

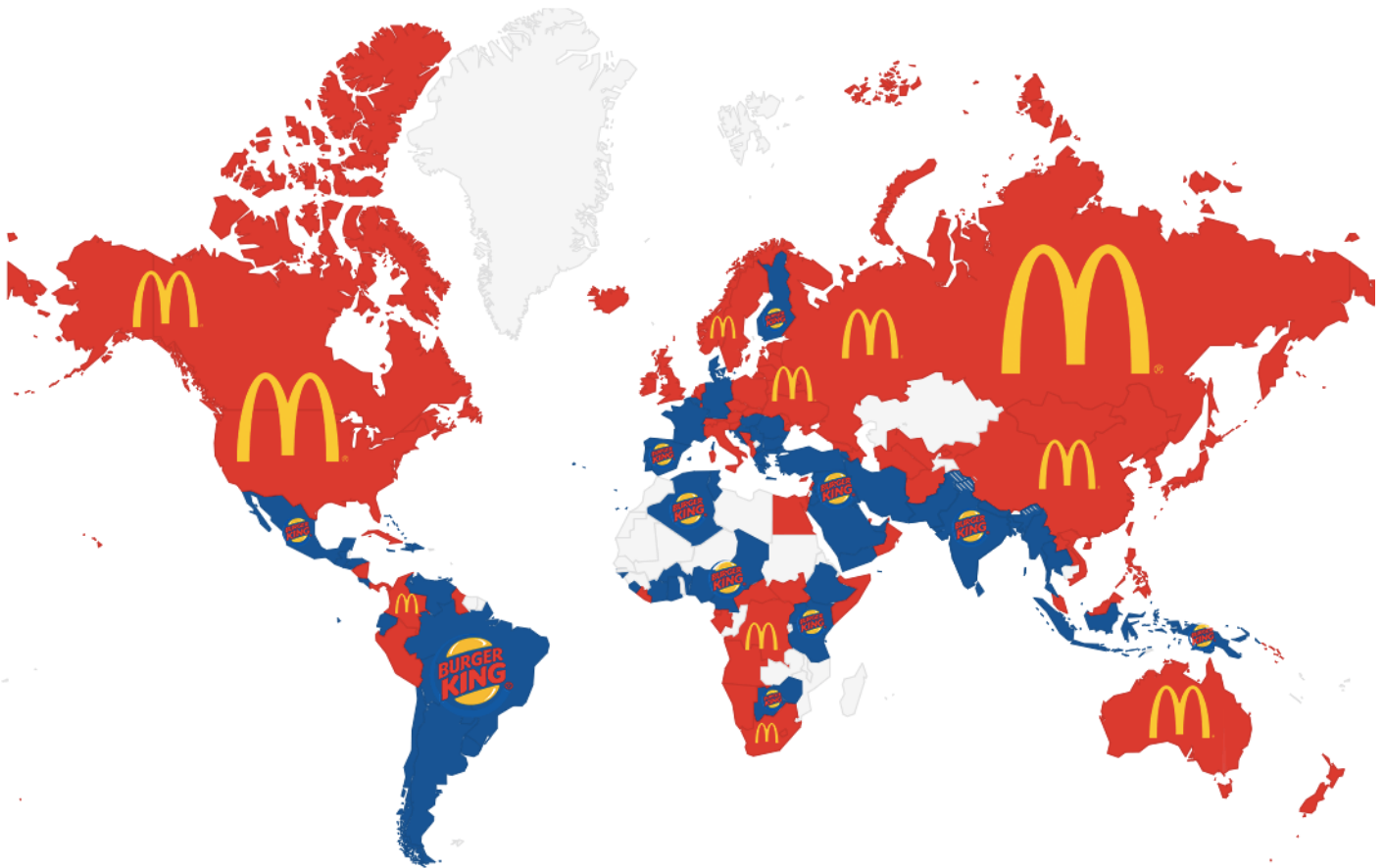
McDonalds vs BK DSC520 Final Project

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The American Fast Food Burger

Burgers are an American tradition, its part of our culture. Over the last century we have not only seen the rise of the burger, but fast food chains that are bringing this delicacy worldwide. The two largest burger chains in America are McDonald with their golden arches, and Burger King and its crown. We can even see their global dominance and reach, with their competition known as the biggest fast food brand off. With that being said, both chains have iconic meals recognizable anywhere you go. McDonald has the Big Mac and Burger King (BK) has the Whooper as their trademarked meals.



McDonalds vs BK Global Presence(Heat Map)

The Health Dilemma

Both of the fast food chains, while convenient and providing great bargains for food, are known to not be the healthiest. One question to ask is which of the two have a healthier menu. Comparing Burgers and Fries, can we identify which of the two is better for you. Another question is since these restaurants are global chains, do the menus in other countries have healthier options than those that are within America? In order to solve these questions we will be pull data from the nutritional fact tables of both chains, as well as the McDonald chain in India to make some comparisons. We will be comparing the composition of their key items, looking at the calories, carbs, sodium and fats, and hopefully identifying any trends leading us to the healthier fast food option!

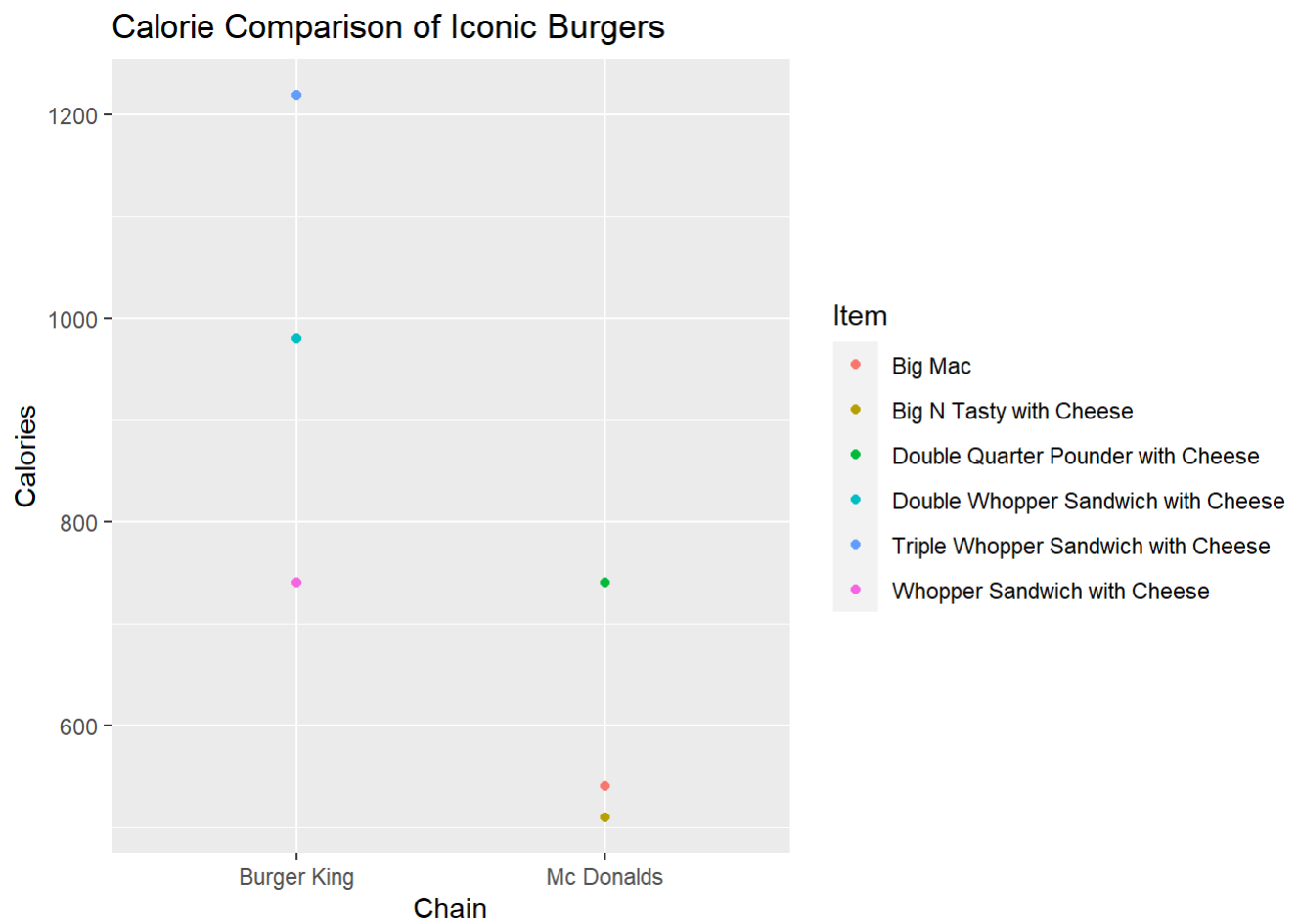
Analysis

The first thing necessary is to combine the data sets from McDonald America, McDonald India, and BK. With One data set we have all the data we need to make our comparisons. We have variables like calories, fat content, cholesterol, sodium, carbs, sugars, and protein for each of the items. We also have an identifier for which menu each item came from. A sample of the data set looks like this.

##	Chain	Item	Type			
## 1	Burger King	Whopper Sandwich	Whopper Sandwiches			
## 2	Burger King	Whopper Sandwich with Cheese	Whopper Sandwiches			
## 3	Burger King	Bacon & Cheese Whopper Sandwich	Whopper Sandwiches			
## 4	Burger King	Double Whopper Sandwich	Whopper Sandwiches			
## 5	Burger King	Double Whopper Sandwich with Cheese	Whopper Sandwiches			
## 6	Burger King	Triple Whopper Sandwich	Whopper Sandwiches			
##	Serving.Size.g	Calories	Total.Fat.g	Saturated.Fat.g	Trans.Fat.g	Chol.mg
## 1	270	660	40	12	1	5
## 2	292	740	46	16	2	115
## 3	303	790	51	17	2	125
## 4	354	900	58	20	3	175
## 5	377	980	64	24	3	195
## 6	438	1130	75	28	4	255
##	Sodium.mg	Total.Carb.g	Total.Sugar.g	Protein.g		
## 1	90	980	2	11		
## 2	1340	50	11	32		
## 3	1560	50	11	35		
## 4	1050	49	11	48		
## 5	1410	50	11	52		
## 6	1120	49	11	67		

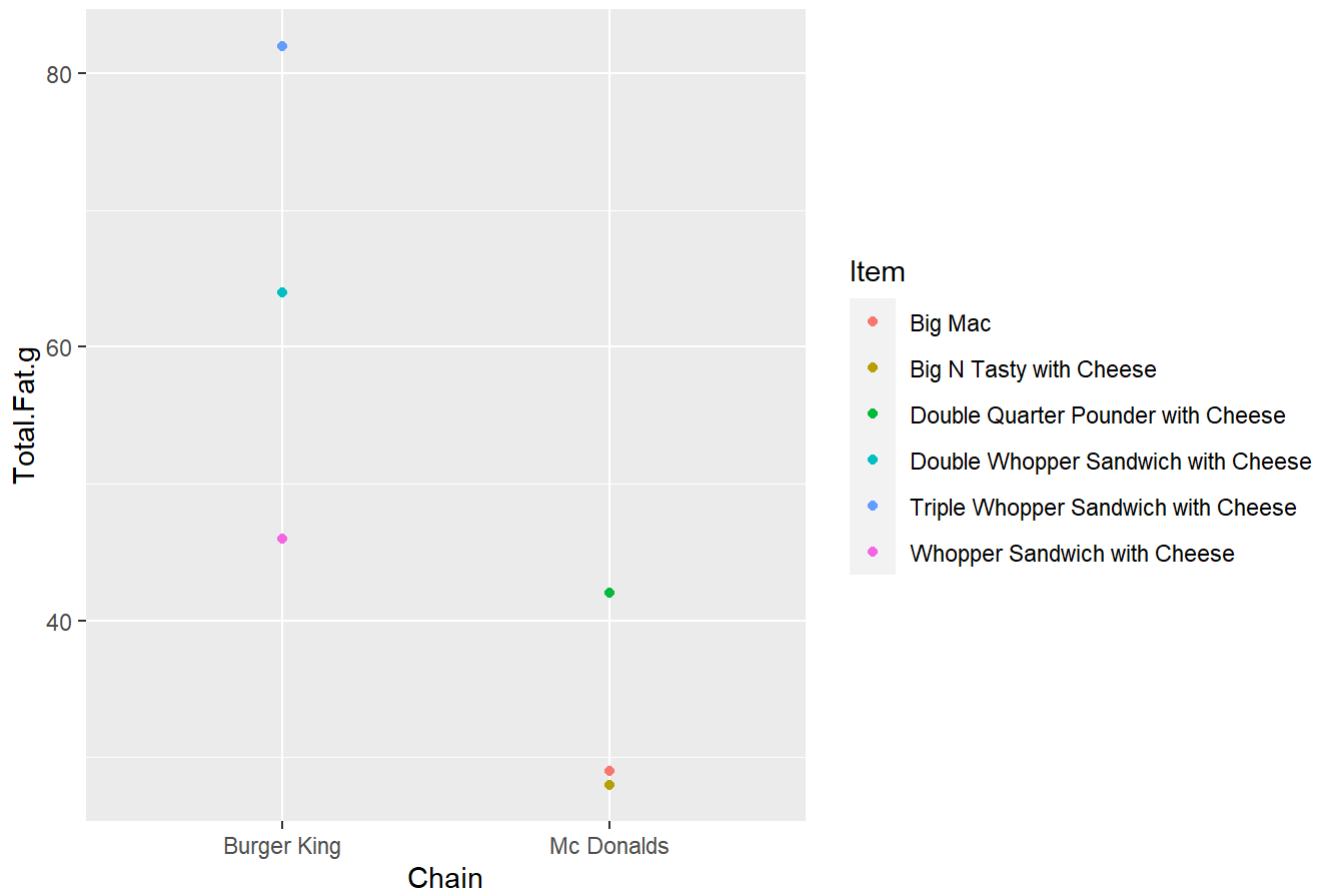
Now we can start splitting the data set into smaller samples. The first to tackle is the iconic burger battle of the Burger King Whooper and the McDonald Big Mac/Double Quarter Pounder/and Big and Tasty. The Whooper comes in three sizes so we will compare all of them to the McDonald line up.

From here we can see that McDonald's has fewer calories on average than BK items.

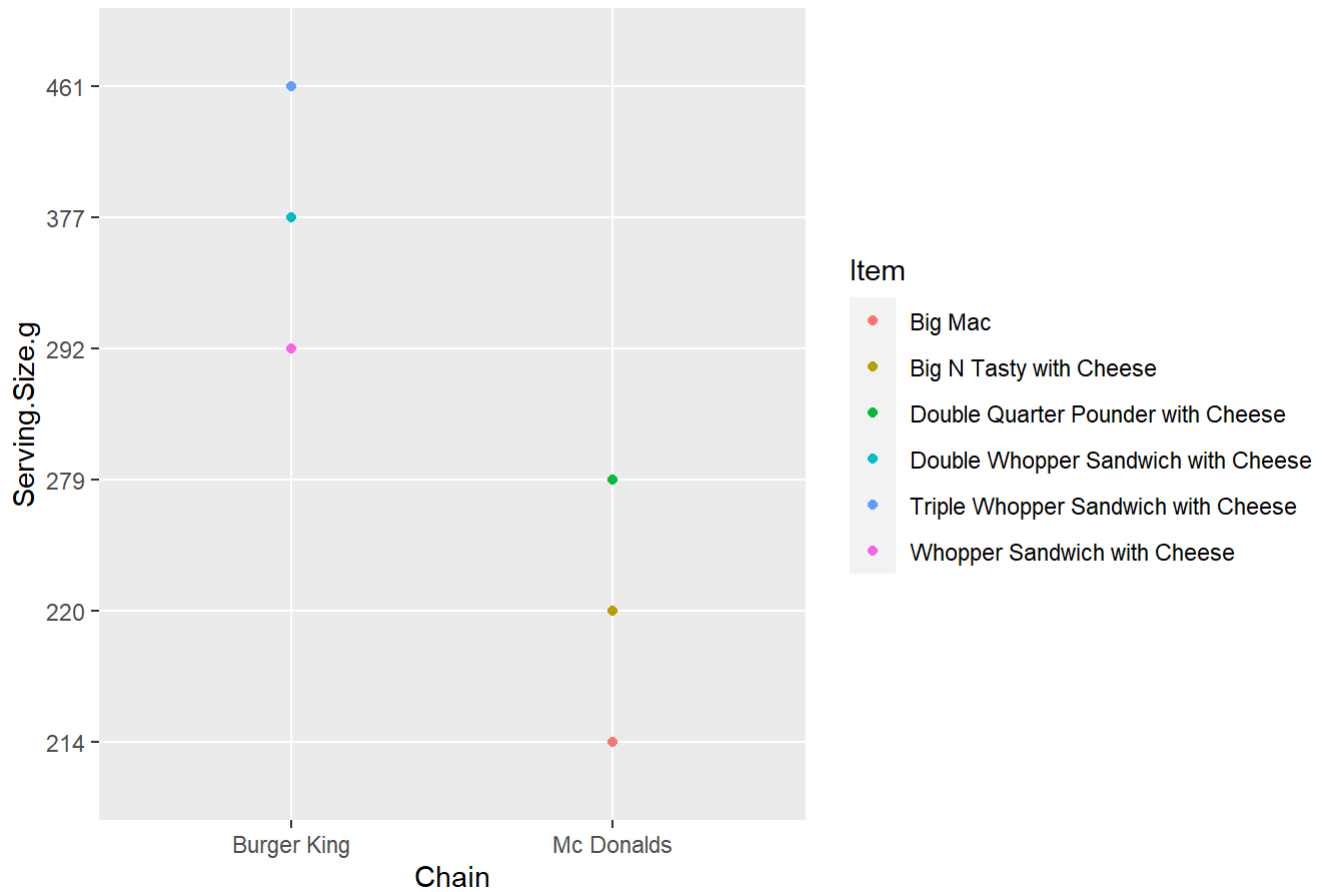


We also see a reduction of the Fats and Serving size of McDonald items in Comparison.

Fat Comparison of Iconic Burgers

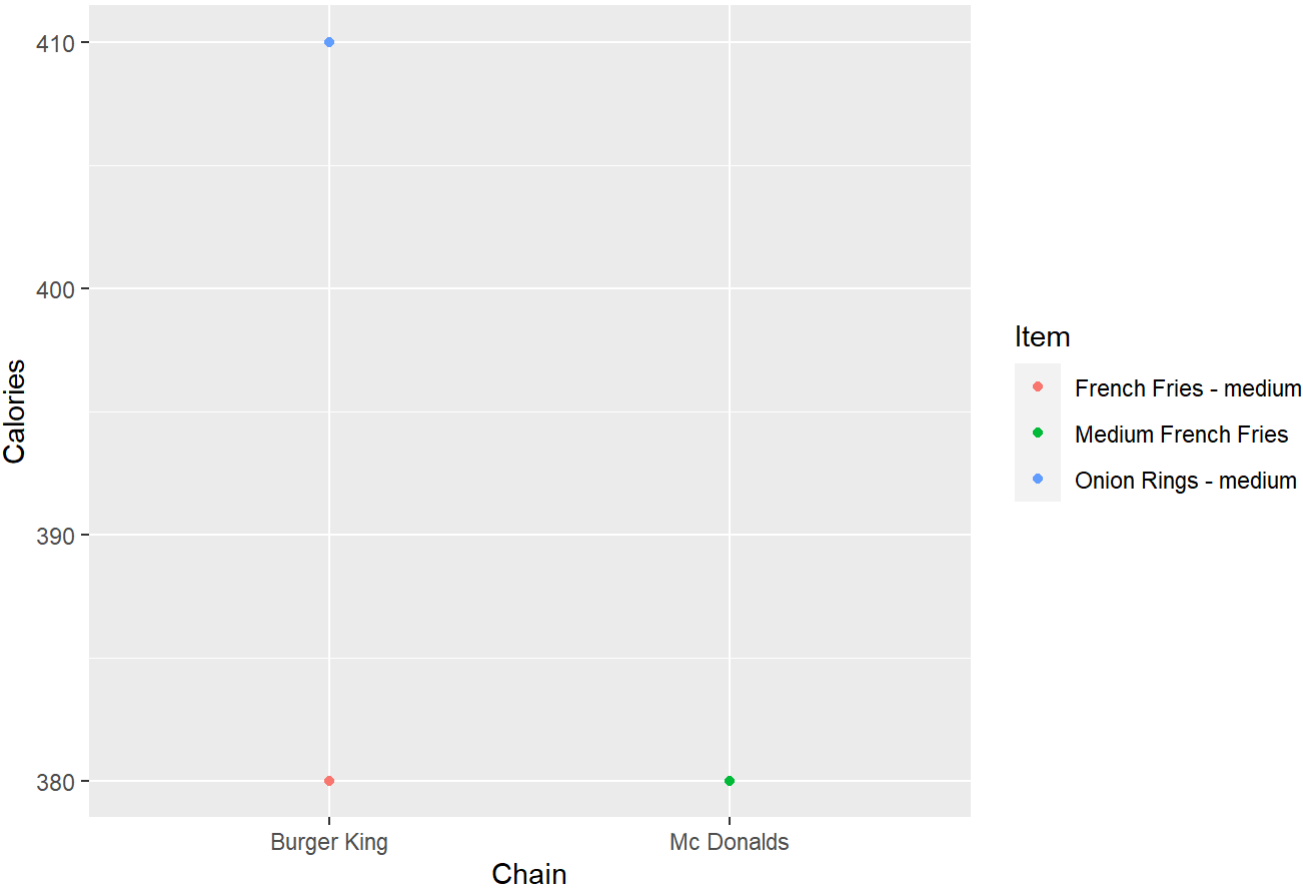


Serving Size Comparison of Iconic Burgers

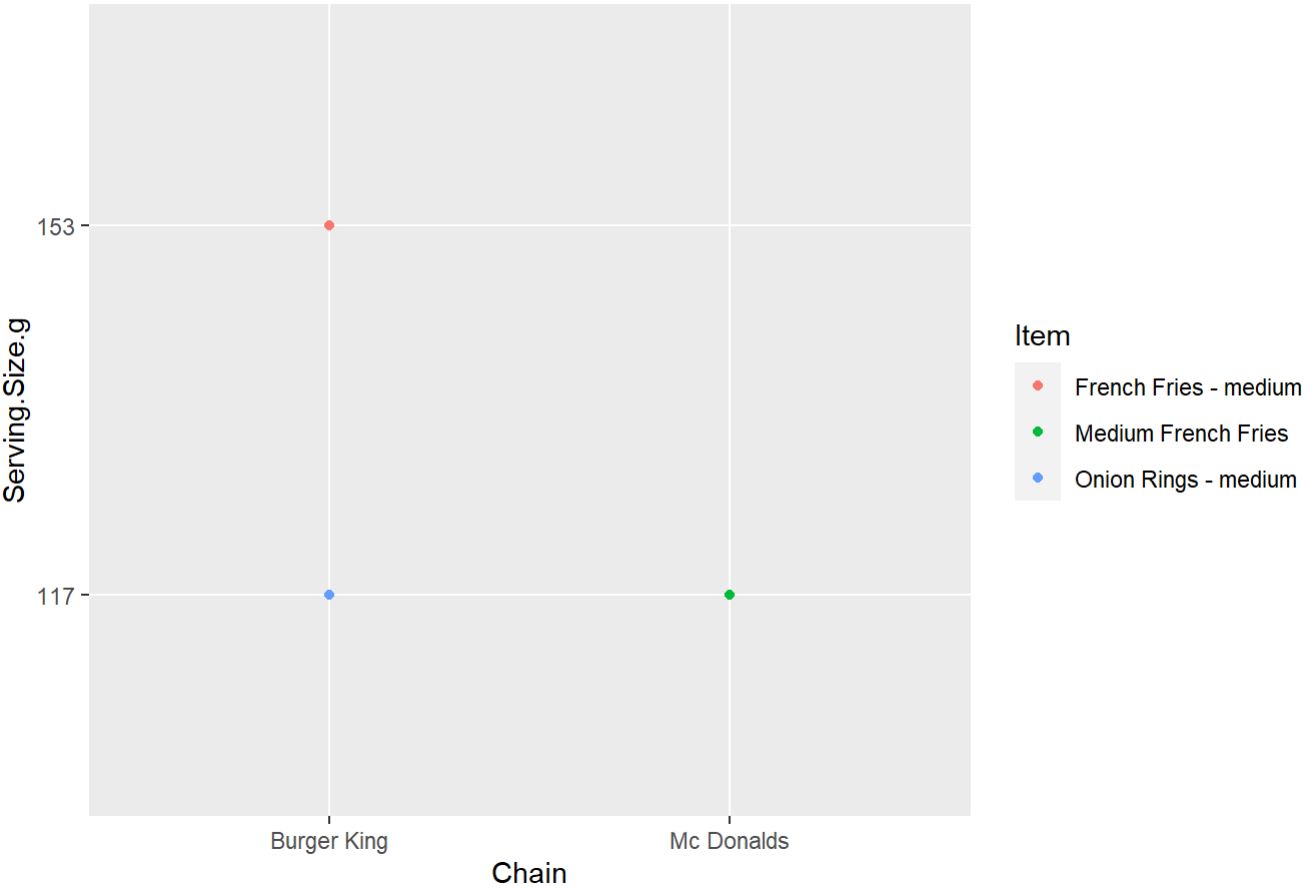


Everyone knows you can't order burgers without french fries. This is next on our comparisons. BK has the option of fries or onion rings. The onion rings seem to come in with the same caloric weight as the McDonald french fries. We can see that a medium fries is slightly more calories at BK than McDonalds.

Calorie Comparison of French Fries!



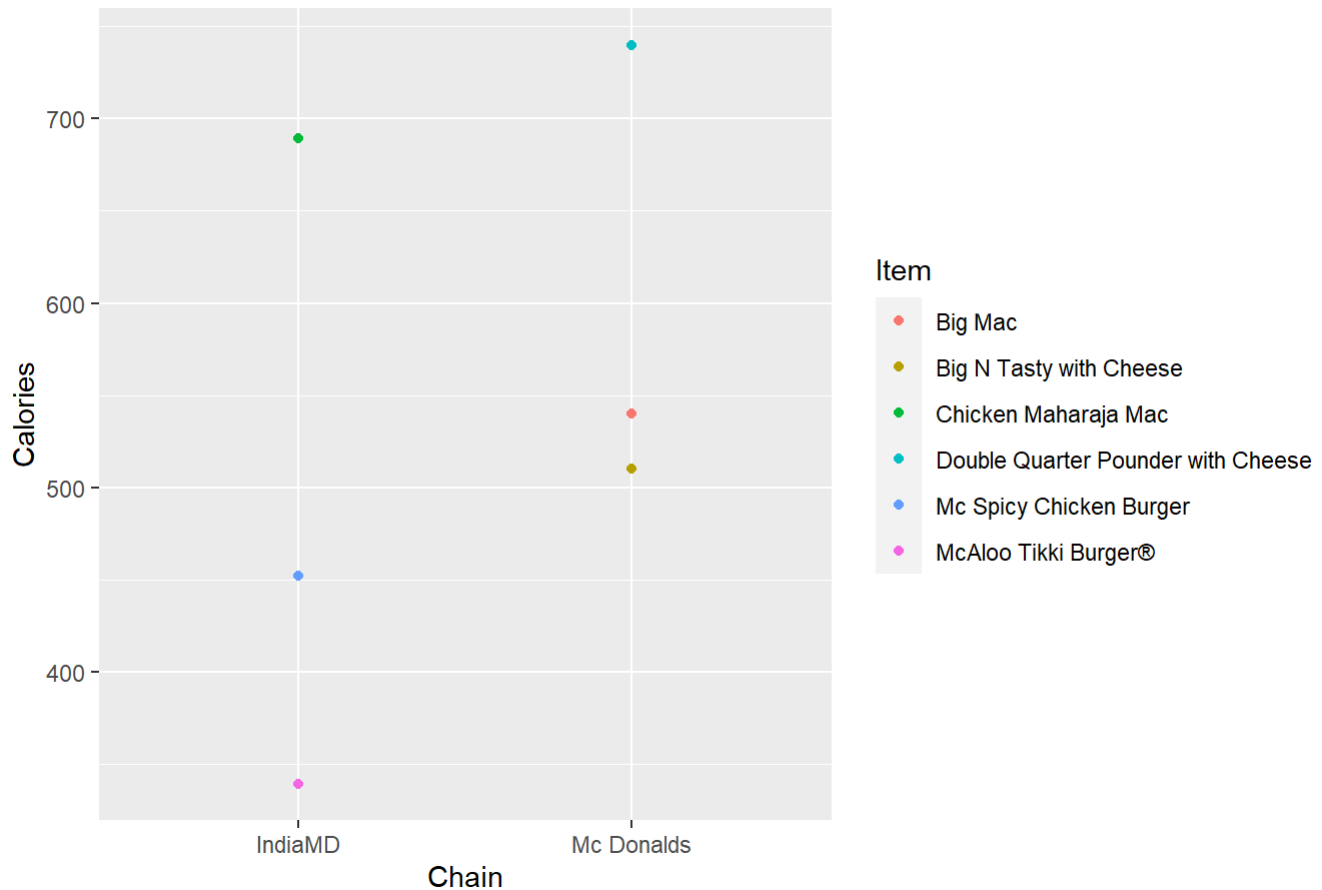
Potato Serving Size



So far in our analysis, we are noticing with the two menu items that McDonalds is slightly healthier than BK in America. Both of these companies are international franchises with diverse menus across the world. Lets take a second to compare the menu of India's McDonald vs Americas to see if there are any trends.

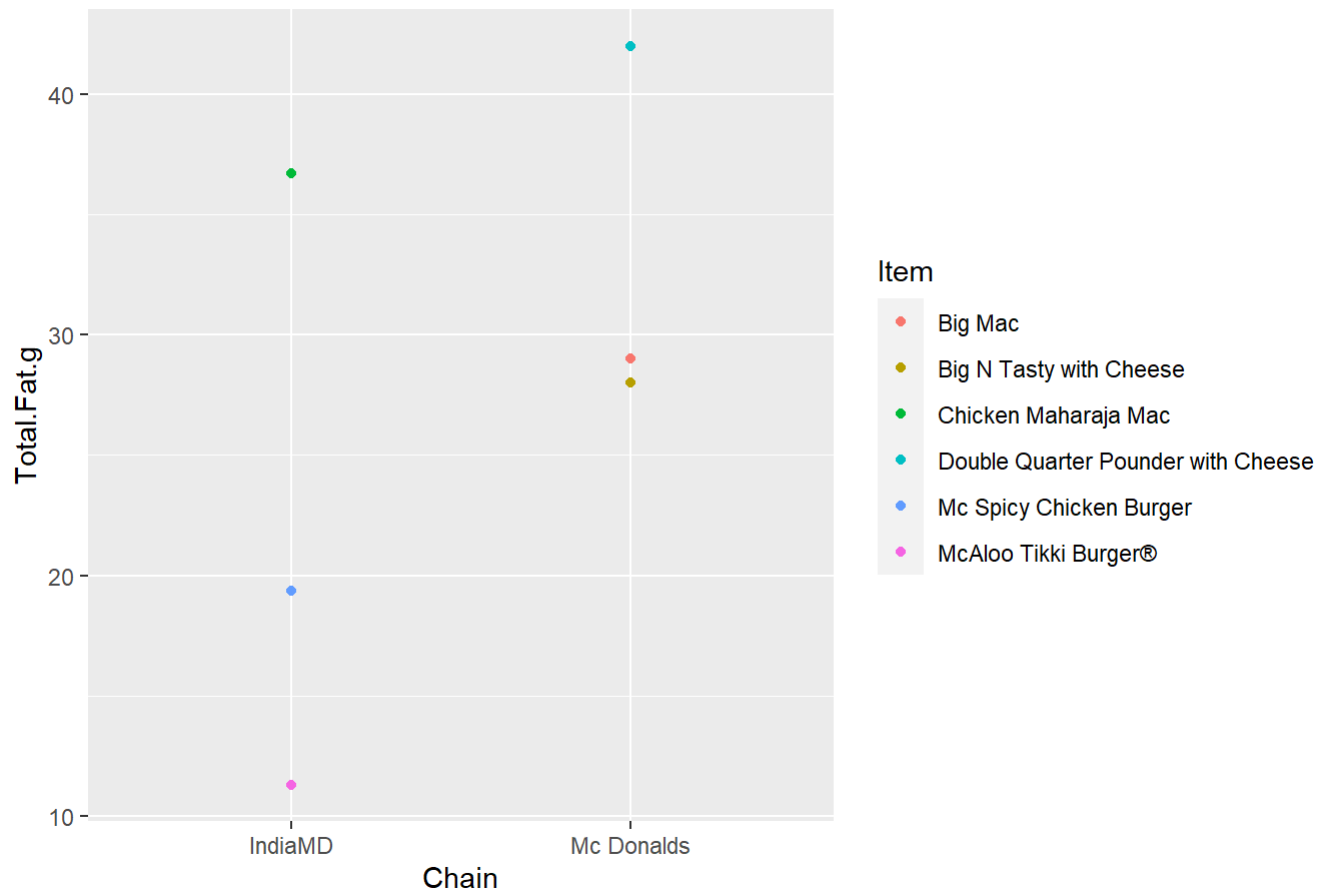
India doesn't typically have as much meat on the menu, so we have hand selected a few items for comparison. What we can see from the small selection is that India's burgers are less calories than Americas.

Calorie Comparison of Indian vs American Burgers

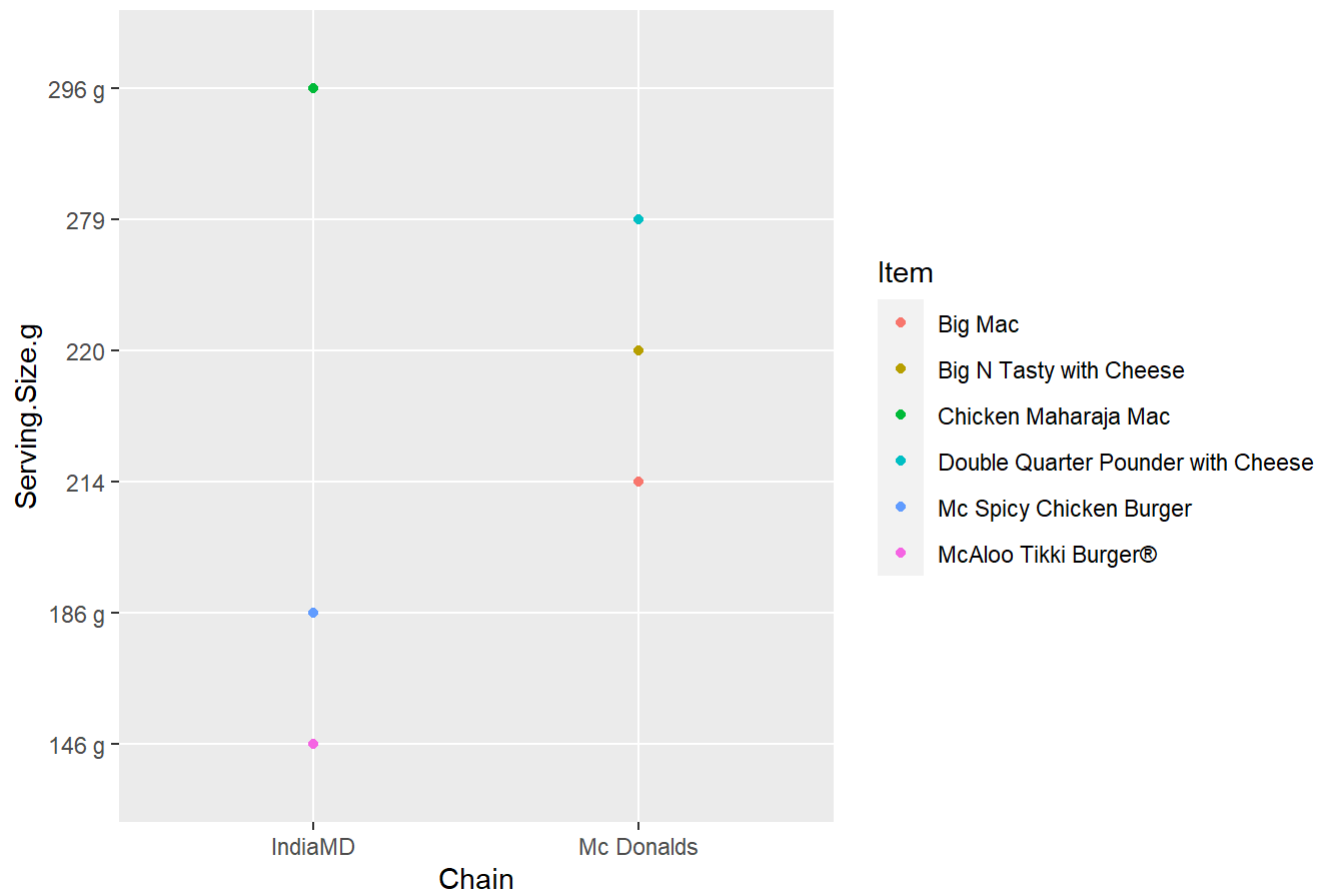


We also see the same the serving size and fat content being lower in India than America.

Fat Comparison of Indian vs American Burgers

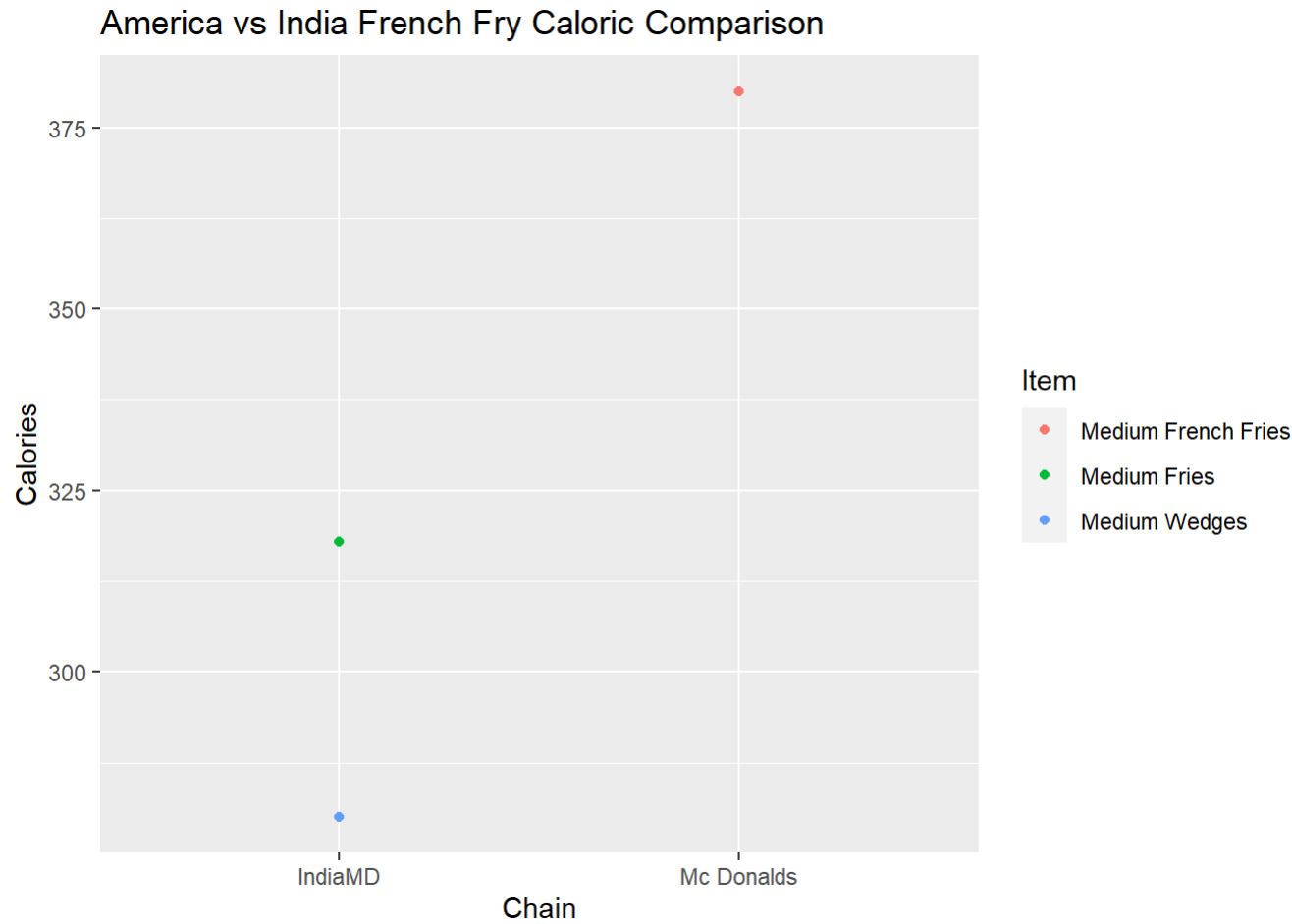


Serving Size Comparison of Indian vs American Burgers

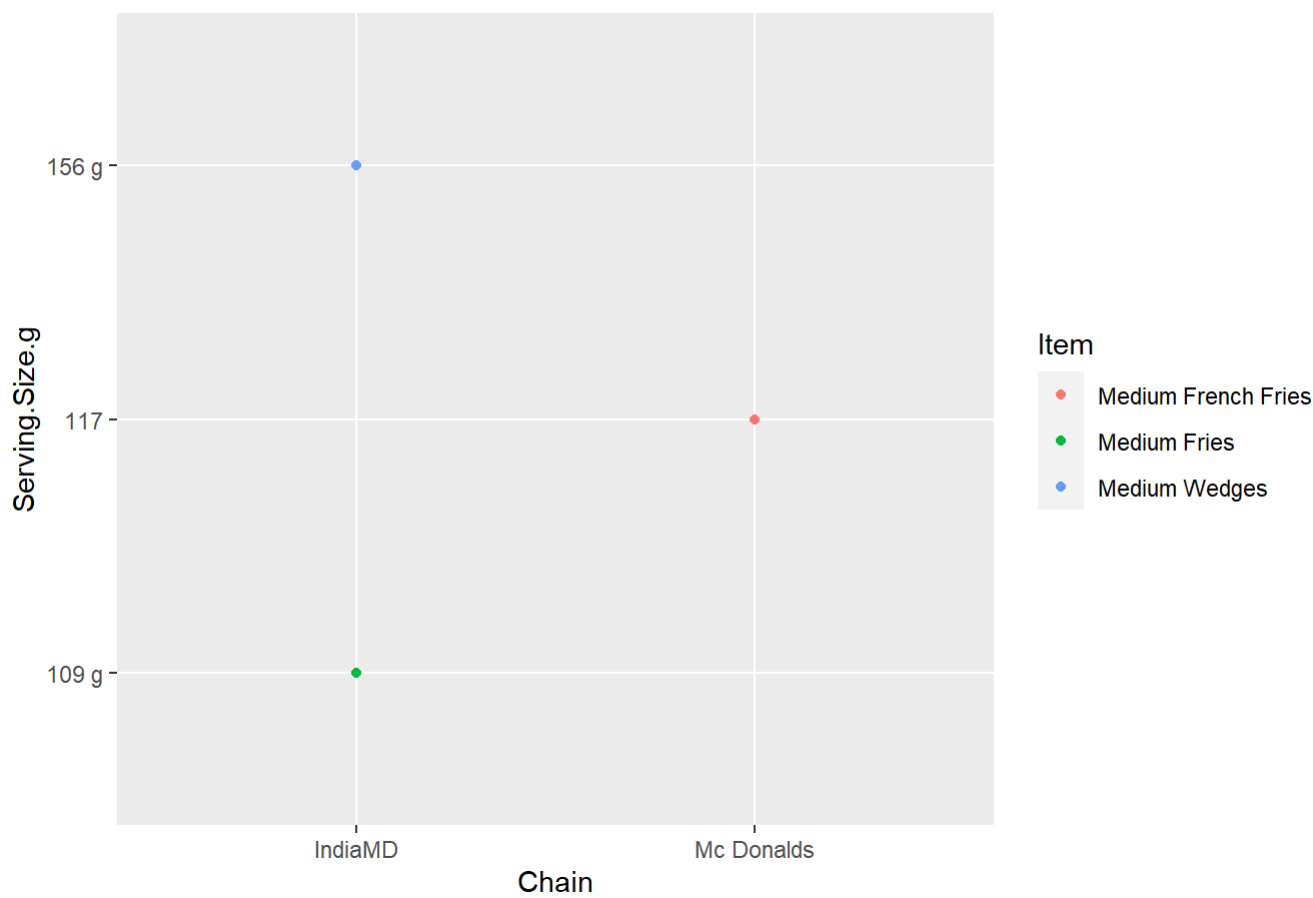


One more comparison between the two would be the french fries, here we would expect India and America to be the same size since its the same item. India also serves potatoes as a side.

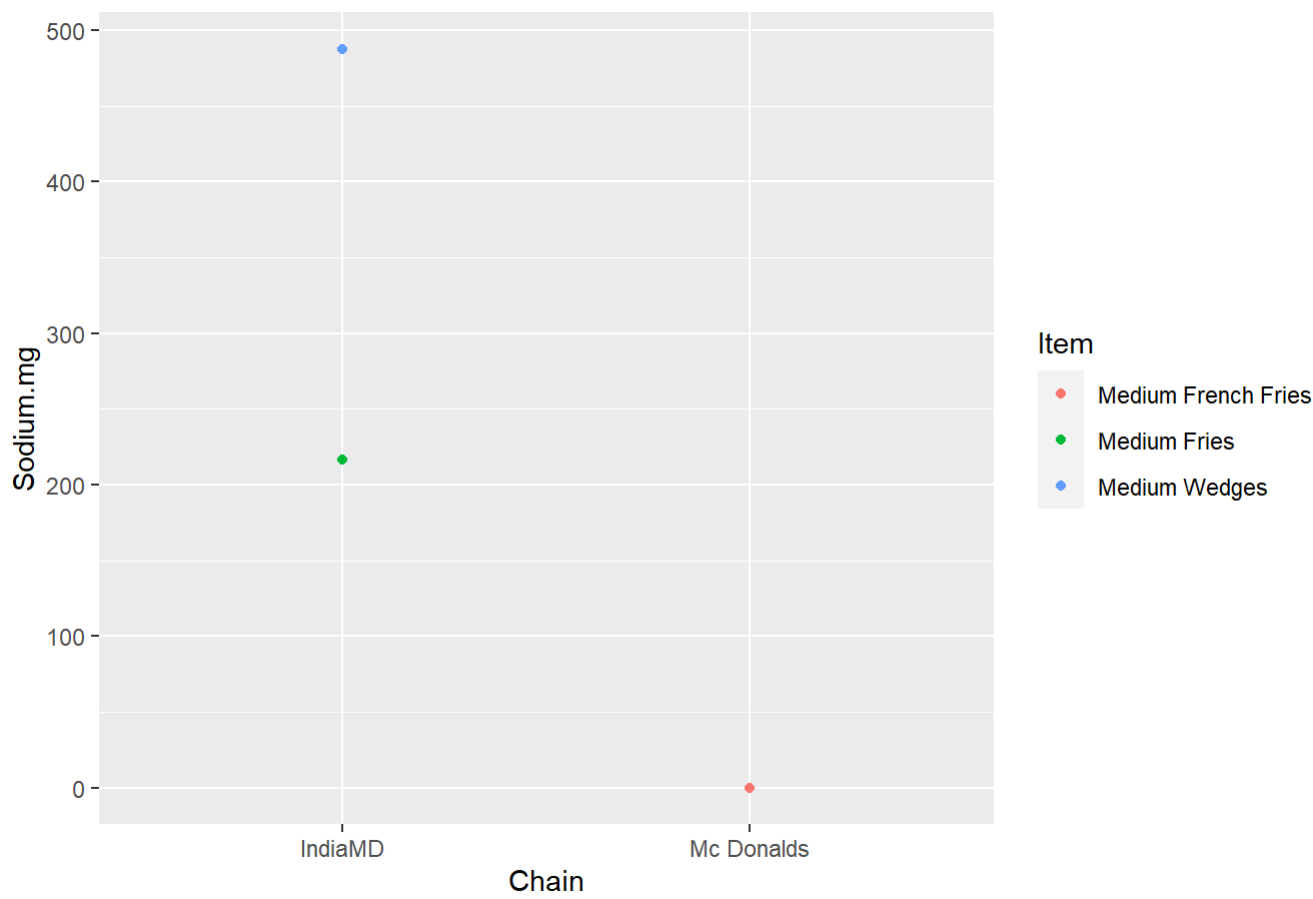
Instead what we are seeing is that India MD has a smaller serving size, caloric value, and sodium content then Americas.



America vs India French Fry Sodium Comparison



America vs India French Fry Serving SizeComparison



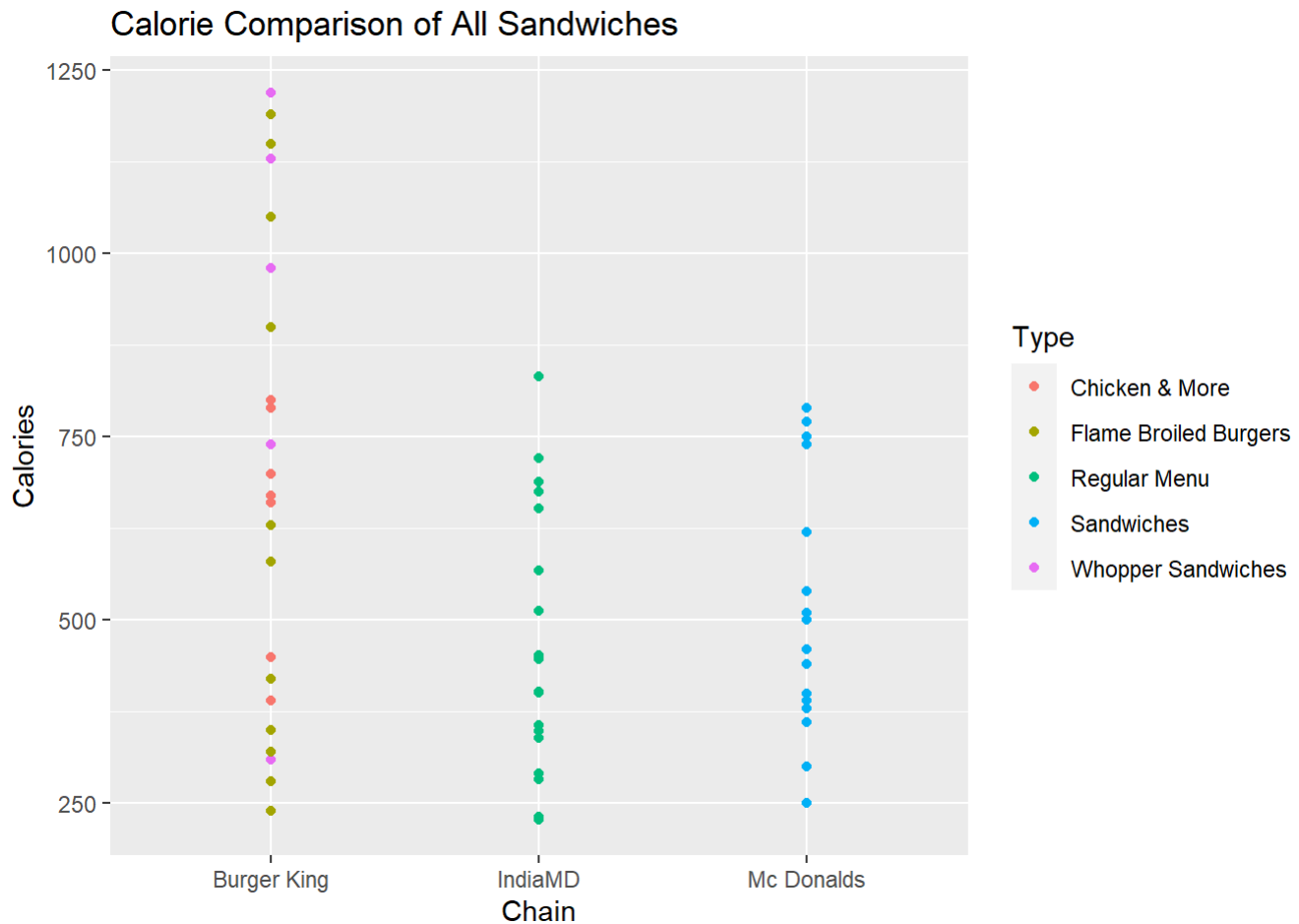
Analysis Summary 1

So far we have compared the iconic burgers of BK, McDonald America, and McDonald India. We have seen that BK has the most calories per serving in their meals. We have also seen that Indian McDonalds tends to have smaller serving sizes than its American counter part for the same item. Now that we have seen 1 to 1 comparisons, we can start looking at larger data sets to see if any of the trends hold true.

Menu Comparison

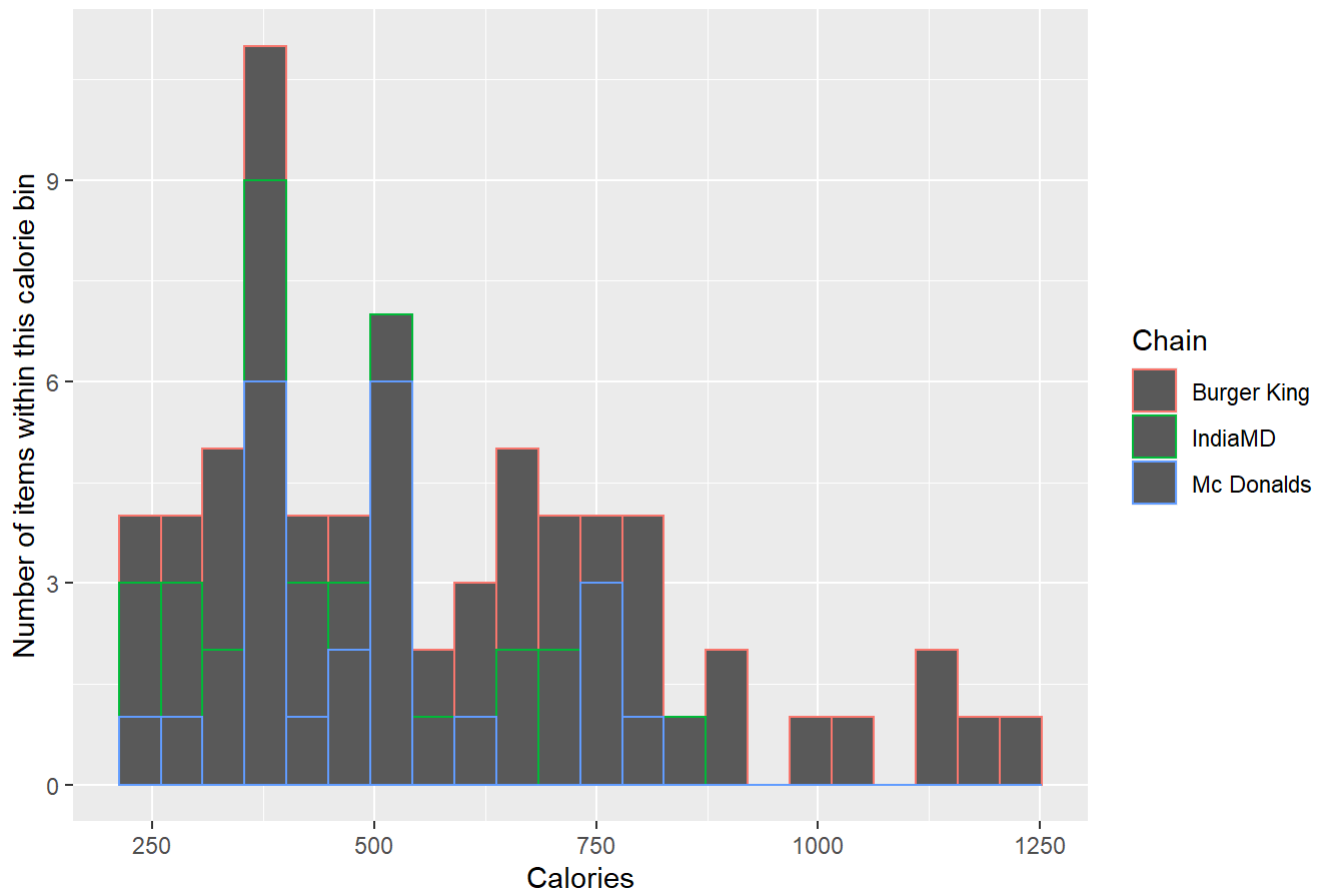
One analysis from our initial findings was that India MD was the healthiest. The issue with this study is that we looked at a small sample size. Without taking the entire sandwich lineup into consideration, it is hard to say if one is actually healthier than the other. To solve this, we can compare Whoopers, to MD Burgers, to MD Chicken Sandwiches in India, looking at all sandwich options from each menu. We know chicken is leaner than beef so that could be one explanation for the trend.

Lets take a look at the entire Sandwich and Burger menu from all three menus. Here we can see that Burger King does have several higher calorie items. The Whooper and the burgers have several entry points over 1000 calories.



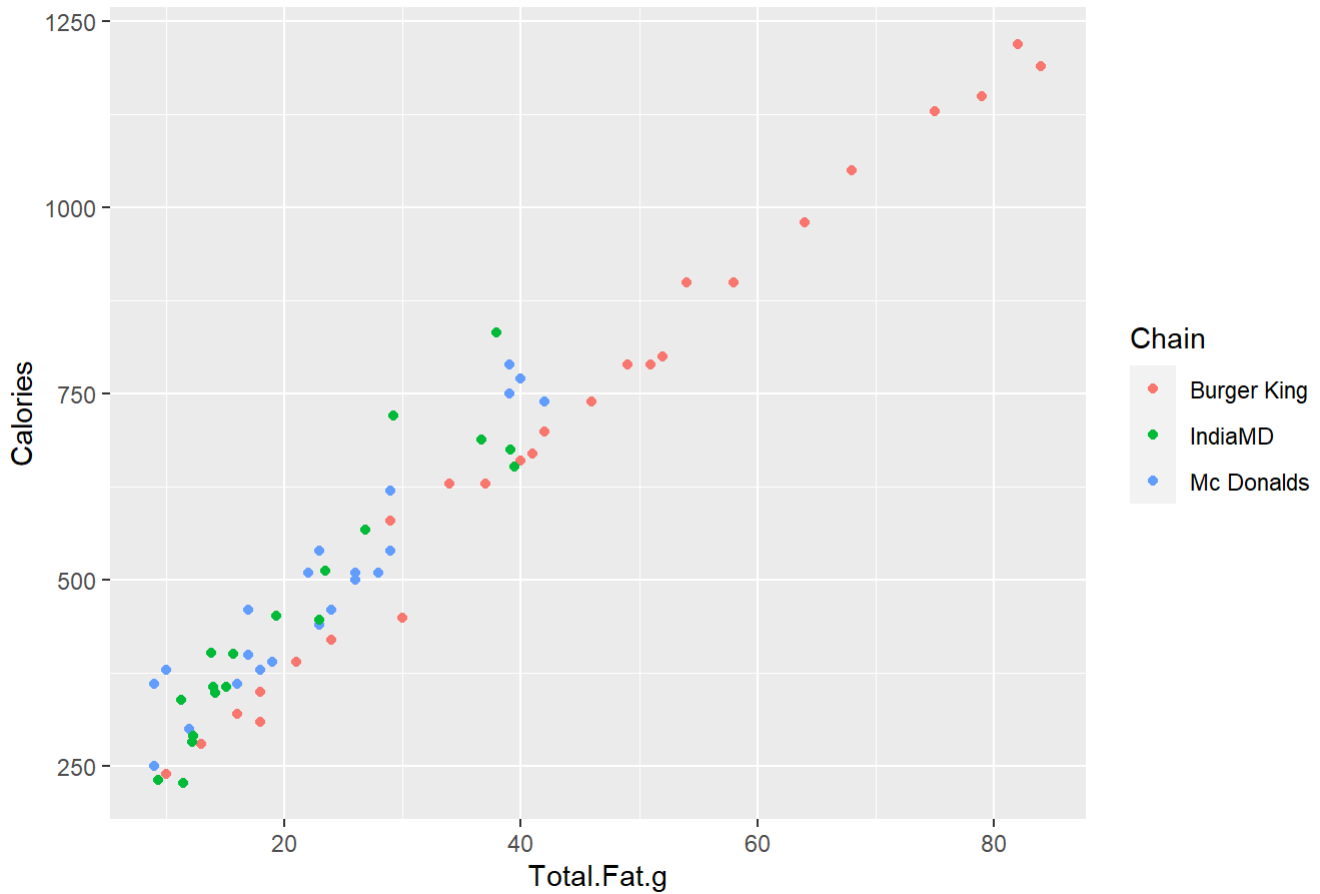
We can use a histogram chart to bin the caloric values from each of the burgers. By doing this we see that India McDonald does have several low calorie burgers and sandwiches. That is not to say that McDonalds America and Burger King don't also have low calorie options, but we do see their menus populated with higher caloric items.

Histogram Comparison of All Sandwiches



One item of interest is the fat content of the burgers. Knowing that fast food is typically on the healthier side, we can see if there is a correlation between the fat content and the calories of each of the menu items at each chain.

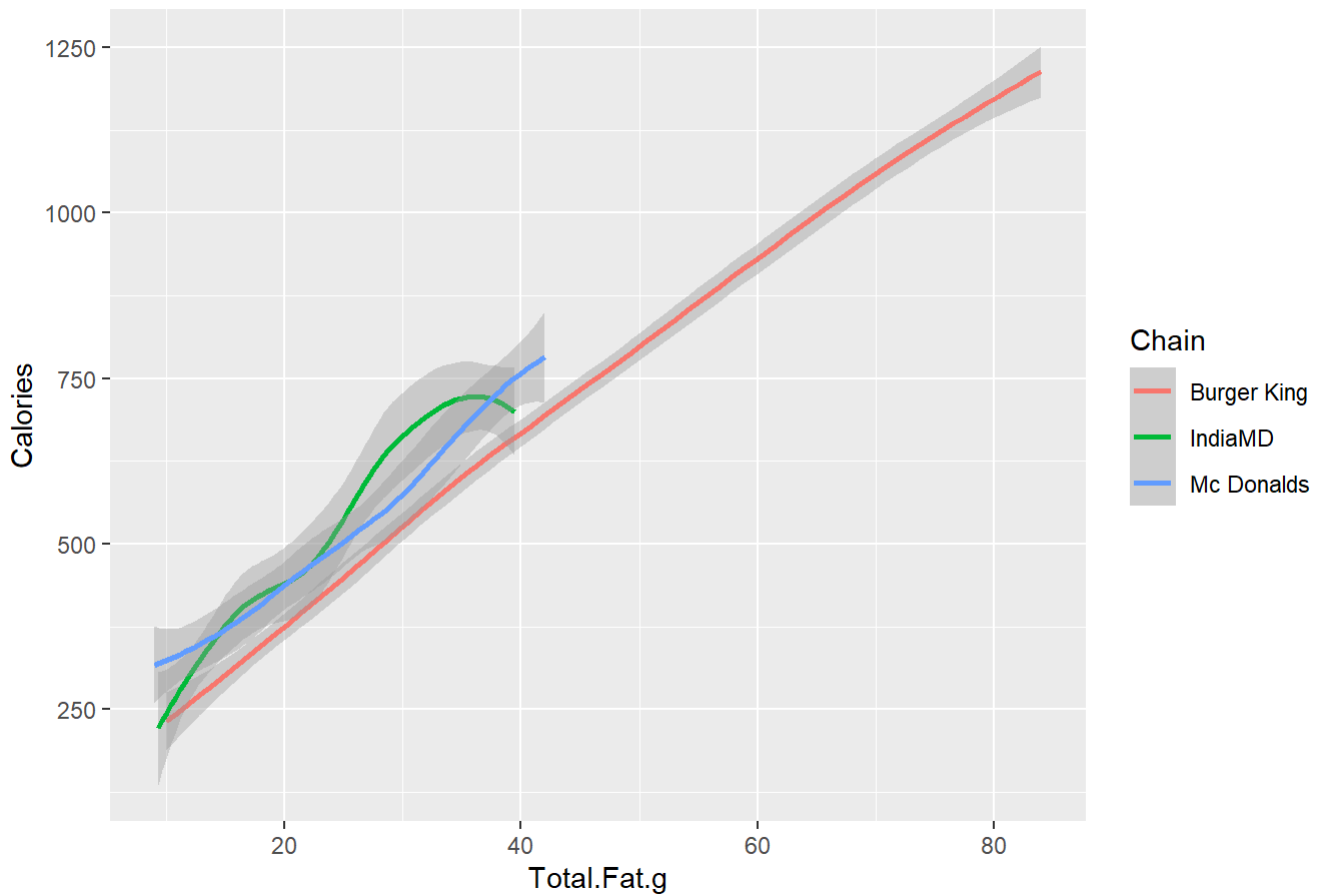
Fat Comparison of All Sandwiches



We see that Burger king has the highest fat content, and it has a a clear correlation between fat content and calories. We can dig deeper into this by looking at a smooth line plot

```
## `geom_smooth()` using method = 'loess' and formula 'y ~ x'
```

Fat Comparison of All Sandwiches



The line plot shows an extremely linear trend. We can use the correlation coefficient to see just how correlated the two are. We see a 0.97 correlation showing that the fat content is directly correlated to the calorie content. It is clear in the BK menu, and the two McDonalds menu's show a similar, and slightly less correlated trend.

```
cor(MassBurgerCompare$Total.Fat.g, MassBurgerCompare$Calories)
```

```
## [1] 0.9748421
```

It is worthwhile to take a look at other metrics like protein, sodium, and sugar to identify if any other nutritional information should be tracked.

```
cor(MassBurgerCompare$Protein.g, MassBurgerCompare$Calories)
```

```
## [1] 0.5290681
```

```
cor(MassBurgerCompare$Sodium.mg, MassBurgerCompare$Calories)
```

```
## [1] 0.3565384
```

```
cor(MassBurgerCompare$Total.Carb.g, MassBurgerCompare$Calories)
```

We get values between 0.37 to 0.52 for each of these items, this tells us that there likely isn't too much correlation for us to investigate this.

Analysis Summary 2

In our second set of analysis, we looked at the menus of each of the chains/locations more holistically. We saw that Burger King has the least healthiest options. We also saw a correlation between the amount of fat within one of the burgers and the calorie value of the burger.

Implications

The implications of this work is a clear analysis that BK has unhealthy options. From the fries to the whooper, it is denser and quite a bit heavier than McDonald. We also saw that the same menu item in two regions showed different values. This shows that McDonald might just have less healthy options in America.

Limitations

Some of the limitations of this study is that I didn't look at Burger Kings menu internationally. We did see that McDonald was slightly healthier overseas, and this might also be the case for BK. We also didn't have data for the grams of meat as an option. BK does have a higher fat content, and it would be helpful to see if this is just coming from the meat or the sauce or another source. If it is just the meat content and the protein content is also higher in BK, then it might not be as unhealthy as it appears.

Another thing we didn't spend time looking at was the other menu options like chicken nuggets, drinks, shakes, and dessert. We could have looked for correlation there as well, but burgers felt like the items that are more typically ordered when going to one of these chains.

Concluding Remarks

In the end, the Whooper came out as the fattiest burger, the most caloric dense, and the leader of the pack. Whether that is a good or bad thing is for you to decide. We do see McDonald in America and India having healthier options, and even BK has some healthy options for those calorie conscious. The Golden Arches of McDonald and their sandwich lineup, like the Big Mac is healthier than that of BK Whooper. There is plenty of more work that can be done to help identify the best option for you! Even if you do go to BK after this, one thing is certain, stay away from the Whooper.