

Tippie College of Business

R Programming Final Project

How do lowans purchase liquor?

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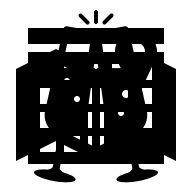
- *Main takeaways and implications of analysis*

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Introduction to Questions and Data Set



Key Questions

How do Iowans purchase liquor?

What?

Where?

When?

What types of liquor
do Iowans buy most?

What regions of Iowa
buy the most liquor?

When do Iowans buy
the most liquor?

What are the product
preferences?

What regions spend
the most on liquor?

How has COVID
impacted liquor sales?

Background on Data Set

“Iowa Liquor Sales” data set collected by the Iowa Alcoholic Beverages Division

- Retrieved from data.iowa.gov
- Includes vendor invoice data for all transactions of Class E Liquor Licenses in Iowa since 2012
 - Class E License applies specifically to stores, not bars and restaurants
 - Data set shows transactions between vendors and stores that sell directly to customers

Narrowed the scope of our analysis to sales from January 1st, 2019 to October 31st, 2020

- Began with 411,000 observations
- Narrowed in R to 406,000 observations
- Our data consisted of the following information regarding alcohol purchases:
 - Location of sale
 - Stores and vendors involved in the transaction
 - Product descriptions and categories
 - Sale quantity, containers per package, and volume of containers



Data Analysis

What types of liquor do lowans buy most frequently?

Findings

- American Vodkas was the highest sold Liquor category followed by Canadian Whiskies and Straight Bourbon Whiskies
- The American Vodkas category could be so high due to the amount of Hawkeye sold in Iowa

Category	Gallons Sold
American Vodkas	216,155
Canadian Whiskies	110,457
Spiced Rum	61,392
Straight Bourbon Whiskies	49,944
Cocktails /RTD	45,274

Product Categories by Gallons Sold



What

Where

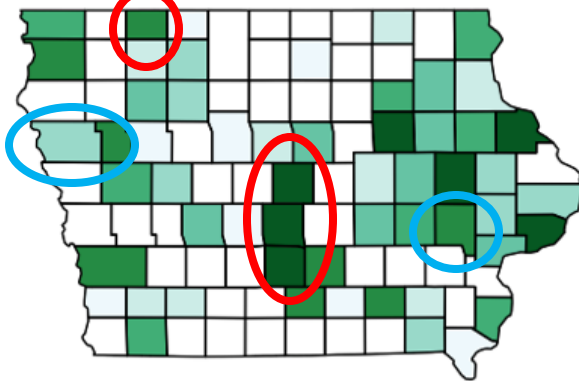
When

IOWA

What regions buy the most liquor (volume)?

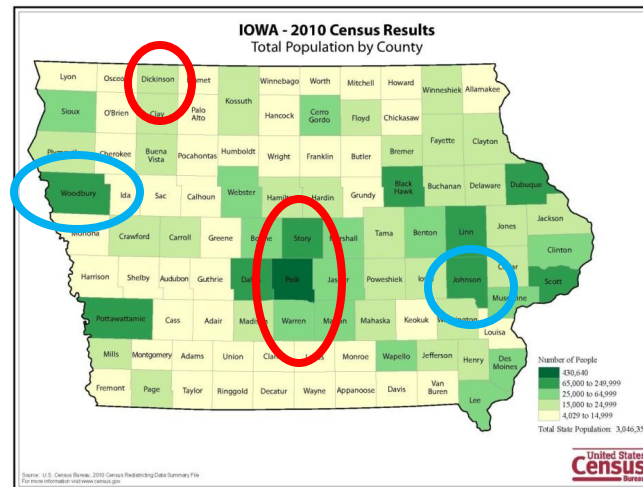
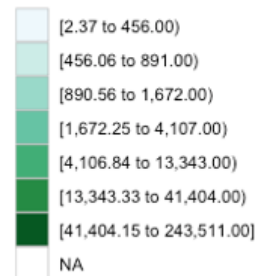
- Volume of liquor purchases driven largely by population
- Eastern and Central Iowa are the leading regions
- Story, Warren, and Dickinson outperformed based on their population (in red)
- Surprised that Johnson county was not higher on the list
- Woodbury also underperforms compared to population

Total Gallons Sold by County
Iowa Alcohol Sales



source: <https://data.iowa.gov/Sales-Distribution/Iowa-Liquor-Sales/m3tr-qhgy>

Total Gallons



<https://morningconsult.com/2016/01/29/eleven-maps-that-explain-iowa/>

County	Gallons Sold
Polk	243,510
Scott	88,092
Linn	85,831
Dubuque	73,574
Story	67,139
Warren	60,534
Black Hawk	41,404
Dickinson	28,099
Pottawattamie	27,346
Johnson	25,443

IOWA

What

Where

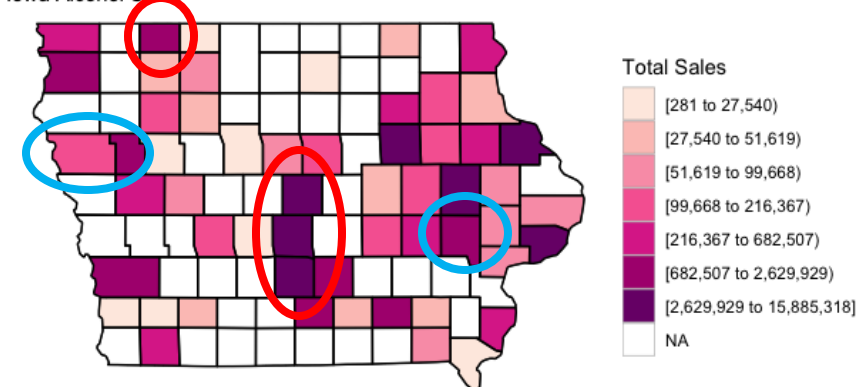
When

What regions of Iowa spend the most on liquor?

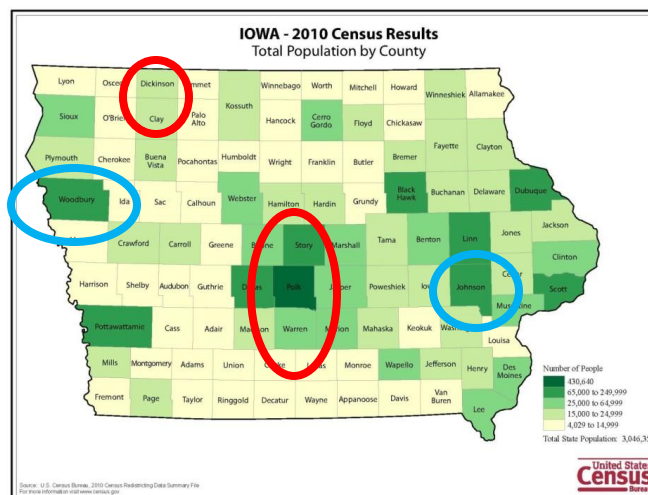
Similar trends for sales dollars as sales in volume

- Same top ten except Johnson and Pottawattamie swapped
- Trend shows that counties don't differ significantly by price of preferred liquor
- Further analysis needed for per capita data

Sales in Dollars by County
Iowa Alcohol Sales



source: <https://data.iowa.gov/Sales-Distribution/Iowa-Liquor-Sales/m3tr-qhgy>



<https://morningconsult.com/2016/01/29/eleven-maps-that-explain-iowa/>

County	Total Sales
Polk	\$15,885,318
Scott	\$5,837,773
Linn	\$5,091,410
Dubuque	\$4,364,781
Story	\$4,096,112
Warren	\$3,624,231
Black hawk	\$2,629,928
Dickinson	\$1,670,167
Johnson	\$1,553,184
Pottawattamie	\$1,466,880

What

Where

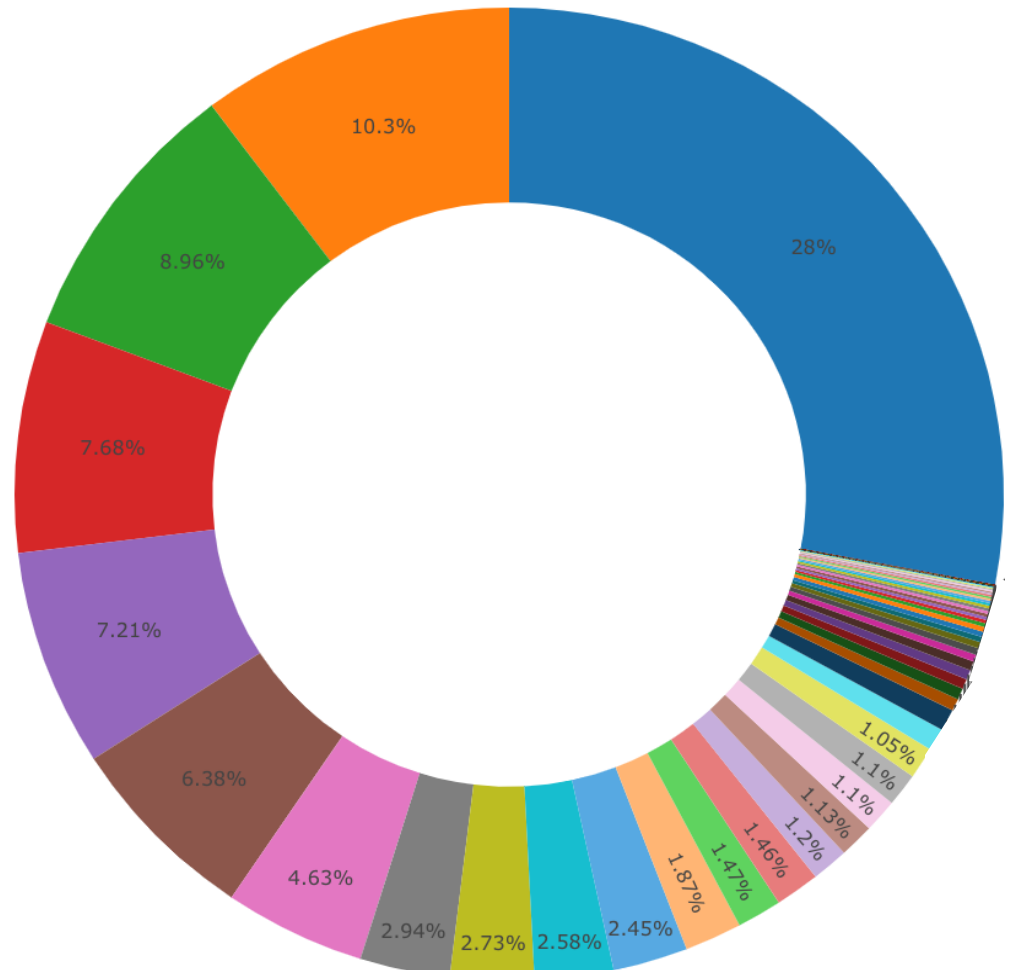
When

IOWA

What regions of Iowa spend the most on liquor?

The top 7 Counties represent 73.16% of the total Liquor sales in Iowa

- Polk 28%
- Scott 10.3%
- Linn 8.96%
- Dubuque 7.68%
- Story 7.21%
- Warren 6.38%
- Black Hawk 4.63%



What

Where

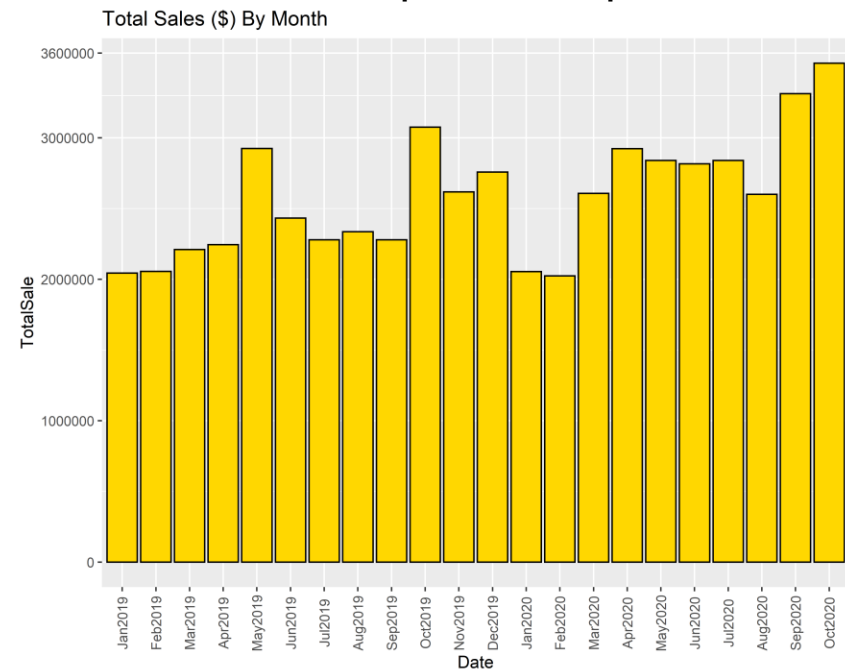
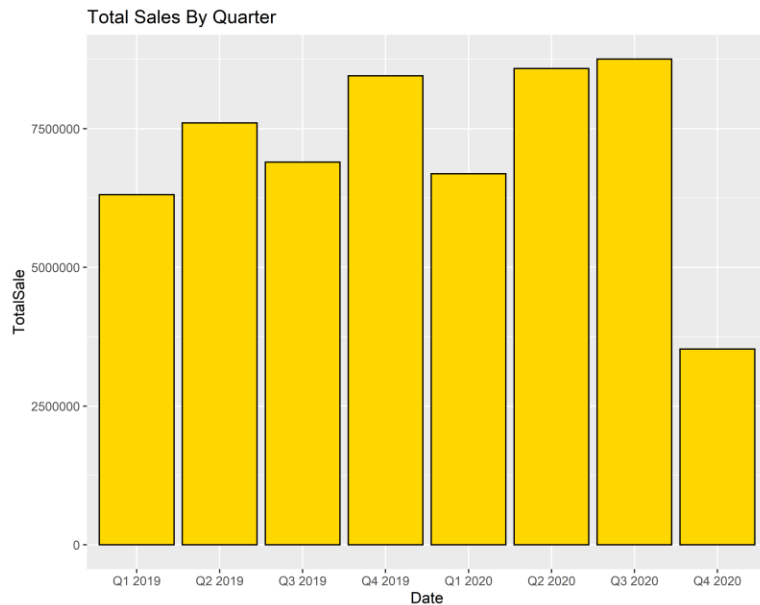
When

IOWA

When do lowans buy the most liquor?

Findings

- As COVID-19 has come into our lives, the average monthly sales in terms of USD has increased compared to the same time period the last year
- Q4 2020 only has October data, however October did \$3,528,090 in total sales... if October is any indication of the coming two months, November and December would bring Q4 to \$10,584,270. A 20.56% increase from the previous quarter



What

Where

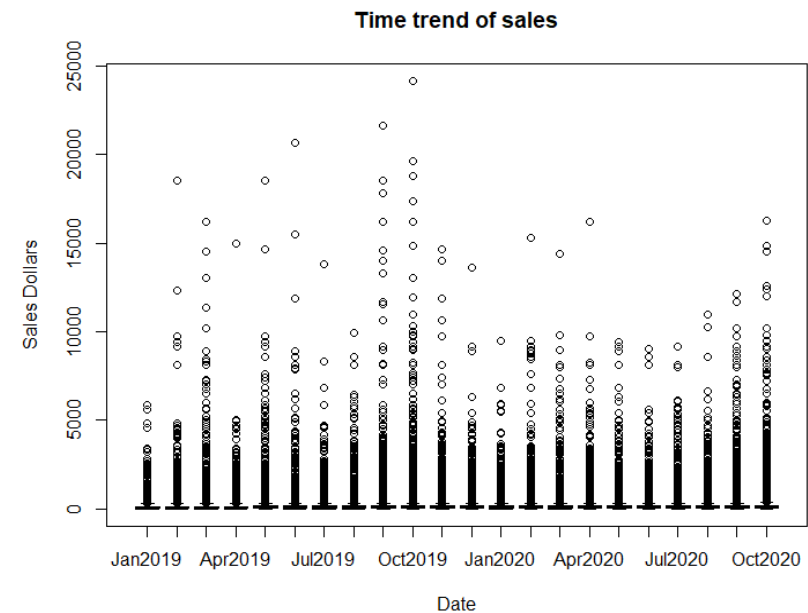
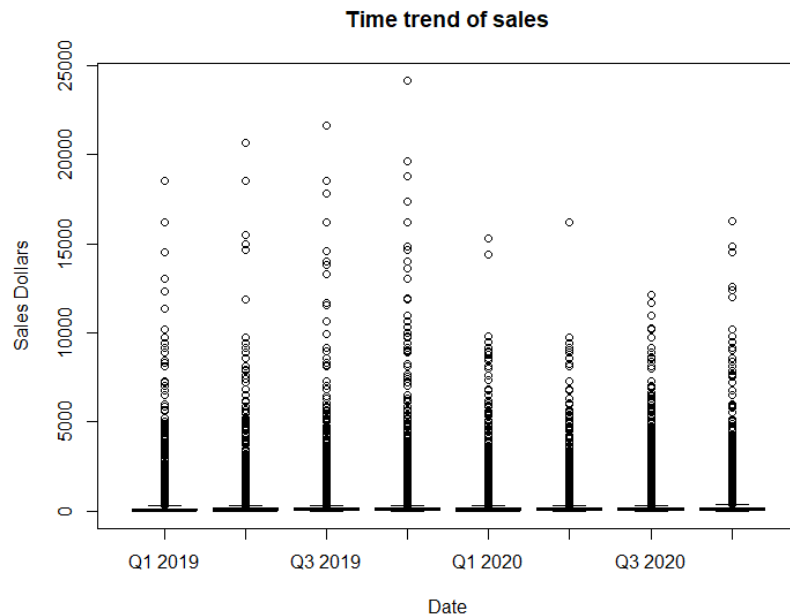
When

IOWA

How have current events impacted liquor sales?

Findings

- COVID-19 has consolidated the max transaction values but increased the average transaction value.
- The outliers in 2019 can be attributed to holiday weekends and individual days throughout the year. As these were celebrated by socially by less people, there were less outliers in the first 3 quarters of 2020



What

Where

When

IOWA

How have current events impacted liquor sales?

Date	TotalSale	TotalBottleSold	TotalVolumeSold
Jan2019	2044079	163397	35470.88
Feb2019	2055211	160487	37361.63
Mar2019	2209989	161423	36393.82
Apr2019	2245421	180233	39484.74
May2019	2925283	221867	50544.31
Jun2019	2432682	185105	40342.99
Jul2019	2279603	181827	39858.11
Aug2019	2336575	185274	39473.22
Sep2019	2279683	169603	37120.09
Oct2019	3075585	225052	48480.46
Nov2019	2617381	192237	40368.11
Dec2019	2758668	207530	43165.94
Jan2020	2054092	162287	34101.22
Feb2020	2023608	155514	33111.95
Mar2020	2607512	196688	42638.73
Apr2020	2924213	214912	49424.66
May2020	2840464	214173	48182.17
Jun2020	2816812	208974	45364.39
Jul2020	2839950	209397	45868.78
Aug2020	2601418	192375	41600.28
Sep2020	3312917	230882	51146.54
Oct2020	3528090	244638	51895.70

Findings

- April – Sept (Q2 and Q3) in their respective years are the only month/quarter columns that are complete for both years to compare COVID-19 data
- May is the only month in 2020 from April – Sept that is lower than its 2019 month. Both quarters are higher in 2020 than in 2019

Date	TotalSale	TotalBottleSold	TotalVolumeSold
Q1 2019	6309280	485307	109226.3
Q2 2019	7603387	587205	130372.0
Q3 2019	6895861	536704	116451.4
Q4 2019	8451634	624819	132014.5
Q1 2020	6685212	514489	109851.9
Q2 2020	8581489	638059	142971.2
Q3 2020	8754285	632654	138615.6
Q4 2020	3528090	244638	51895.7

What

Where

When



Key Findings

Conclusions and Takeaways

Main Findings

- The best-selling category of liquor in Iowa is American Vodka; however, the top selling individual product was Black Velvet Whiskey.
- Polk county consumed and purchased (by total price) the most alcohol in Iowa, but Story, Warren, and Dickinson outperformed on both consumption and purchases when compared to their 2010 census data.
- Quarter 4 in 2019 resulted in the highest sales for the year, and Quarter 4 for 2020, based on our projections, looks to be the best performing quarter in 2020. The effects of COVID in 2020 show increased sales throughout the year, but alcohol sales increased dramatically following COVID outbreaks, as expected.

Implications of Findings

- As COVID cases continue to rise, alcohol sales and consumption should also rise.
- Black Velvet Whiskey may want to consider increasing supply in Iowa should COVID worsen.

Challenges

Loading and Cleaning Data

- Issue with loading the data into script.R using the URL method due to the size of the data (20,095,649 observations and 24 variables)
- Couldn't connect population data to get per capita values
- Lost some county information in narrowing our data

Analysis Limitations

- Couldn't group major retailers because each store had franchise name
 - Each location of HyVee, Target, Walmart, had a distinct name, too hard to aggregate on large scale given time constraint

Sources:

- <https://data.iowa.gov/Sales-Distribution/Iowa-Liquor-Sales/m3tr-qhgy/data>
- <https://morningconsult.com/2016/01/29/eleven-maps-that-explain-iowa/>