance, Tuesday, Wednesday, and Friday have relatively high percentages for "both" (80.4%, 76.8%, and 76.8% respectively).
- **Intermittent Dinner Eaters:** Days with a significant percentage of "one out of two" suggest intermittent dining habits, where people eat dinner on one day but not the other. Thursday stands out with a substantial percentage of "one out of two" (27.7%).
- **No Dinner Habit:** Days with a high percentage of "neither" indicate that a significant portion of people did not eat dinner on those days. Wednesday seems to be a day when a considerable number of people do not have the habit of having dinner, with a relatively high percentage of "neither" (6.2%).

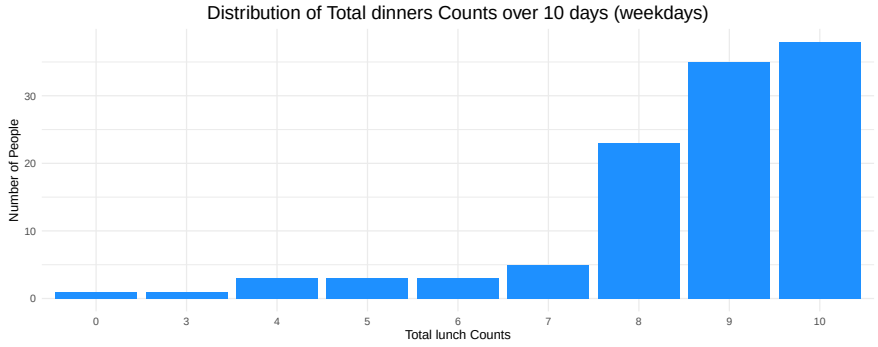
3.3.2 Dinner Status on Weekends

```
create_dinner_status_plot(food_df_dinner_weekend,
"Percentage Dinner Weekend", weekdays = FALSE){
#...
}
```

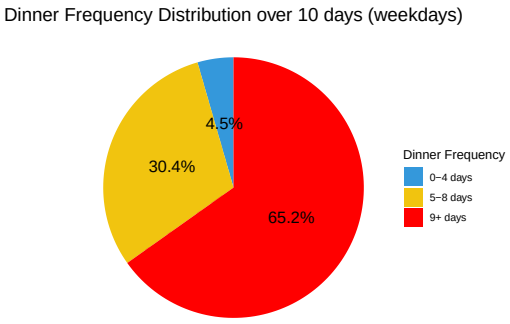


- **Consistent Lunch Eaters:** Saturday has a relatively high percentage for "both" (76.8%).
- **Intermittent Lunch Eaters:** Sunday stands out with a substantial percentage of "one out of two" (22.3%).
- **No Lunch Habit:** Saturday has a relatively low percentage of "neither" (1.79%).

3.3.3 Total Dinner Counts Distribution on weekdays



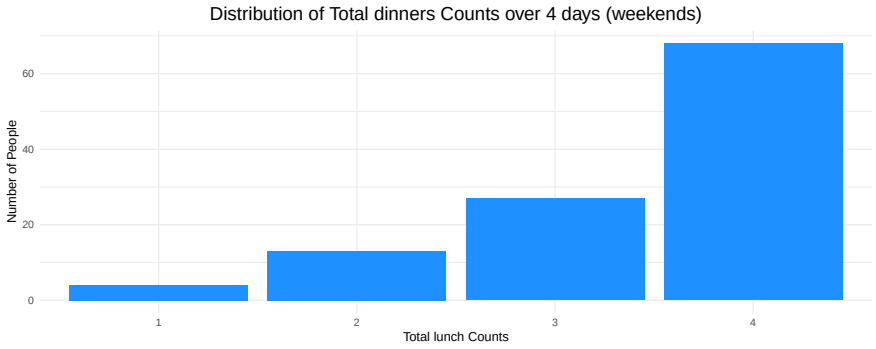
We have created the following categories:

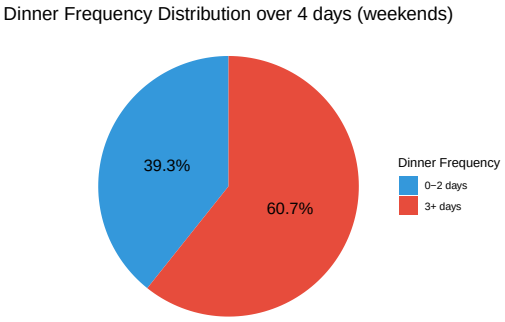


- **0-4 Days:** About 4.5% of people had dinner only on 0-4 days out of 10. This indicates a minority that occasionally has dinner, less than half of the weekdays.
- **5-8 Days:** A significant portion, 30.4%, had dinner on 5-8 days. This suggests a sizable group with a moderate and regular dinner routine, eating at least once every two days.

- **9+ Days:** Around 65.2% of individuals had dinner on 9 or more days. This majority represents individuals who practically have dinner every day, showing a robust and regular dinner habit.

3.3.4 Total Dinner Counts Distribution on weekends



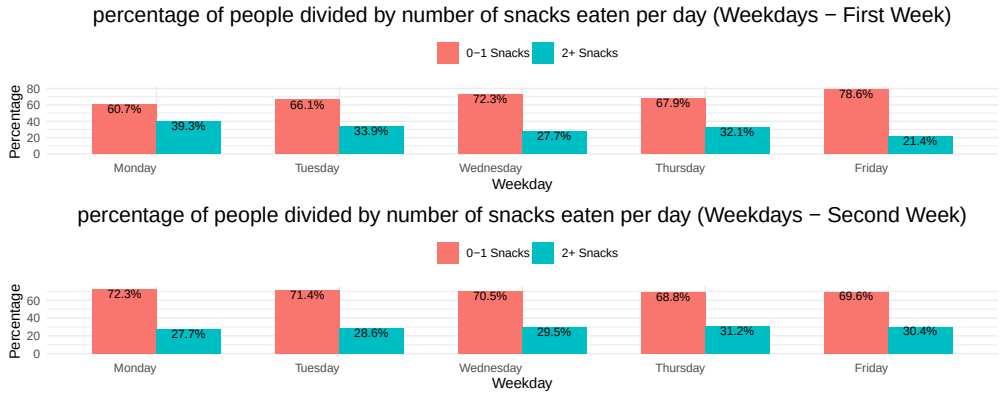


- **0-2 Days:** Roughly 39.3% of individuals had dinner on 0-2 days out of 4 on weekends, indicating a subgroup that tends to have dinner infrequently during the weekends, possibly less than half of the time.
- **3+ Days:** The majority, accounting for 60.7%, had dinner on 3 or more days during the weekends. This majority represents individuals with a consistent dinner routine on weekends, having dinner on more than half of the days.

3.4 Snack Status

In this part, we look into how people eat snacks over two weeks, considering weekdays and weekends in the first and second weeks. We're interested in figuring out how many snacks individuals eat each day. We're separating people into two groups: those who eat 0-1 snacks and those who eat 2 or more snacks daily. This helps us understand how snack habits vary on different days of the week and between the two weeks of the study.

3.4.1 Snack Status on Weekdays

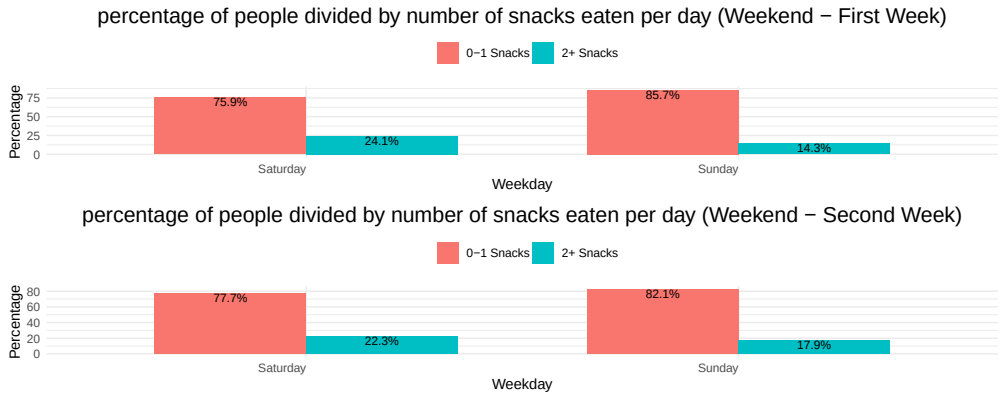


In the first week, most people consistently chose to eat 0 or 1 snacks instead of 2 or more each day. This means many prefer a moderate snacking approach during the weekdays, ranging from 60.7% on Monday to 78.6% on Friday.

Moving to the second week, the trend stays quite similar. People generally still prefer 0-1 snacks. The percentages vary within a similar range, with a noticeable change after Thursday. There, the percentage of those having 0-1 snacks drops to 68.8%, suggesting a slight increase in the preference for more snacks after that day.

To sum up, both weeks show a liking for a moderate snacking pattern, with some changes in the percentages, possibly influenced by daily routines or external factors.

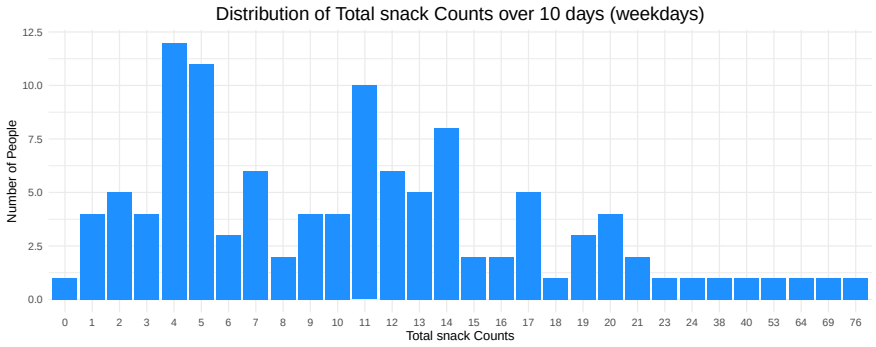
3.4.2 Snack Status on Weekends



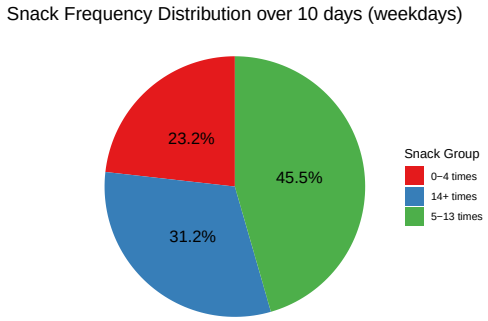
On weekends, people seem to follow a pattern similar to weekdays, preferring to have 0-1 snacks. During the first weekend, especially on Sunday, there's a notable peak, with 85.7% of individuals choosing 0-1 snacks. This suggests a strong preference for fewer snacks during leisure time.

The trend continues in the second weekend, with most people still favoring 0-1 snacks. Although the percentage drops slightly on Sunday compared to the previous week, the preference for fewer snacks remains evident at 82.1%.

3.4.3 Total Snack Counts Distribution on weekdays

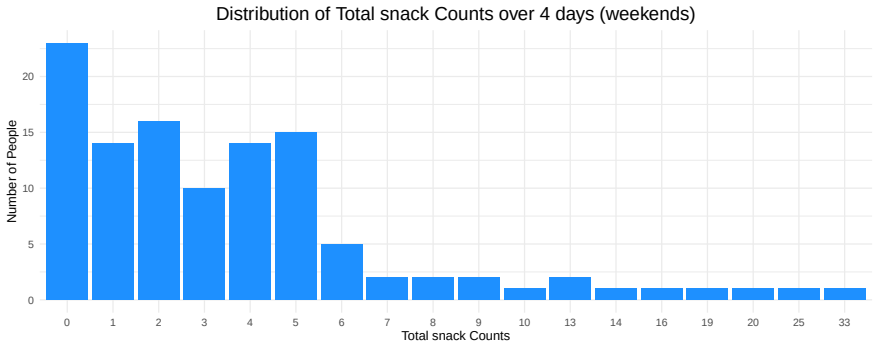


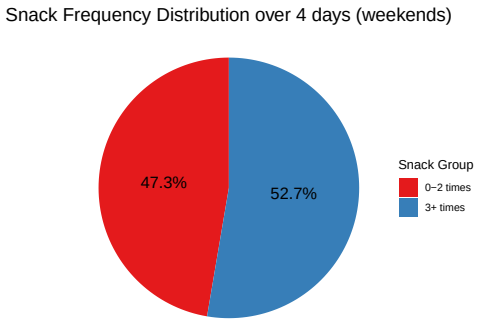
We have created the following categories using first and third quartiles:



- **0-4 Times:** Approximately 23.2% of the surveyed population demonstrated a mindful and controlled snacking habit, opting for snacks between 0 to 4 times.
- **5-13 Times:** Almost half of those interviewed (45.5%) showed a balanced approach to snacking, eating between 5 and 13 times. This suggests a moderate and varied snacking pattern.
- **14+ Times:** About 31.2% of participants displayed a more indulgent snacking behavior, eating snacks more than 14 times. This subset of the population appears to have a propensity for more frequent snacking, indicating a preference for a diverse range of snacks throughout the designated periods.

3.4.4 Total Snack Counts Distribution on weekends





- **0-2 Times:** Almost half of the surveyed individuals (47.3%) opted for a restrained snacking routine, indulging in snacks between 0 to 2 times out of 4 days on weekends.
- **3+ Times:** The majority, comprising 52.7% of the participants, leaned towards a more frequent snacking pattern, eating snacks 3 times or more out of the 4 total days. This suggests a prevailing propensity to snack more on weekends.

4 Dietary Patterns

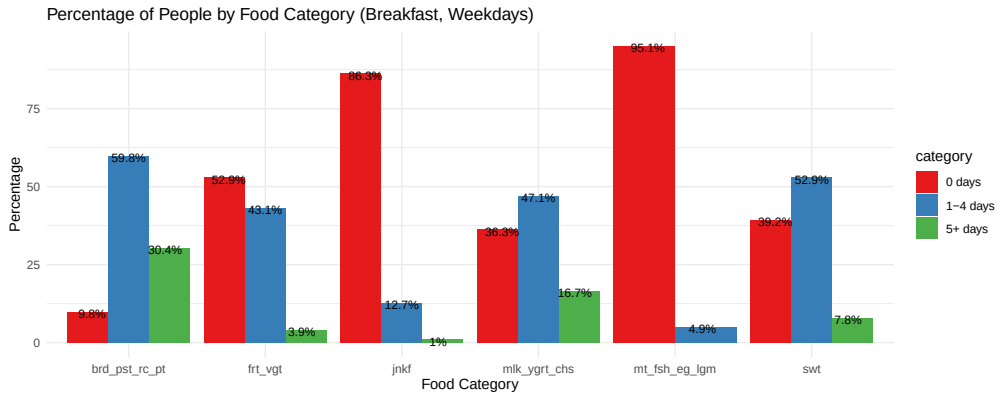
This section explores the patterns of breakfast, lunch, dinner, and snack choices on both weekdays and weekends. By looking at the percentage distribution of different food categories, our goal is to understand the varied choices people make in their everyday meals.

4.1 Breakfast Patterns Analysis

The analysis of breakfast patterns on weekdays and weekends reveal insights into individuals' choices. The following plots showcase the percentage of people by food category.

4.1.1 Breakfast Patterns on Weekdays

Studying what people eat for breakfast on weekdays gives us insight into their food choices during the workweek. The following graphs and comments help us understand how popular different types of foods are by showing us the different breakfast habits of the people we interviewed.



Here are some observations:

more than 50% of people do not eat fruit for breakfast on weekdays, on the other hand there is a small percentage (under 4%) who eat it more than half of the days. The majority of people (almost 60% eat carbohydrates about once every two days) up to 30% who eat it more than 5 days. Regarding junk food,

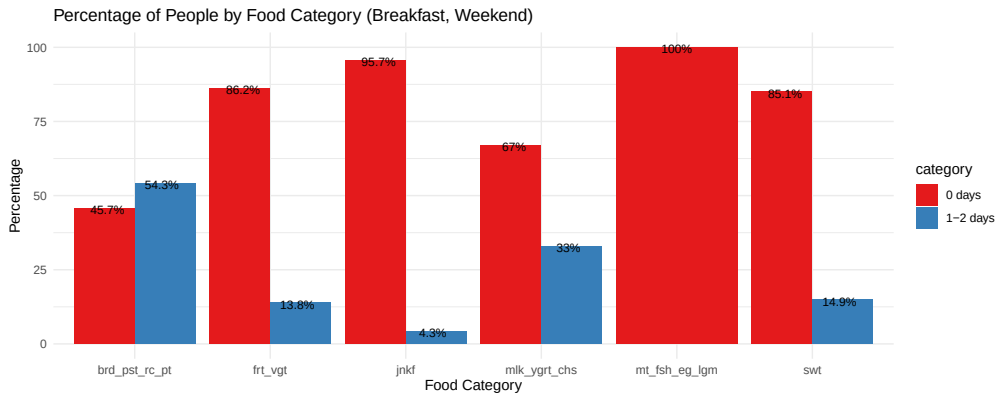
there are 1% who eat it often but practically all of them (86%) never eat junk food for breakfast. For sweets the data is more balanced (39% - 52% - 8%) while for proteins 95% do not eat them for breakfast.

These results provide a comprehensive view of the diversity in breakfast choices during weekdays. The percentages offer insights into the prevalence of different food categories among the surveyed individuals.

It is interesting to note that people have a range of dietary preferences. Some go for healthier options like fruits and vegetables, while others sometimes treat themselves to sweets and junk food. This mix shows how people's individual tastes and nutritional habits play a role in what they choose to eat for breakfast.

4.1.2 Breakfast Patterns on Weekends

Looking at how people have breakfast on weekends shows us another side of their dietary preferences, revealing what they choose during their free days. The percentages shown in the plots help us get a full picture of the different types of foods people go for when they might not be as rushed. Let's take a closer look at the observations to discover the details of how people choose their breakfast on weekends.



1. **frt_vgt (Fruits and Vegetables):**
   - **0 days:** 86.17% of individuals did not consume fruits and vegetables during the weekends.
   - **1-2 days:** 13.83% included fruits and vegetables in their breakfast on 1-2 days.
2. **brd_pst_rc_pt (Bread, Pasta, Rice, and Potatoes):**
   - **0 days:** 45.74% did not have bread, pasta, rice, and potatoes during the weekends.
   - **1-2 days:** The majority (54.26%) consumed these items on 1-2 days.
3. **jnkf (Junk Food):**
   - **0 days:** 95.74% did not consume junk food during the weekends.
   - **1-2 days:** A very small percentage (4.26%) indulged in junk food on 1-2 days.
4. **mlk_ygrt_chs (Milk, Yogurt, and Cheese):**
   - **0 days:** 67.02% of individuals did not consume milk, yogurt, and cheese on weekends.
   - **1-2 days:** 32.98% had these dairy products on 1-2 days.
5. **mt_fsh_eg_lgm (Meat, Fish, Eggs, and Legumes):**
   - **0 days:** 100.00% did not include meat, fish, eggs, or legumes in their weekend breakfast.
6. **swt (Sweets):**
   - **0 days:** 85.11% of individuals did not have sweets for breakfast during weekends.
   - **1-2 days:** 14.89% consumed sweets on 1-2 days.

These results give us a close look at how people choose their breakfasts on weekends, showing a wide range of preferences. The percentages help us understand how often people opt for different types of foods during this time.

In particular, the results highlight a general trend towards less healthy choices compared to weekdays. Despite this, most people seem to avoid junk food and prefer to include fruit and vegetables in breakfast.

4.1.3 Conclusions

In conclusion, analysis of weekday and weekend breakfast habits reveals distinct dietary preferences among individuals. On weekdays, 52.94% of individuals did not consume fruits and vegetables, while on weekends 86.17%.

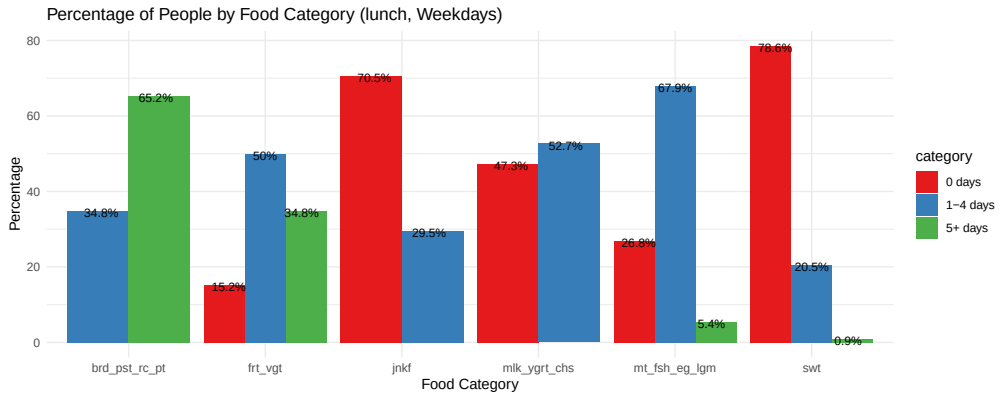
As regards bread, pasta, rice and potatoes, 9.80% did not consume these foods on weekdays, while 45.74% abstained on weekends. On weekdays, the majority (59.80%) consumed them for 1-4 days, while on weekends, 54.26% consumed them for 1-2 days.

Practically no one included Meat, Fish, Eggs and Legumes in their weekend breakfast (100.00%), reflecting the trend on weekdays (95.10%).

In general, the analysis highlights a trend towards healthier choices both on weekdays and on weekends (a little less on weekends), the avoidance of junk food and a limited consumption of sweets.

4.2 Lunch Patterns Analysis

4.2.1 Lunch Patterns on Weekdays



The corresponding data for weekdays is summarized below:

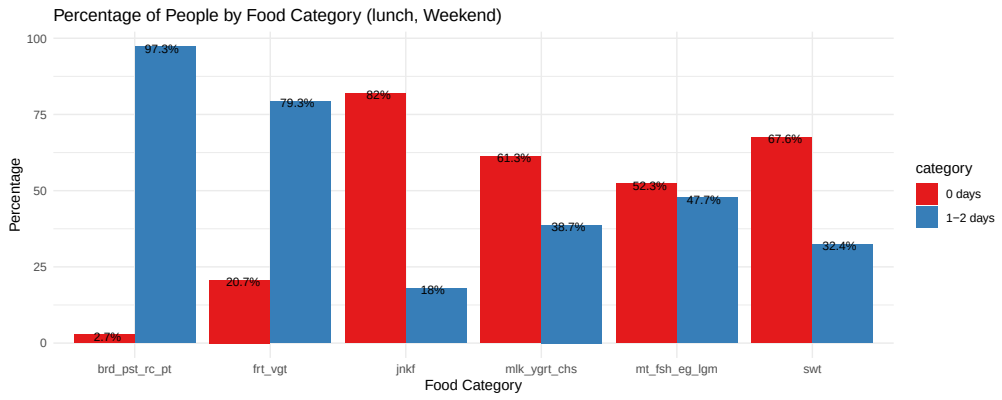
1. **Fruits and Vegetables (frt_vgt):**
   - Approximately 15.18% of individuals did not include fruits and vegetables in their weekday lunches.
   - The majority (50.00%) had fruits and vegetables on 1-4 days, while 34.82% consumed them 5 or more days.
2. **Bread, Pasta, Rice, and Potatoes (brd_pst_rc_pt):**
   - About 34.82% refrained from consuming these items during weekday lunches.
   - The majority (65.18%) had bread, pasta, rice, and potatoes on 1-4 days.
3. **Junk Food (jnkf):**
   - The majority (70.54%) did not include junk food in their weekday lunches.
   - A smaller percentage (29.46%) indulged in junk food on 1-4 days.
4. **Milk, Yogurt, and Cheese (mlk_ygrt_chs):**

- Almost half (47.32%) did not consume milk, yogurt, and cheese during weekday lunches.
- An almost equal percentage (52.68%) had these dairy products on 1-4 days.

5. **Meat, Fish, Eggs, and Legumes (mt_fsh_eg_lgm):**
   - The majority (78.57%) did not include meat, fish, eggs, and legumes in their weekday lunches.
   - A significant percentage (67.86%) had these items on 1-4 days, and 5.36% included them on 5 or more days.
6. **Sweets (swt):**
   - Approximately 26.79% did not have sweets during weekday lunches.
   - A smaller percentage (20.54%) consumed sweets on 1-4 days, and a minimal percentage (0.89%) had them on 5 or more days.

While a substantial portion of the surveyed population tends to avoid certain food groups like junk food and sweets, there is variability in the frequency of consumption for other categories such as fruits and vegetables, bread and related items, and dairy products.

4.2.2 Lunch Patterns on Weekends



1. **Fruits and Vegetables (frt_vgt):**
   - The percentage distribution indicates a significant preference for fruits and vegetables in at least one day in the weekends, with 79.28%.
2. **Bread, Pasta, and Rice (brd_pst_rc_pt):**
   - The count and percentage in 0 days are relatively low compared to the 1-2 days category (2% against 98%).
3. **Junk Food (jnkf):**
   - The distribution of junk food is not balanced between 0 days and 1-2 days, with 81.98% in 0 days and 18.02% in 1-2 days.
4. **Milk, Yogurt, and Cheese (mlk_ygrt_chs):**
   - This category is more balanced, but the majority of people do not eat diary product at lunch (61.26%).
5. **Meat, Fish, and Eggs (mt_fsh_eg_lgm):**
   - The distribution for this category is relatively balanced between 0 days and 1-2 days.

6. **Sweets (swt):**

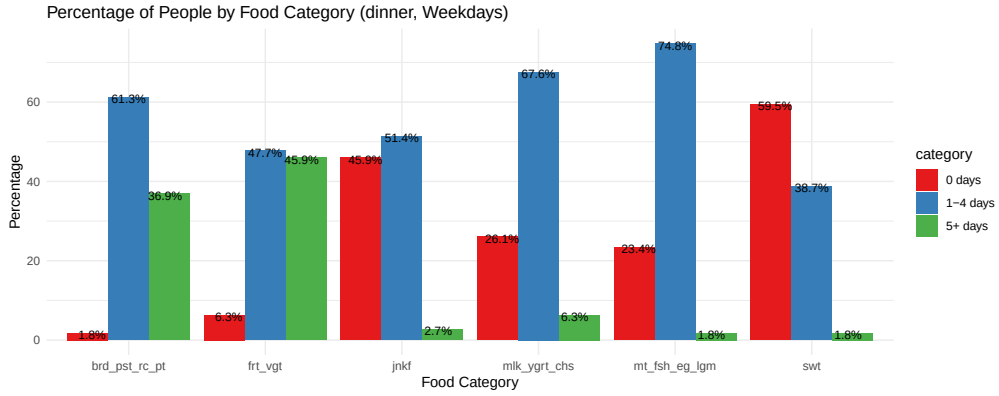
   - Sweets are more commonly not consumed compared to 1-2 days, with a percentage of 67.57% in 0 days and 32.43% in 1-2 days.

4.2.3 Conclusions

Comparing weekday and weekend lunch patterns, it becomes evident that: Individuals tend to include more diverse food categories during weekends. There is a higher prevalence of fruits and vegetables and protein sources on weekdays compared to weekends. Junk food and sweets are consumed more frequently on weekends. These findings suggest that weekday and weekend lunch patterns are distinct, likely influenced by factors such as time constraints, work schedules, and lifestyle preferences.

4.3 Dinner Patterns Analysis

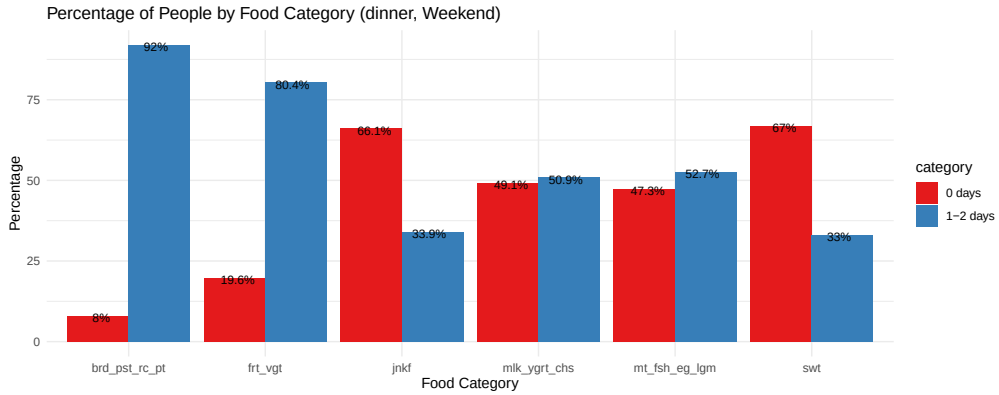
4.3.1 Dinner Patterns on Weekdays



When it comes to weekday dinners, we can observe from the plot that there is a significant preference for fruits and vegetables. About 47% consume them 1 to 4 days a week, while 45% consume them more than 5 days a week.

As expected, a substantial percentage of people (26%) do not eat dairy, and over 70% of individuals have protein for dinner approximately once every two days. It's worth noting a small percentage of people who indulge in junk food and sweets most days (2.7% and 1.8% respectively).

4.3.2 Dinner Patterns on Weekends



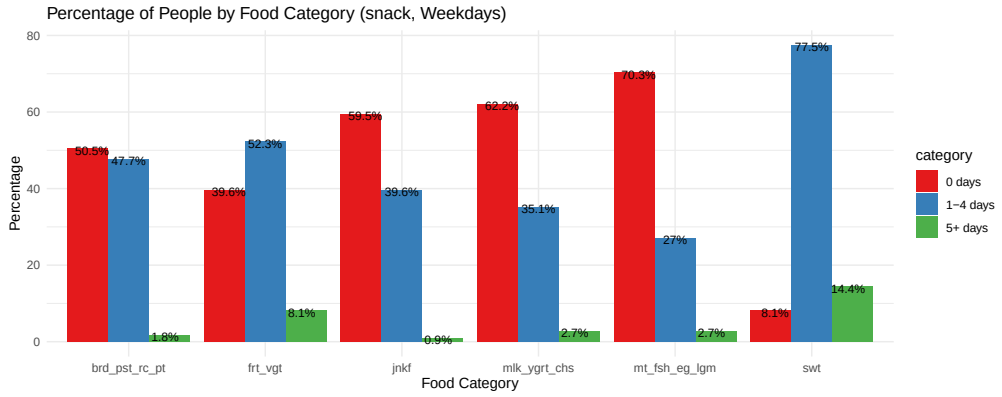
During weekend dinners, the number of people consuming fruit increases, reaching 80.5% of individuals eating fruit for 1-2 days. The dairy consumption pattern is balanced, with 49.1% of the population not having dairy for dinner, while 50.9% include it at least once. The same pattern applies to proteins. As expected, there is an increase in the percentages of people indulging in sweets and junk food at least once, indicating that individuals tend to treat themselves to a cheat meal during the weekends.

4.3.3 Conclusions

Weekday and weekend eating patterns exhibit notable differences. Weekdays generally involve a more consistent and diverse consumption of food items, with a regular inclusion of fruits, vegetables, and protein sources. In contrast, weekends show a decrease in the consumption of certain categories, like protein sources, while there is an increase in the consumption of sweets and junk food.

4.4 Snack Patterns Analysis

4.4.1 Snack Patterns on Weekdays



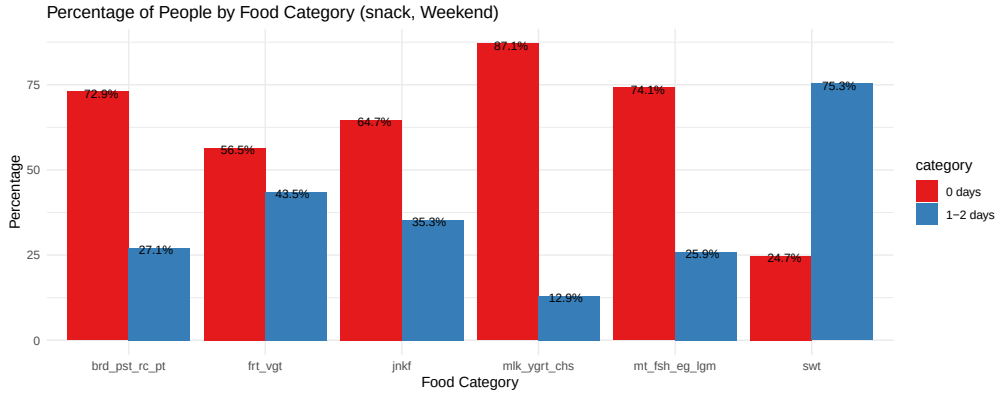
- **Fruits and Vegetables (frt_vgt):**
  - Almost 40% of individuals opted not to include fruits and vegetables in their weekday snacks.
  - The majority (52.25%) demonstrated a moderate but regular incorporation, with fruits and vegetables consumed on 1-4 days.
  - A smaller, yet notable, percentage (8.11%) consistently included fruits and vegetables in their snacks for 5 or more days.
- **Bread, Pasta, Rice, and Potatoes (brd_pst_rc_pt):**
  - Close to half (50.45%) refrained from consuming staple items as snacks during weekdays.
  - A significant portion (47.75%) had these staples on 1-4 days, indicating a common inclusion in snack routines.
  - Only a minimal percentage (1.80%) consistently included them in snacks for 5 or more days.
- **Junk Food (jnkf):**
  - Junk food appears less prevalent in weekday snacks, with 59.5% not including it.
  - A considerable portion (39.64%) indulged in junk food on 1-4 days, while only a minimal percentage (0.90%) had it on 5 or more days.
- **Milk, Yogurt, and Cheese (mlk_ygrt_chs):**
  - The majority (62.16%) did not consume dairy products in their weekday snacks.

- About 35.14% had these dairy products on 1-4 days, and a small fraction (2.70%) included them on 5 or more days.

- **Meat, Fish, Eggs, and Legumes (mt_fsh_eg_lgm):**
  - A significant percentage (70.27%) did not include protein sources in their weekday snacks.
  - About 27.03% had these items on 1-4 days, and a minimal percentage (2.70%) included them on 5 or more days.

- **Sweets (swt):**
  - Sweets are relatively common in weekday snacks, with 77.48% consuming them on 1-4 days.
  - A smaller percentage (14.41%) had sweets consistently in their snacks for 5 or more days.

4.4.2 Snack Patterns on Weekends



The data reveals that a majority (56.47%) of individuals choose not to include fruits and vegetables in their weekend snacks, while about 43.53% sporadically incorporate these items on 1-2 days, suggesting an intermittent consumption pattern.

When it comes to staple items like bread, pasta, rice, and potatoes, a significant percentage (72.94%) avoids including them in weekend snacks. However, approximately 27.06% incorporate these items on 1-2 days, indicating a less frequent but still present inclusion in weekend snacks.

Junk food is less common in weekend snacks, with 64.71% refraining from including it. Nevertheless, a notable portion (35.29%) indulges in junk food on 1-2 days.

The majority (87.06%) avoids dairy products, including milk, yogurt, and cheese, in weekend snacks. A small fraction (12.94%) includes these dairy items on 1-2 days.

When it comes to protein sources such as meat, fish, eggs, and legumes, a significant percentage (74.12%) does not include them in weekend snacks. However, about 25.88% includes these protein sources on 1-2 days.

Sweets exhibit a different pattern, being more prevalent in weekend snacks. Approximately 75.29% consume sweets on 1-2 days, while a smaller percentage (24.71%) refrains from including sweets in weekend snacks.

4.4.3 Conclusions

In general, there aren't significant differences between snacks consumed on weekdays and those on the weekend. However, overall, it can be observed that while people tend to opt for healthier options with balanced diets comprising fruits, vegetables, carbohydrates, and proteins for main meals, they also lean towards sweets and junk food for quicker snacks.

5 Food Analysis: Gender-Department-Degree Distribution

In this section, we explore the percentage of gender, department, and degree groups among different frequencies of breakfast, lunch, dinner and snack. The investigation is not limited to a presentation of percentages but extends to the application of statistical tools, specifically Pearson's Chi-squared tests. This test serve as a robust method to understand the association between these variables and meal groupings.

5.1 Gender Distribution

In this analysis, we explore the gender distribution within different meal groups (breakfast, lunch, dinner, and snacks) on both weekdays and weekends. The tables provide the percentage distribution of males and females across various frequency categories. Additionally, Pearson's Chi-squared tests are conducted to assess the association between gender and meal groupings.

5.1.1 Gender Distribution of Breakfast Groups

The tables present the gender distribution for breakfast groups categorized by the frequency of consumption on weekdays and weekends.

Gender	0-4 days	5-8 days	9+ days
Male	0.378	0.422	0.2
Female	0.288	0.5	0.212

Table 1: Summary of Breakfast Groups by gender on Weekdays

Gender	0-2 days	3+ days
Male	0.358	0.179
Female	0.273	0.25

Table 2: Summary of Breakfast Groups by gender on Weekend

The Chi-squared test is performed to examine the association between gender (`w1_A01`) and breakfast groups:

```
Pearson's Chi-squared test
data:  groups_gender_bf_weekdays[, c("w1_A01", "0-4 days", "5-8 days", "9+ days")]
X-squared = 0.15874, df = 3, p-value = 0.984

Pearson's Chi-squared test
data:  groups_gender_bf_weekend[, c("w1_A01", "0-2 days", "3+ days")]
X-squared = 0.15157, df = 2, p-value = 0.92
```

The results indicate a p-value of 0.92 and 0.984, suggesting no significant association between gender and breakfast groups.

5.1.2 Gender Distribution of Lunch Groups

Similarly, gender distribution within lunch groups is examined.

Gender	0-4 days	5-8 days	9+ days
Male	0.0222	0.356	0.622
Female	0.0606	0.439	0.5

Table 3: Summary of Lunch Groups by gender on Weekdays

Gender	0-2 days	3+ days
Male	0.333	0.667
Female	0.409	0.591

Table 4: Summary of Lunch Groups by gender on Weekend

The Chi-squared test is performed to examine the association between gender (`w1_A01`) and lunch groups:

```
Pearson's Chi-squared test
data:  groups_gender_lc_weekdays[, c("w1_A01", "0-4 days", "5-8 days", "9+ days")]
X-squared = 0.18049, df = 3, p-value = 0.9807

Pearson's Chi-squared test
data:  groups_gender_lc_weekend[, c("w1_A01", "0-2 days", "3+ days")]
X-squared = 0.1517, df = 2, p-value = 0.927
```

The results indicate a p-value of 0.927 and 0.9807, suggesting no significant association between gender and lunch groups.

5.1.3 Gender Distribution of Dinner Groups

The gender distribution in dinner groups is analyzed.

Gender	0-4 days	5-8 days	9+ days
Male	0.0889	0.333	0.578
Female	0.0152	0.273	0.712

Table 5: Summary of Dinner Groups by gender on Weekdays

Gender	0-2 days	3+ days
Male	0.422	0.578
Female	0.379	0.621

Table 6: Summary of Dinner Groups by gender on Weekend

The Chi-squared test is performed to examine the association between gender and dinner groups:

```
Pearson's Chi-squared test
data:  groups_gender_dn_weekdays[, c("w1_A01", "0-4 days", "5-8 days", "9+ days")]
X-squared = 0.21421, df = 3, p-value = 0.9753

Pearson's Chi-squared test
data:  groups_gender_dn_weekend[, c("w1_A01", "0-2 days", "3+ days")]
X-squared = 0.14298, df = 2, p-value = 0.931
```

The results indicate a p-value of 0.931 and 0.9753, suggesting no significant association between gender and dinner groups.

5.1.4 Gender Distribution of Snack Groups

Finally, the gender distribution in snack groups is explored.

Gender	0-4 times	5-13 times	14+ times
Male	0.356	0.4	0.244
Female	0.152	0.5	0.348

Table 7: Summary of Snack Groups by gender on Weekdays

Gender	0-2 times	3+ times
Male	0.622	0.378
Female	0.379	0.621

Table 8: Summary of Snack Groups by gender on Weekend

The Chi-squared test is performed to examine the association between gender and snack groups:

```
Pearson's Chi-squared test
data:  groups_gender_sn_weekdays[, c("w1_A01", "0-4 times", "5-13 times", "14+ times")]
X-squared = 0.255, df = 3, p-value = 0.9683

Pearson's Chi-squared test
data:  groups_gender_sn_weekend[, c("w1_A01", "0-2 times", "3+ times")]
X-squared = 0.26235, df = 2, p-value = 0.8771
```

The results indicate a p-value of 0.8771 and 0.9683, suggesting no significant association between gender and snack groups.

5.2 Department Distribution

In this analysis, we explore the department distribution within different meal groups (breakfast, lunch, dinner, and snacks) on both weekdays and weekends. The data is presented in tables that summarize the proportion of students from each department participating in different meal groups. Additionally, Chi-squared tests are conducted to assess the association between departments and meal group frequency.

5.2.1 Department Distribution of Breakfast Groups

Department	0-4 days	5-8 days	9+ days
Business/Economics	0.4	0.4	0.2
International Relations and Public Admin	0	0.5	0.5
Law	0.235	0.529	0.235
Engineering and Applied Sciences	0.286	0.571	0.143
Social Sciences	0.429	0.429	0.143
Natural Sciences	0.368	0.368	0.263
Humanities	0.4	0.4	0.2
Medicine and Veterinary Medicine	0	0.5	0.5

Table 9: Summary of Breakfast Groups by Department on Weekdays

Department	0-2 days	3+ days
Business/Economics	0.4	0.6
International Relations and Public Admin	0.5	0.5
Law	0.529	0.471
Engineering and Applied Sciences	0.429	0.571
Social Sciences	0.667	0.333
Natural Sciences	0.368	0.632
Humanities	0.6	0.4
Medicine and Veterinary Medicine	0	1

Table 10: Summary of Breakfast Groups by Department on Weekends

The Chi-squared test is performed to examine the association between department and breakfast groups:

```
Pearson's Chi-squared test
data:  groups_department_bf_weekdays[, c("department", "0-4 days", "5-8 days", "9+ days")]
X-squared = 4.4905, df = 21, p-value = 0.9999

Pearson's Chi-squared test
data:  groups_department_bf_weekend[, c("department", "0-2 days", "3+ days")]
X-squared = 3.5312, df = 14, p-value = 0.9977
```

The results indicate a p-value of 0.9977 and 0.9999, suggesting no significant association between department and breakfast groups.

5.2.2 Department Distribution of Lunch Groups

Department	**0-4 days**	**5-8 days**	**9+ days**
Business/Economics	0	0	0
International Relations and Public Admin	0	0.5	0.5
Law	0.118	0.353	0.529
Engineering and Applied Sciences	0.0714	0.464	0.464
Social Sciences	0.0476	0.333	0.619
Natural Sciences	0	0.316	0.684
Humanities	0	0.4	0.6
Medicine and Veterinary Medicine	0	0.5	0.5

Table 11: Summary of Lunch Groups by Department on Weekdays

Department	**0-2 days**	**3+ days**
Business/Economics	0.333	0.667
International Relations and Public Admin	0.5	0.5
Law	0.294	0.706
Engineering and Applied Sciences	0.429	0.571
Social Sciences	0.286	0.714
Natural Sciences	0.421	0.579
Humanities	0.6	0.4
Medicine and Veterinary Medicine	0.5	0.5

Table 12: Summary of Lunch Groups by Department on Weekends

The Chi-squared test is performed to examine the association between department and lunch groups:

```
Pearson's Chi-squared test
data:  groups_department_lc_weekdays[, c("department", "0-4 days", "5-8 days", "9+ days")]
X-squared = 3.6224, df = 21, p-value = 1

Pearson's Chi-squared test
data:  groups_department_lc_weekend[, c("department", "0-2 days", "3+ days")]
X-squared = 3.1126, df = 14, p-value = 0.9989
```

The results indicate a p-value of 0.9989 and 1, suggesting no significant association between department and lunch groups.

5.2.3 Department Distribution of Dinner Groups

Department	0-4 days	5-8 days	9+ days
Business/Economics	0	0.4	0.6
International Relations and Public Admin	0	0.5	0.5
Law	0.118	0.176	0.706
Engineering and Applied Sciences	0.0714	0.393	0.536
Social Sciences	0.0476	0.19	0.762
Natural Sciences	0	0.211	0.789
Humanities	0	0.4	0.6
Medicine and Veterinary Medicine	0	0.5	0.5

Table 13: Summary of Dinner Groups by Department on Weekdays

Department	0-2 days	3+ days
Business/Economics	0.4	0.6
International Relations and Public Admin	0	1
Law	0.353	0.647
Engineering and Applied Sciences	0.464	0.536
Social Sciences	0.286	0.714
Natural Sciences	0.421	0.579
Humanities	0.4	0.6
Medicine and Veterinary Medicine	0.75	0.25

Table 14: Summary of Dinner Groups by Department on Weekends

The Chi-squared test is performed to examine the association between department and dinner groups:

```
Pearson's Chi-squared test
data:  groups_department_dn_weekdays[, c("department", "0-4 days", "5-8 days", "9+ days")]
X-squared = 3.9365, df = 21, p-value = 1

Pearson's Chi-squared test
data:  groups_department_dn_weekend[, c("department", "0-2 days", "3+ days")]
X-squared = 4.2778, df = 14, p-value = 0.9935
```

The results indicate a p-value of 0.9935 and 1, suggesting no significant association between department and dinner groups.

5.2.4 Department Distribution of Snack Groups

Department	0-4 times	5-13 times	14+ times
Business/Economics	0.267	0.2	0.533
International Relations and Public Admin	0	1	0
Law	0.353	0.471	0.176
Engineering and Applied Sciences	0.321	0.393	0.286
Social Sciences	0.143	0.476	0.381
Natural Sciences	0.105	0.632	0.263
Humanities	0	0.8	0.2
Medicine and Veterinary Medicine	0.5	0.25	0.25

Table 15: Summary of Snack Groups by Department on Weekdays

Department	0-2 times	3+ times
Business/Economics	0.267	0.733
International Relations and Public Admin	0	1
Law	0.471	0.529
Engineering and Applied Sciences	0.607	0.393
Social Sciences	0.429	0.571
Natural Sciences	0.526	0.474
Humanities	0.4	0.6
Medicine and Veterinary Medicine	0.75	0.25

Table 16: Summary of Snack Groups by Department on Weekends

The Chi-squared test is performed to examine the association between department and snack groups:

```
Pearson's Chi-squared test
data:  groups_department_sn_weekdays[, c("department", "0-4 times", "5-13 times", "14+ times")]
X-squared = 6.7813, df = 21, p-value = 0.9985
```

```
Pearson's Chi-squared test
data:  groups_department_sn_weekend[, c("department", "0-2 times", "3+ times")]
X-squared = 4.8547, df = 14, p-value = 0.9877
```

The results indicate a p-value of 0.9877 and 0.9985, suggesting no significant association between department and snack groups.

5.3 Degree Distribution

In this section, we explore the degree distribution within different meal groups on both weekdays and weekends. The data is presented in tables that summarize the proportion of students from each degree participating in different meal groups. Additionally, Chi-squared tests are conducted to assess the association between degree and meal group frequency.

5.3.1 Degree Distribution of Breakfast Groups

Degree	0-4 days	5-8 days	9+ days
BSc	0.358	0.463	0.179
MSc	0.273	0.477	0.25

Table 17: Summary of Breakfast Groups by Degree on Weekdays

Degree	0-2 days	3+ days
BSc	0.493	0.507
MSc	0.432	0.568

Table 18: Summary of Breakfast Groups by Degree on Weekends

The Chi-squared test is carried out to investigate the association between degree and breakfast groups:

```
Pearson's Chi-squared test
data:  groups_degree_bf_weekdays[, c("degree", "0-4 days", "5-8 days", "9+ days")]
X-squared = 0.16339, df = 3, p-value = 0.9833
```

```
Pearson's Chi-squared test

data:  groups_degree_bf_weekend[, c("degree", "0-2 days", "3+ days")]
X-squared = 0.14661, df = 2, p-value = 0.9293
```

The results indicate a p-value of 0.9293 and 0.9833, suggesting no significant association between degree and breakfast groups.

5.3.2 Degree Distribution of Lunch Groups

Degree	0-4 days	5-8 days	9+ days
BSc	0.0448	0.313	0.642
MSc	0.0455	0.545	0.409

Table 19: Summary of Lunch Groups by Degree on Weekdays

Degree	0-2 days	3+ days
BSc	0.373	0.627
MSc	0.386	0.614

Table 20: Summary of Lunch Groups by Degree on Weekends

The Chi-squared test is performed to examine the association between degree and lunch groups:

```
Pearson's Chi-squared test
data:  groups_degree_lc_weekdays[, c("degree", "0-4 days", "5-8 days", "9+ days")]
X-squared = 0.25786, df = 3, p-value = 0.9677

Pearson's Chi-squared test
data:  groups_degree_lc_weekend[, c("degree", "0-2 days", "3+ days")]
X-squared = 0.13928, df = 2, p-value = 0.9327
```

The results indicate a p-value of 0.9327 and 0.9677, suggesting no significant association between degree and lunch groups.

5.3.3 Degree Distribution of Dinner Groups

Degree	0-4 days	5-8 days	9+ days
BSc	0.0597	0.299	0.642
MSc	0.0227	0.295	0.682

Table 21: Summary of Dinner Groups by Degree on Weekdays

Degree	0-2 days	3+ days
BSc	0.388	0.612
MSc	0.409	0.591

Table 22: Summary of Dinner Groups by Degree on Weekends

The Chi-squared test is performed to examine the association between degree and dinner groups:

```
Pearson's Chi-squared test
data:  groups_degree_dn_weekdays[, c("degree", "0-4 days", "5-8 days", "9+ days")]
X-squared = 0.15744, df = 3, p-value = 0.9841

Pearson's Chi-squared test
data:  groups_degree_dn_weekend[, c("degree", "0-2 days", "3+ days")]
X-squared = 0.13985, df = 2, p-value = 0.9325
```

The results indicate a p-value of 0.9325 and 0.9841, suggesting no significant association between degree and dinner groups.

5.3.4 Degree Distribution of Snack Groups

Degree	0-4 times	5-13 times	14+ times
BSc	0.164	0.522	0.313
MSc	0.341	0.364	0.295

Table 23: Summary of Snack Groups by Degree on Weekdays

Degree	0-2 times	3+ times
BSc	0.493	0.507
MSc	0.455	0.545

Table 24: Summary of Snack Groups by Degree on Weekends

The Chi-squared test is performed to examine the association between degree and snack groups:

```
Pearson's Chi-squared test
data:  groups_degree_sn_weekdays[, c("degree", "0-4 times", "5-13 times", "14+ times")]
X-squared = 0.23349, df = 3, p-value = 0.972

Pearson's Chi-squared test

data:  groups_degree_sn_weekend[, c("degree", "0-2 times", "3+ times")]
X-squared = 0.1419, df = 2, p-value = 0.9315
```

The results indicate a p-value of 0.9315 and 0.972, suggesting no significant association between degree and snack groups.

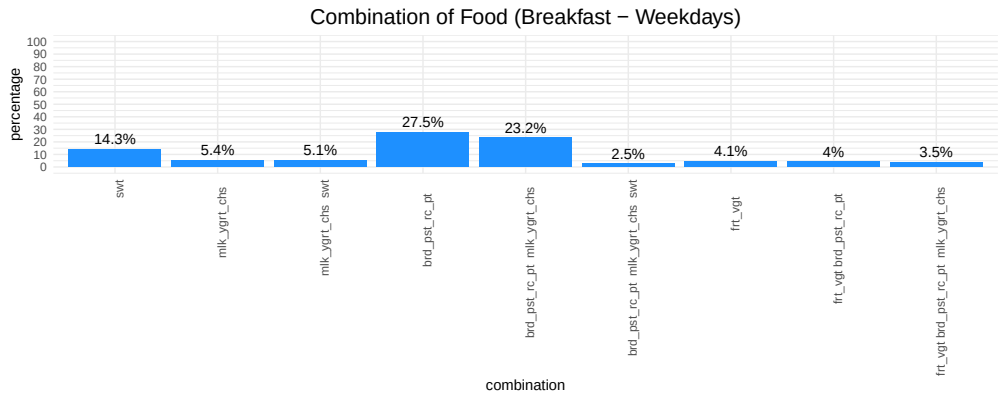
6 Combination of Food

This section investigates the combination of foods consumed during different meals: breakfast, lunch, dinner, and snacks. The analysis explores the preferences in food combinations on both weekdays and weekends, providing insights into the diverse dietary choices.

6.1 Breakfast Analysis: Combination of Food

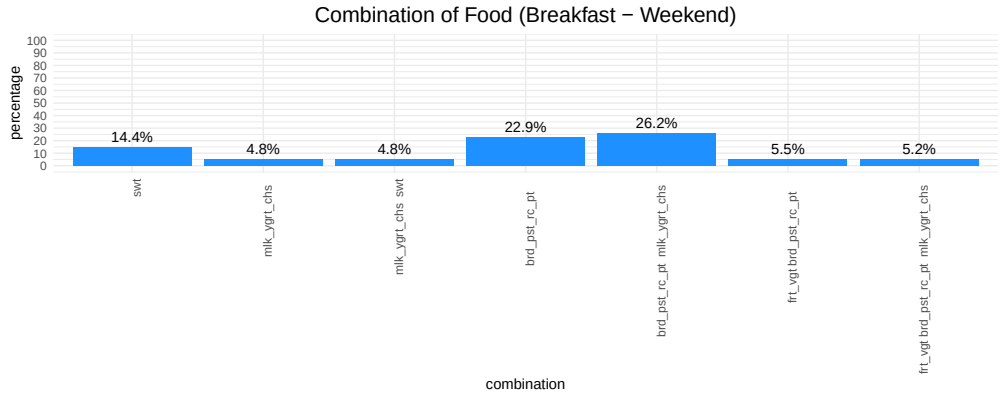
Focusing on breakfast choices, this section takes a closer look at the combinations of foods people consume on both weekdays and weekends. Through visual plots, we aim to show the percentage of food combinations, providing a breakdown of participants' breakfast preferences. These visual representations help capture the variety and prevalence of specific food pairings, offering a more comprehensive understanding of how people structure their breakfasts during different days of the week.

6.1.1 Combination of Food (Breakfast - Weekdays)



The chart above shows the percentage distribution of various food combinations during weekday breakfasts. The most common choice, making up over 27%, is carbohydrates alone, indicating that many people base their weekday breakfasts on carbohydrates. The second most popular combination is carbohydrates with dairy, accounting for 23.2%. More intricate and less common combinations, like including dairy products, carbohydrates, and sweets, follow with a representation of 2.5%. This breakdown offers insights into the prevalent breakfast choices and the diversity of combinations during weekdays.

6.1.2 Combination of Food (Breakfast - Weekends)

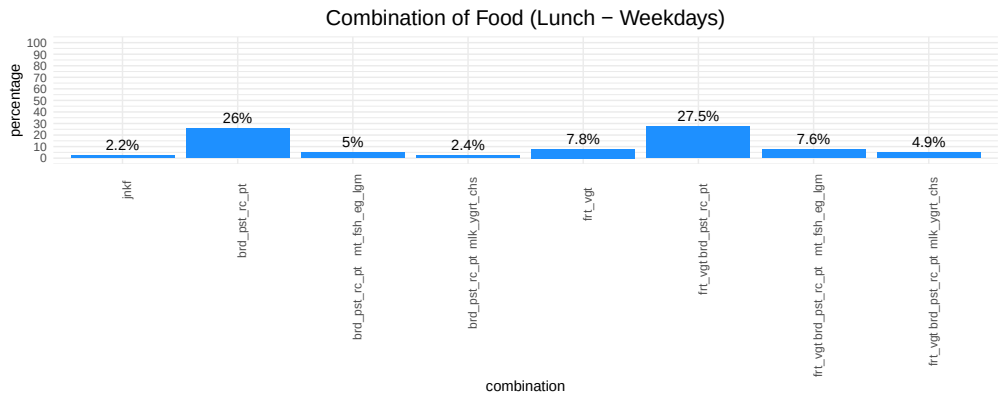


- **Prominent Combination:** The combination "brd_pst_rc_pt mlk_ygrt_chs" is the most prevalent choice, constituting 26.2% of weekend breakfasts. This suggests a preference for a combination the carbohydrate and dairy products, a more complex breakfast with respect weekdays.
- **Variety in Preferences:** Similar to weekdays, individuals display diverse preferences during weekends. The presence of sweet items ("swt") in 14.4% of breakfasts indicates a liking for sugary options.
- **Complex Combinations Remain:** Some individuals opt for more complex combinations, including multiple food groups. For example, fruit, dairy products and carbohydrate is chosen by 5.17% of individuals, reflecting a desire for a diverse and balanced breakfast.

6.2 Lunch Analysis: Combination of Food

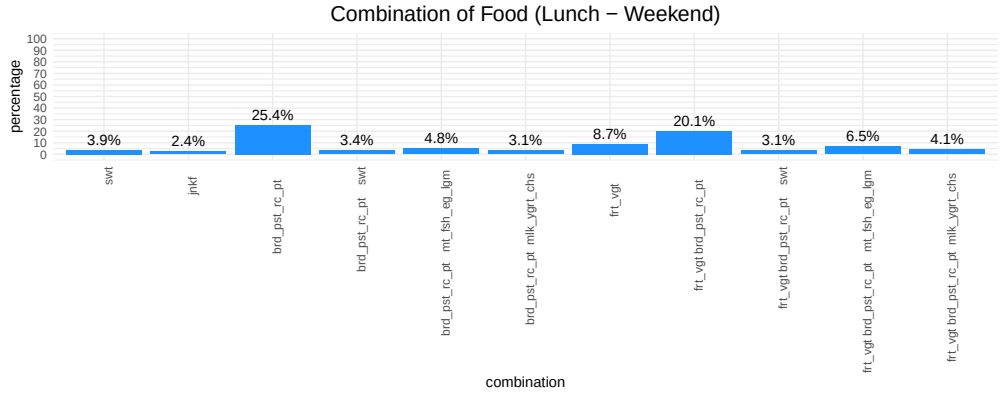
Focusing on lunchtime habits, this analysis explores the combinations of foods chosen by individuals on both weekdays and weekends. Plots illustrate the distribution of food combinations, shedding light on the prevalent choices and variations in dietary preferences during lunch.

6.2.1 Combination of Food (Lunch - Weekdays)



We note that at lunchtime, the most commonly used food category is carbohydrates (26%), but these are often flanked by fruit and vegetables (27%). Surprisingly, proteins from meat, fish and legumes are not so present (5% with carbohydrates and 7.6% with carbohydrates and fruit/vegetables) as well as dairy products. The least present category is junk food (2.2%).

6.2.2 Combination of Food (Lunch - Weekends)

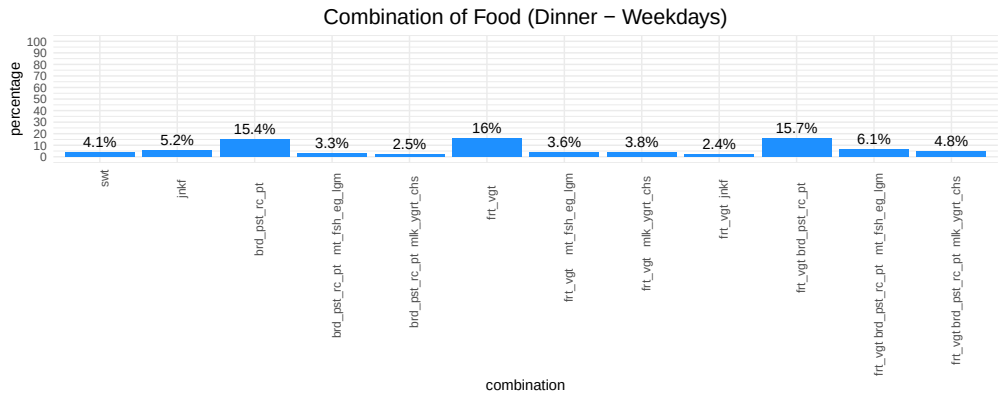


- **Prominent Combination:** Carbohydrates, as always, takes the lead during weekend lunches, constituting 25.4% of choices.
- **Variety in Preferences:** Similar to weekdays, individuals display diverse preferences during weekends. Combinations involving carbohydrates and fruit/vegetables indicate a liking for fruit and vegetable-based options.
- **Sweet Options Emerge:** The presence of combinations like sweets and carbohydrates (3.4%) suggests an increased inclination towards sweet items during weekend lunches.
- **Complex Combinations Remain:** Some individuals continue to opt for more complex combinations, including multiple food groups. For example, "frt_vgt brd_pst_rc_pt mlk_ygrt_chs" is chosen by 4.12% of individuals, reflecting a desire for a diverse and balanced lunch.

6.3 Dinner Analysis: Combination of Food

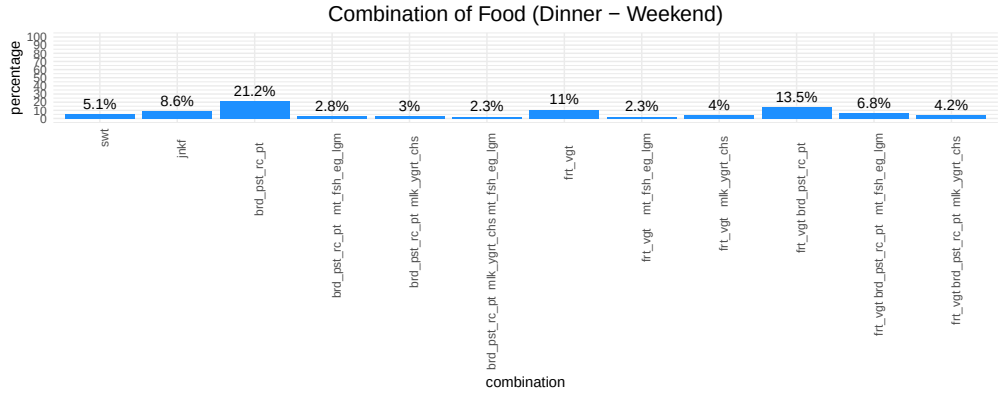
Dinner choices are investigated in this section, with an emphasis on the combinations of foods consumed during weekdays and weekends. The plots show the distribution of different food combinations, highlighting patterns and variations in dinner preferences among participants.

6.3.1 Combination of Food (Dinner - Weekdays)



For dinners, the combinations appear to be more balanced, with no clear predominance. Fruits alone slightly outnumber the combination of fruit and carbohydrates or carbohydrates alone (16% - 15.7% - 15.4%). Additionally, there's a slight increase in the percentage for junk food, reaching 5.2%. This suggests a more varied distribution of dinner combinations.

6.3.2 Combination of Food (Dinner - Weekends)

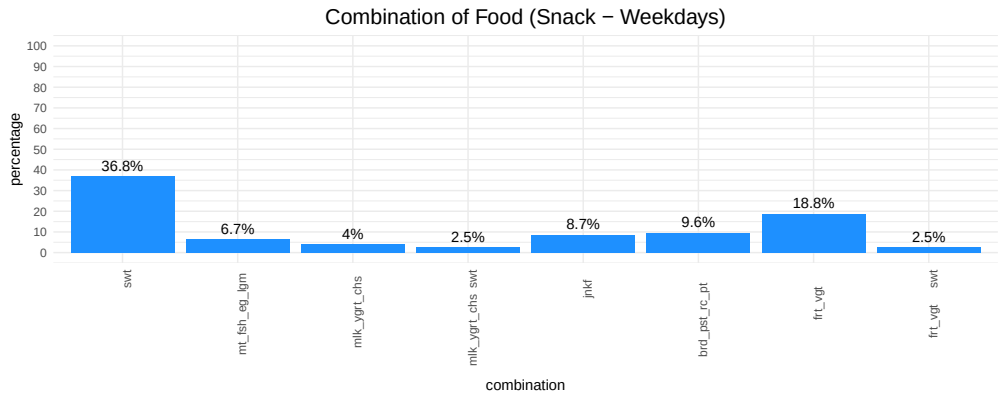


Carbohydrates again predominate with 21%. This is followed by fruit and carbohydrates as usual and junk food continues to increase (8.6%). Also to be noted are more complex combinations such as fruit/vegetables carbohydrates and protein, which although a low percentage make up a part of them (6.8%).

6.4 Snack Analysis: Combination of Food

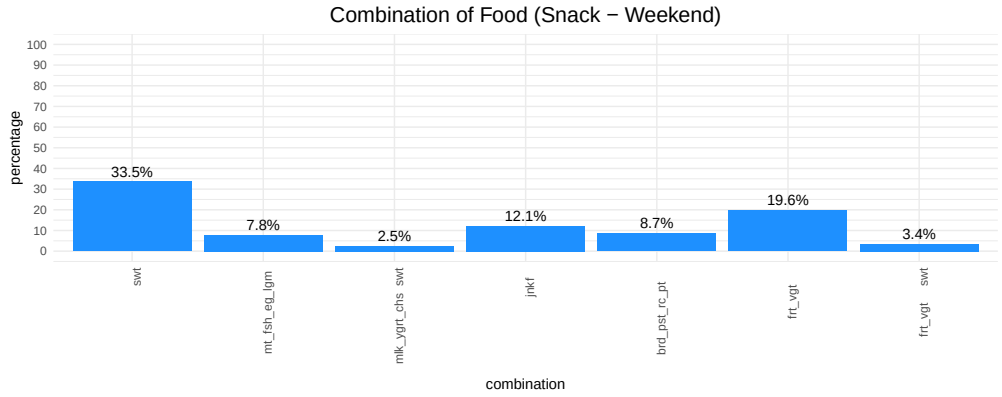
This section zooms in on snack preferences, examining the combinations of foods chosen for snacking on both weekdays and weekends.

6.4.1 Combination of Food (Snack - Weekdays)



In snacks we have a completely different pattern. The snacks that are favoured are sweets with over 35%. This is followed by fruit and vegetables (18.8%). Food combinations are rare as the snack is interpreted as something quick and simple as opposed to a main meal.

6.4.2 Combination of Food (Snack - Weekends)



During the weekend, for snacks, we have practically the same pattern as during the weekdays. There are no particular differences, so what we said before also applies here.

7 Association Rules Analysis

In this section, we delve into the combination of foods consumed during different meals, examining patterns and preferences on both weekdays and weekends. Association rules help us understand the relationships between different food items and can provide insights into common dietary patterns.

7.1 Association Rules for Breakfast

The following section explores association rules related to breakfast consumption, shedding light on interesting patterns and relationships between various food groups, both on weekdays and weekends.

7.1.1 Association Rules for Breakfast (Weekdays)

Here are some association rules for breakfast on weekdays along with relevant metrics:

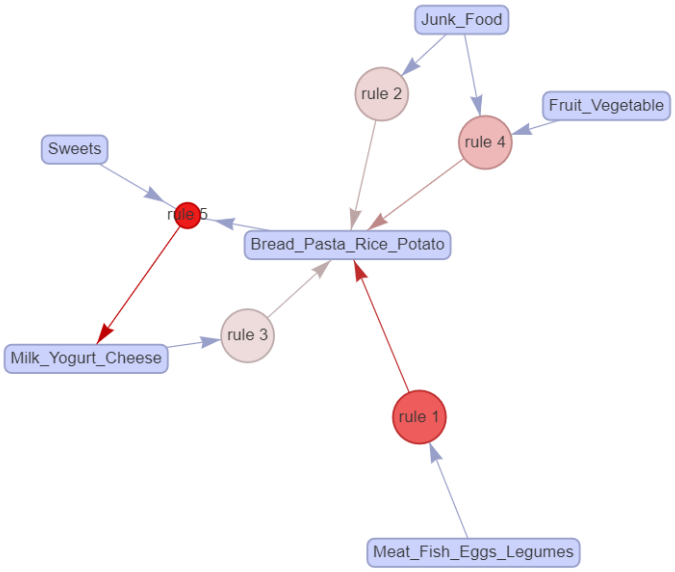


Figure 1: Associations rules(breakfast - Weekdays)

1. **Rule 1:** {Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.01
   - Confidence: 1
   - Lift: 1.49
2. **Rule 2:** {Junk_Food} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0369
   - Confidence: 0.727
   - Lift: 1.09
3. **Rule 3:** {Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.309
   - Confidence: 0.708
   - Lift: 1.06
4. **Rule 4:** {Junk_Food , Fruit_Vegetable} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.02
   - Confidence: 0.81
   - Lift: 1.21
5. **Rule 5:** {Bread_Pasta_Rice_Potato , Sweets} ⇒ {Milk_Yogurt_Cheese}
   - Support: 0.02
   - Confidence: 0.072
   - Lift: 1.65

These rules reveal intriguing relationships among diverse food groups during weekday breakfasts. Take Rule 5, for instance, which highlights a robust connection between the consumption of milk, yogurt, or cheese and the inclusion of bread, pasta, rice, or potatoes, with a significant confidence level of 72%.

7.1.2 Association Rules for Breakfast (Weekends)

Here are some association rules for breakfast on weekends along with relevant metrics:

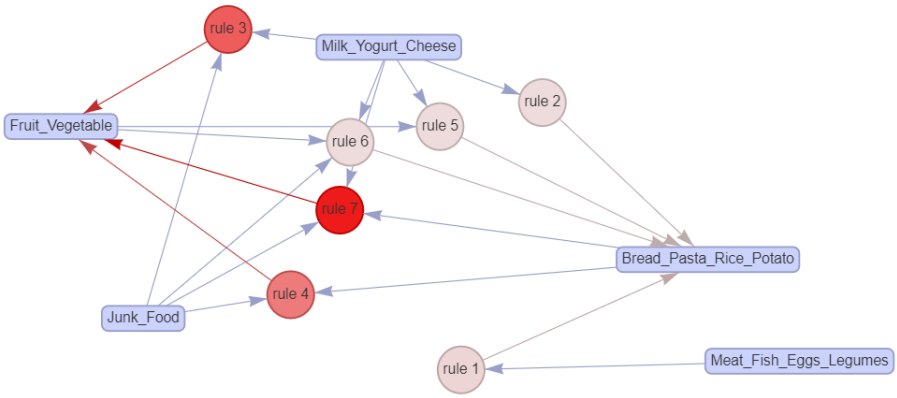


Figure 2: Associations rules(breakfast - Weekend)

1. **Rule 1:** {Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0185
   - Confidence: 0.833
   - Lift: 1.23
2. **Rule 2:** {Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.339
   - Confidence: 0.736
   - Lift: 1.09
3. **Rule 3:** {Junk_Food, Milk_Yogurt_Cheese} ⇒ {Fruit_Vegetable}
   - Support: 0.0148
   - Confidence: 0.8
   - Lift: 3.8
4. **Rule 4:** {Bread_Pasta_Rice_Potato, Junk_Food} ⇒ {Fruit_Vegetable}
   - Support: 0.0258
   - Confidence: 0.7
   - Lift: 3.33
5. **Rule 5:** {Fruit_Vegetable, Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0627
   - Confidence: 0.739
   - Lift: 1.09
6. **Rule 6:** {Fruit_Vegetable, Junk_Food, Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0111

- Confidence: 0.75
- Lift: 1.11

7. **Rule 7:** {Bread_Pasta_Rice_Potato, Junk_Food, Milk_Yogurt_Cheese} ⇒ {Fruit_Vegetable}
   - Support: 0.0111
   - Confidence: 1.0
   - Lift: 4.75

These rules provide insights into the associations between different food groups during weekend breakfasts. For example, Rule 5 suggests that when individuals consume fruit and dairy, there is a high likelihood of including carbohydrates in their breakfast, with a confidence of 73%.

7.2 Association Rules for Lunch

In this segment, we analyze association rules for lunch, uncovering intriguing connections between different food categories during both weekdays and weekends.

7.2.1 Association Rules for Lunch (Weekdays)

Here are some association rules for lunch on weekdays along with relevant metrics:

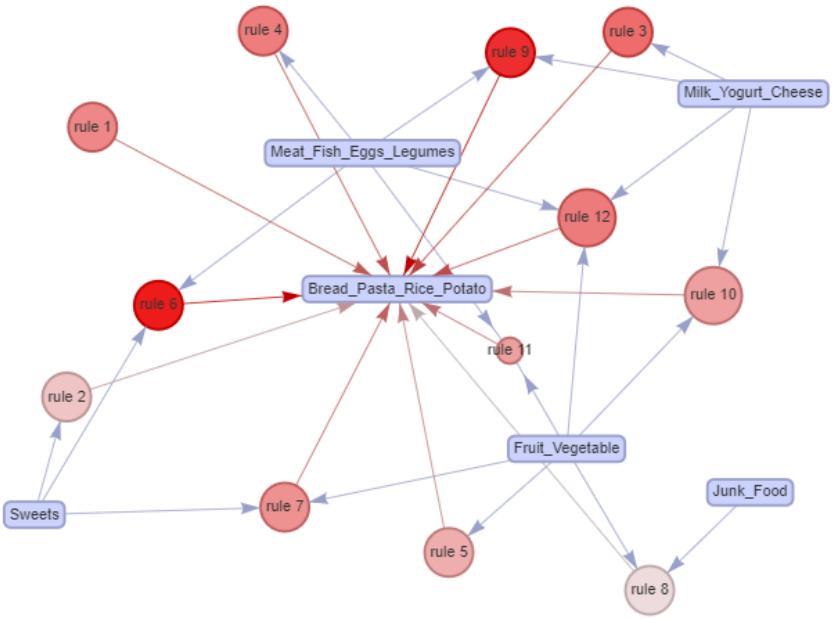


Figure 3: Associations rules (lunch - Weekdays)

1. **Rule 1:** {} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.833
   - Confidence: 0.833
   - Lift: 1.0

2. **Rule 2:** {Sweets} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0396

- Confidence: 0.745
- Lift: 0.894

3. **Rule 3:** {Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.112
   - Confidence: 0.856
   - Lift: 1.03
4. **Rule 4:** {Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.177
   - Confidence: 0.842
   - Lift: 1.01
5. **Rule 5:** {Fruit_Vegetable} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.446
   - Confidence: 0.782
   - Lift: 0.939
6. **Rule 6:** {Meat_Fish_Eggs_Legumes, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0136
   - Confidence: 0.929
   - Lift: 1.11
7. **Rule 7:** {Fruit_Vegetable, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0146
   - Confidence: 0.824
   - Lift: 0.988
8. **Rule 8:** {Fruit_Vegetable, Junk_Food} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0177
   - Confidence: 0.708
   - Lift: 0.85
9. **Rule 9:** {Milk_Yogurt_Cheese, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0323
   - Confidence: 0.912
   - Lift: 1.09
10. **Rule 10:** {Fruit_Vegetable, Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.0699
    - Confidence: 0.807
    - Lift: 0.969
11. **Rule 11:** {Fruit_Vegetable, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.1
    - Confidence: 0.807

- Lift: 0.968

12. **Rule 12:** {Fruit_Vegetable, Milk_Yogurt_Cheese, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.0167
    - Confidence: 0.842
    - Lift: 1.01

These rules reveal interesting associations between different food groups during weekday lunches. For example, Rule 9 suggests a strong association between the consumption of dairy products along with meat, fish, eggs, or legumes and the inclusion of bread, pasta, rice, or potatoes, with a high confidence of 91.2%.

7.2.2 Association Rules for Lunch (Weekends)

Here are some association rules for lunch on weekends along with relevant metrics:

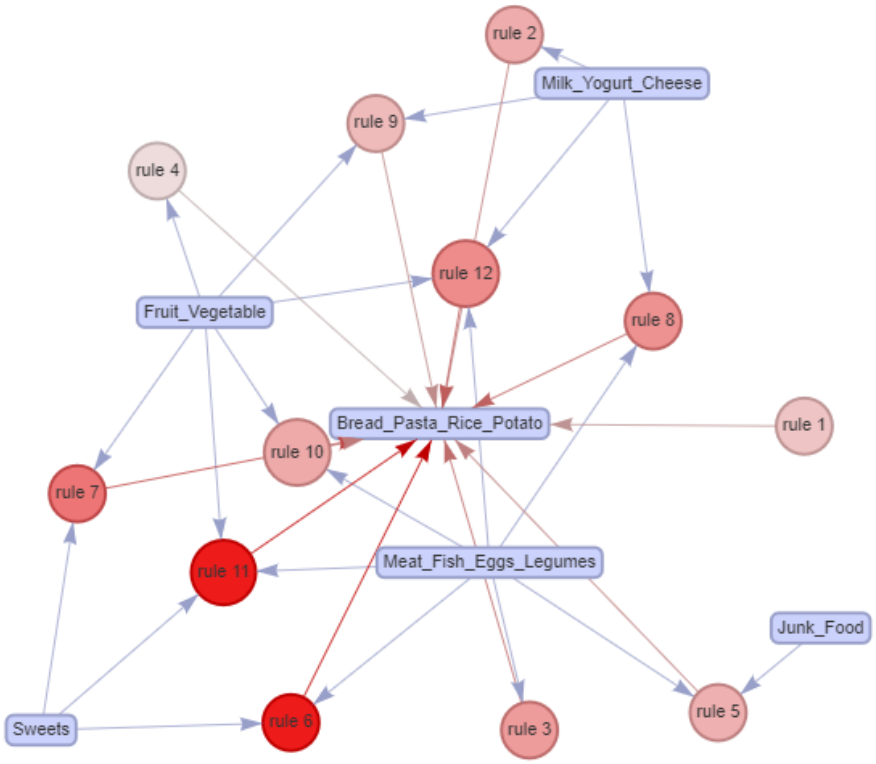


Figure 4: Associations rules (lunch - Weekends)

1. **Rule 1:** {} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.794
    - Confidence: 0.794
    - Lift: 1.0

2. **Rule 2:** {Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.114
    - Confidence: 0.839

- Lift: 1.06

3. **Rule 3:** {Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.177
   - Confidence: 0.869
   - Lift: 1.09
4. **Rule 4:** {Fruit_Vegetable} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.383
   - Confidence: 0.752
   - Lift: 0.947
5. **Rule 5:** {Junk_Food, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0121
   - Confidence: 0.833
   - Lift: 1.05
6. **Rule 6:** {Meat_Fish_Eggs_Legumes, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0218
   - Confidence: 1.0
   - Lift: 1.26
7. **Rule 7:** {Fruit_Vegetable, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0484
   - Confidence: 0.909
   - Lift: 1.14
8. **Rule 8:** {Milk_Yogurt_Cheese, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0363
   - Confidence: 0.882
   - Lift: 1.11
9. **Rule 9:** {Fruit_Vegetable, Milk_Yogurt_Cheese} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.063
   - Confidence: 0.812
   - Lift: 1.02
10. **Rule 10:** {Fruit_Vegetable, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.092
    - Confidence: 0.844
    - Lift: 1.06
11. **Rule 11:** {Fruit_Vegetable, Meat_Fish_Eggs_Legumes, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.0121
    - Confidence: 1.0
    - Lift: 1.26

12. **Rule 12:** {Fruit_Vegetable, Milk_Yogurt_Cheese, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.0194
    - Confidence: 0.889
    - Lift: 1.12

These rules provide insights into the associations between different food groups during weekend lunches. For instance, Rule 12 suggests a strong association between the consumption of fruit/vegetable along diary products and proteins, with the inclusion of bread, pasta, rice, or potatoes, with a high confidence of 88%.

7.3 Association Rules for Dinner

Discovering associations in dinner choices is the focus of this section, providing insights into the combinations of food items commonly consumed during weekdays and weekends.

7.3.1 Association Rules for Dinner (Weekdays)

Here are some association rules for dinner on weekdays along with relevant metrics:

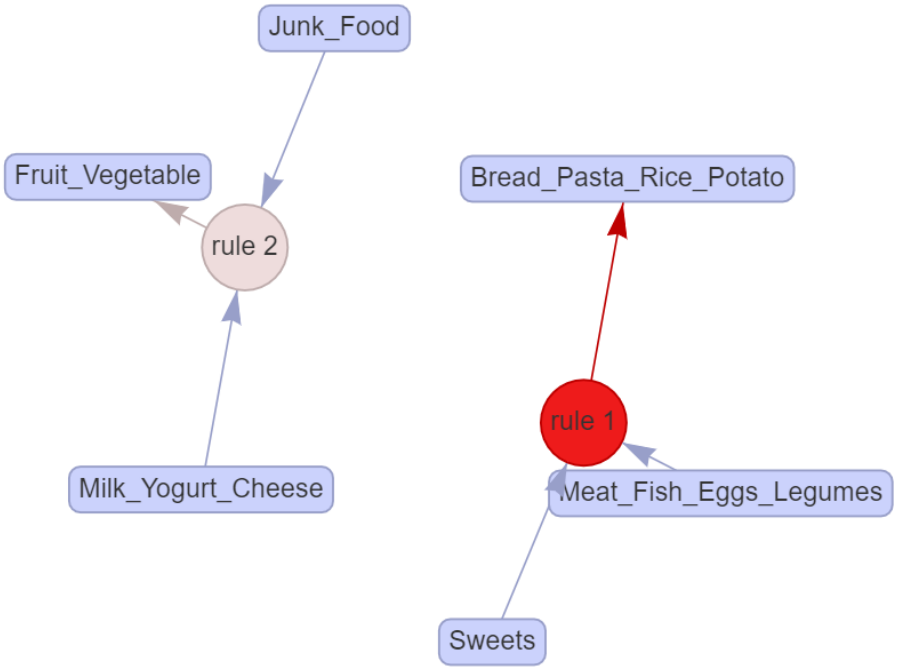


Figure 5: Associations rules (dinner - Weekdays)

1. **Rule 1:** {Meat_Fish_Eggs_Legumes, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
    - Support: 0.0109
    - Confidence: 0.857
    - Coverage: 0.0128
    - Lift: 1.49
2. **Rule 2:** {Junk_Food, Milk_Yogurt_Cheese} ⇒ {Fruit_Vegetable}
    - Support: 0.0119

- Confidence: 0.722
- Coverage: 0.0164
- Lift: 1.18

These rules provide insights into the associations between different food groups during weekday dinners. For example, Rule 1 suggests a strong association between the consumption of meat, fish, eggs, legumes, and sweets, with the inclusion of bread, pasta, rice, or potatoes, with a high confidence of 85.7%.

7.3.2 Association Rules for Dinner (Weekends)

Here are some association rules for dinner on weekends along with relevant metrics:

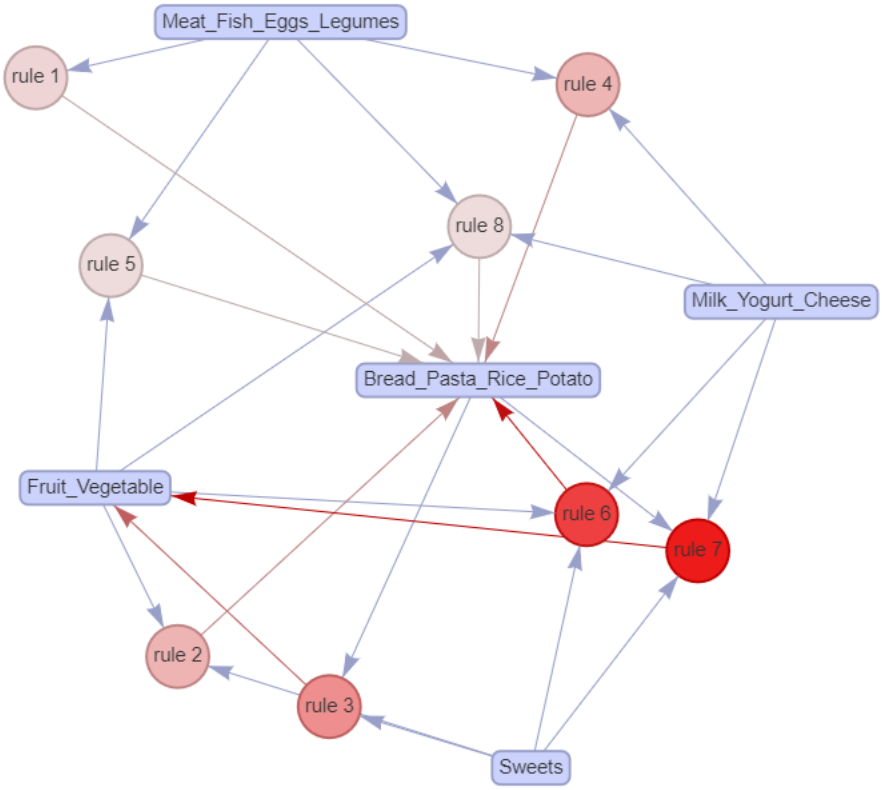


Figure 6: Associations rules (dinner - Weekends)

1. **Rule 1:** {Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.142
   - Confidence: 0.744
   - Coverage: 0.191
   - Lift: 1.21
2. **Rule 2:** {Fruit_Vegetable, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0326
   - Confidence: 0.824
   - Coverage: 0.0396

- Lift: 1.34

3. **Rule 3:** {Bread_Pasta_Rice_Potato, Sweets} ⇒ {Fruit_Vegetable}
   - Support: 0.0326
   - Confidence: 0.737
   - Coverage: 0.0443
   - Lift: 1.46
4. **Rule 4:** {Milk_Yogurt_Cheese, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.042
   - Confidence: 0.818
   - Coverage: 0.0513
   - Lift: 1.33
5. **Rule 5:** {Fruit_Vegetable, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0886
   - Confidence: 0.731
   - Coverage: 0.121
   - Lift: 1.19
6. **Rule 6:** {Fruit_Vegetable, Milk_Yogurt_Cheese, Sweets} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.014
   - Confidence: 1.0
   - Coverage: 0.014
   - Lift: 1.62
7. **Rule 7:** {Bread_Pasta_Rice_Potato, Milk_Yogurt_Cheese, Sweets} ⇒ {Fruit_Vegetable}
   - Support: 0.014
   - Confidence: 0.857
   - Coverage: 0.0163
   - Lift: 1.7
8. **Rule 8:** {Fruit_Vegetable, Milk_Yogurt_Cheese, Meat_Fish_Eggs_Legumes} ⇒ {Bread_Pasta_Rice_Potato}
   - Support: 0.0186
   - Confidence: 0.727
   - Coverage: 0.0256
   - Lift: 1.18

These guidelines provide valuable observations regarding the correlations among various food categories during weekend dinners. Notably, Rule 6 highlights a strong connection between fruits, vegetables, dairy products (milk, yogurt, cheese), and sweets, coupled with the inclusion of carbohydrates such as bread, pasta, rice, or potatoes. This association is characterized by a high confidence level of 100%.

7.4 Association Rules for Snacks

No significant association rules were identified for snacks during both weekdays and weekends based on the available data. It is possible that the dataset does not contain sufficient information or patterns to establish meaningful associations for snacks during these specific time periods. This absence of significant associations suggests that, at least within the scope of the provided dataset, snacks may be consumed relatively independently of other food groups during weekdays and weekends.

8 Processing Drink Data

In this section, we process the drink data and create different data frames for breakfast, lunch, dinner, and snacks. The categories d7, d8, d9, and d10 were created based on the type of drinks and correspond to:

- **d7:** Water
- **d8:** Coffee/Tea
- **d9:** Alcoholic
- **d10:** Non-Alcoholic

```
# Define a function to process breakfast drink data
process_drink_data <- function(df) {
  df %>%
    filter(type_meal == 1) %>%
    mutate(
      d7 = c3_12 + c6_18,    # water
      d8 = c3_14 + c6_20,    # coffee/tea
      d9 = c3_16 + c3_17 + c3_18 + c3_19 + c6_22 + c6_23 + c6_24 + c6_25,  # alcoholic
      d10 = c3_13 + c3_15 + c6_19 + c6_21  # non-alcoholic
    ) %>%
    select(-matches("c3_[0-9]+|c6_[0-9]+")) %>%
    filter(d7 != 0 | d8 != 0 | d9 != 0 | d10 != 0)
}

# Process breakfast drink data for different subsets
drink_df_breakfast <- process_drink_data(total_meal_df)
drink_df_breakfast_firstweek_weekdays <- ...
drink_df_breakfast_firstweek_weekend <- ...
drink_df_breakfast_secondweek_weekdays <- ...
drink_df_breakfast_secondweek_weekend <- ...
drink_df_breakfast_weekdays <- ...
drink_df_breakfast_weekend <- ...
```

We repeat the same pattern for lunch, dinner and snacks, obtaining drink_df_lunch, drink_df_dinner, drink_df_snack and all the other combinations.

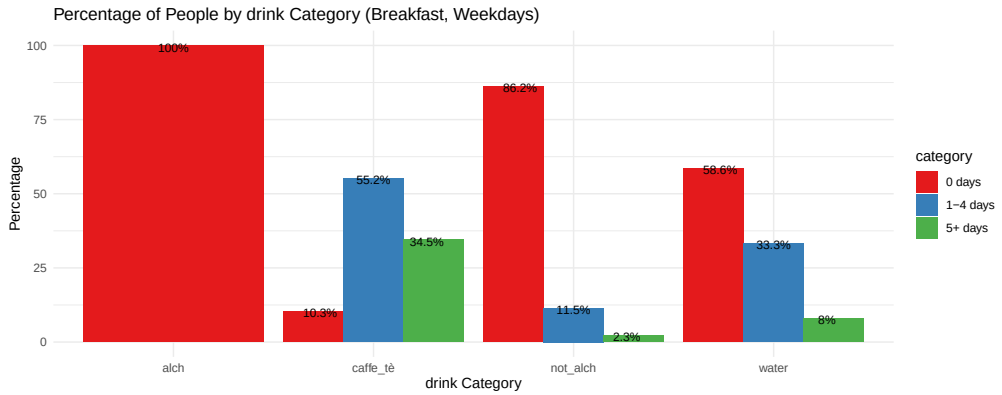
9 Drink Patterns

In this section, we delve into the analysis of drink patterns, focusing on different meal times such as breakfast, lunch, dinner, and snacks on both weekdays and weekends. We examine the diversity of drink categories and their distribution.

9.1 Breakfast Patterns analysis

This analysis focuses on consumption patterns observed during breakfast on both weekdays and weekends. The aim is to clarify the percentage of people who choose different drinks and identify any trends. By examining these patterns, we can gain insights into the diversity of beverage choices people make during breakfast, providing a clearer understanding of their morning beverage habits.

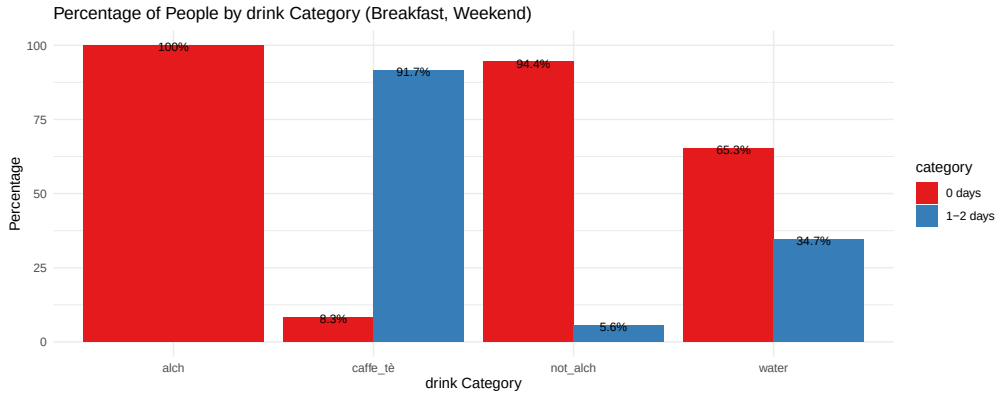
9.1.1 Breakfast Patterns on weekdays



The percentage that jumps out at you immediately, although predictable, is the fact that 100% of people do not drink alcohol for breakfast. The preferred drinks are tea and coffee used for more than five days by more than 30% of people.

9.1.2 Breakfast Patterns on weekends

Similarly, the analysis of drink patterns on weekends provides insights into individuals' choices during leisure days. The following plots showcase the percentage of people by drink category:

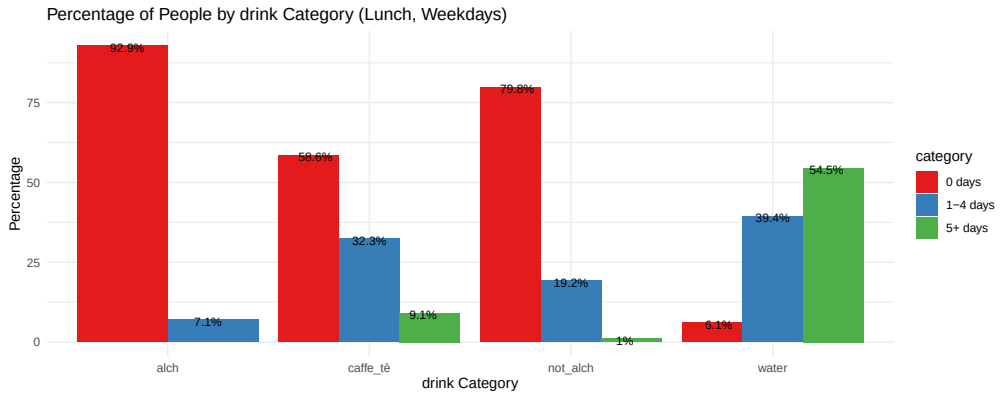


Even at the weekend there are no people who consume alcohol during breakfast. More than 90% of people consume coffee or tea 1-2 days out of 4 (weekends of the first and second week)

9.2 Lunch Patterns analysis

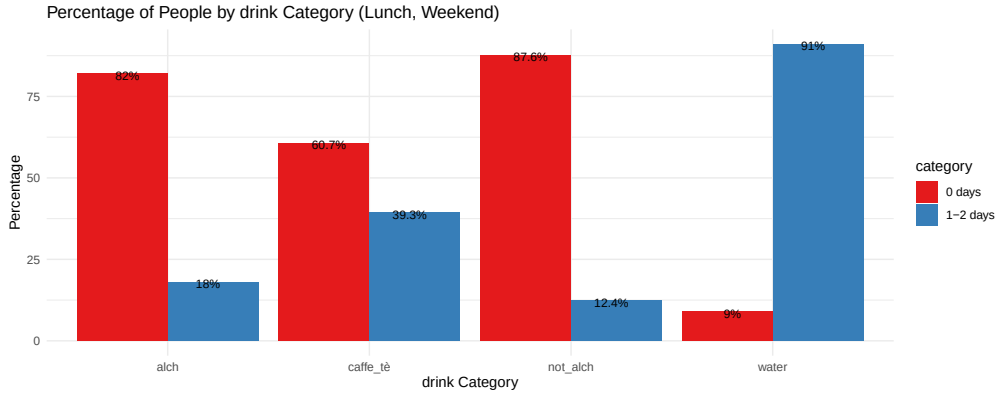
The lunchtime analysis focuses on weekdays and weekends, exploring the variety of beverages consumed during this mealtime and providing a breakdown of preferences.

9.2.1 Lunch Patterns on weekdays



Unlike breakfast, the percentage of people who don't drink alcohol has decreased slightly. It reaches 7% of those who drink alcohol 1 to 4 days out of 10. More than half of the people drink water almost every day during lunch, a symptom of a healthy, balanced diet, while just under 20% of people drink non-alcoholic beverages about once every other day.

9.2.2 Lunch Patterns on weekends

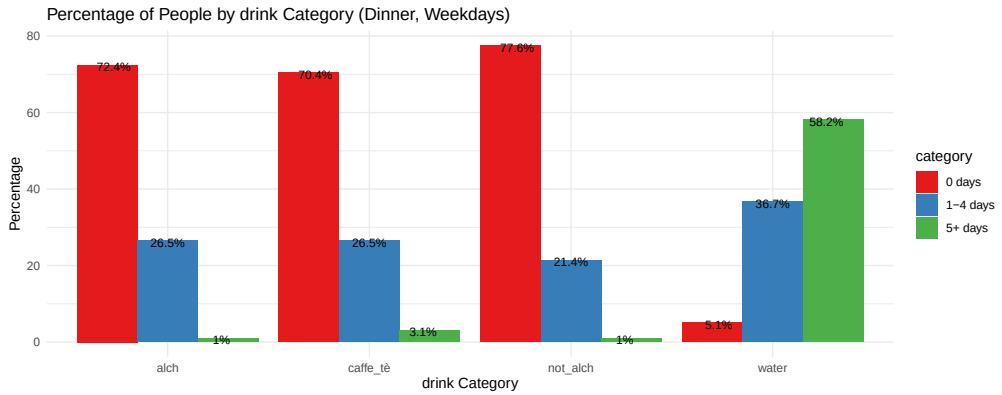


With regard to lunch at weekends, almost all people drink water (91%), while drinks such as tea and coffee are fairly balanced (60%-40%) between those who do not drink them at all and those who drink them about once every two days.

9.3 Dinner Patterns analysis

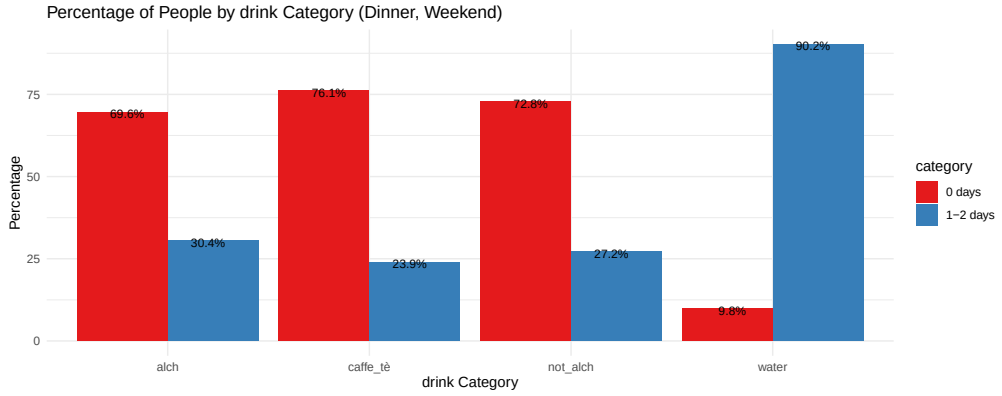
This section provides an in-depth analysis of drink patterns during weekday and weekend dinners, highlighting any distinct trends and preferences among the surveyed individuals.

9.3.1 Dinner Patterns on weekdays



During dinners there is a very low, but present, percentage of people who drink more than half of the days alchol (1%). Also striking is the fact that 5% of people do not drink water for even one day. While we see drinks such as coffee and tea not being used for even one day by more than 70% of people.

9.3.2 Dinner Patterns on weekends

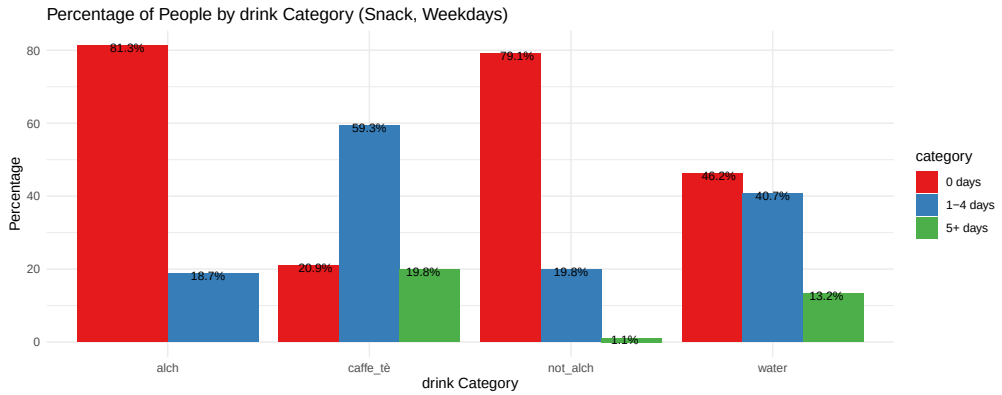


During weekends 30% of people drink alcohol at least once. We have a similar pattern for non-alcoholic drinks (72.8% - 27.2%).

9.4 Snack Patterns analysis

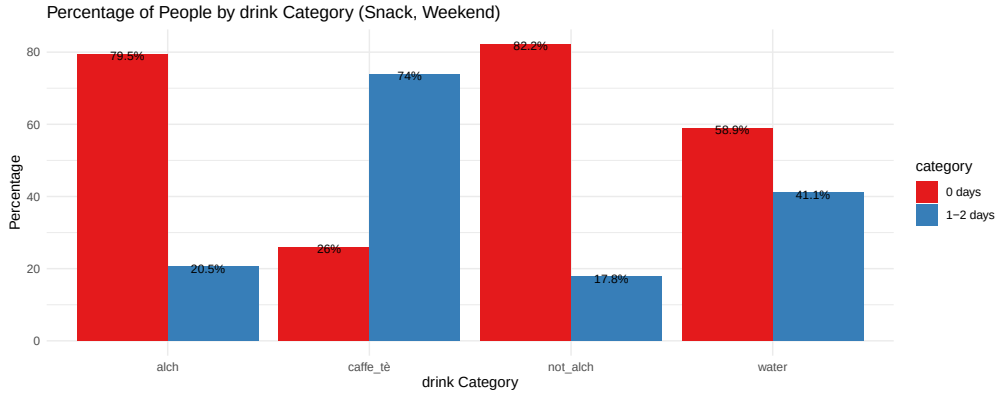
The following section explores the drink patterns associated with snacks, providing insights into individuals' preferences during snack times.

9.4.1 Snack Patterns on weekdays



In this plot coffee and tea become more stable, reaching almost 60% of people who drink them about once every two days. Predictable data as they can be drinks to be used as a "quick breakfast" or during the afternoons to drink something hot. Non-alcoholic drinks such as fruit juices are also predictable; there is also a small percentage of people who drink them in more than 5 days (1.1%).

9.4.2 Snack Patterns on weekends



As regards the weekend, the drinks declared as snacks follow a very similar pattern to that of weekdays, there are no different situations or data.

10 Conclusion

In this comprehensive exploration of dietary patterns and drink preferences, we aimed to uncover associations and trends within the dataset, shedding light on the complexity of individuals' food choices across weekdays and weekends. The project explored both association rules and consumption models. While this project provides valuable insights into dietary and beverage consumption patterns, further exploration could be done. Future studies could incorporate additional factors, such as demographics and lifestyle choices, to improve the depth of understanding. In conclusion, the project provides valuable information in the field of dietary analysis, highlighting the interconnection of food choices and providing a basis for future research in nutrition and lifestyle studies.