STA304 Paper 1

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Abstract

Homeless population is an important index to measure one city's degree of happiniess. This paper explores the total homeless population and the different population groups in total homeless population in the city of Toronto by analyzing data provided by Toronto's Shelter Management Information System (SMIS). Single Adult has make up the majority of homeless population in Toronto. While the total homeless population in Toronto doesn't show obvious trend of increasing or decreasing in long term from 2021 to 2021, it do have some increaing trend in the short run from Septermber to November in 2021.

1. Introduction

Homelessness describes the situation of an individual, family or community without stable, safe, permanent, appropriate housing, or the immediate prospect, means and ability of acquiring it. People become homeless for a variety of reasons, including job loss, divorce, domestic violence, mental illness, poor physical health, substance misuse, and physical, sexual, or emotional abuse (Victor 2021).In Canada, Homeless has always been a controversial topic. Following a huge disinvestment in affordable housing, structural transformations in the economy, and reduced spending on social assistance, widespread homelessness arose in Canada in the 1980s. Stakeholders throughout the country have tried and tested methods to solve the problem since then. These efforts, which have mostly focused on providing emergency assistance, have stymied substantial development (Victor 2021). The problem of homeless is especially serious in Toronto. On any given night, there are over 10,000 homeless people in Toront. The economy and housing market are the primary causes of homelessness in Toronto. Rental costs have risen considerably in the last ten years, and the shortage of affordable housing has reached new highs. The majority of shelter users get Ontario Works or Ontario Disability Support, yet social assistance rates are unresponsive to local economic factors, resulting in a widening affordability disparity. The most major barrier to getting individuals out of shelters is a lack of financial resources (Victor 2021)[1].

The City of Toronto funds and operates services dedicated to people experiencing homelessness in Toronto. In this paper, we are going to discuss the population of homeless people based on data provided by Shelter Management Information System (SMIS), which shares information about people experiencing homelessness who are entering and leaving the shelter system each month. In our data analysis, we are about to discuss the our topic from three aspects. First, we are going to analyze the distribution of different social group of homeless people. Then, we are going to explore the monthly enter and exit headcount of city funded shelter. What's more, we will also discuss the population of newly identified people using shelter and the population change in actively homeless people. This paper aims to explore the reasons and causes behind homeless problem in Toronto, especially considering the influence of Covid-19 pandemic.

This paper contains 2 major parts: Introduction and Data. In Data section, there are 3 subsections: Data source, Methodology and Data Collection and Data characteristics. In Data source, we are going to

[1]https://github.com/BellaTang12/304-paper1

generally talk about the the data's background information. In Methodology and Data Collection and Data characteristics, we are going to discuss how the data was collected and biases of this dataset. In the part of Data characteristics, we will analysis each variables in the dataset in details with proper numerical and graphical summaries displayed in order to explore the relationship between different population group and homeless problem. This paper analysis using tidyverse (Wickham et al. 2019), kableExtra(Zhu 2021) and dplyr(Wickham et al. 2021) packages. Data is derived from open data Toronto (Gelfand 2020)[2].

2. Data

2.1 Data source

The data used in this report comes from the Shelter Management Information System (SMIS) managed by city of Toronto. The City of Toronto finances and operates programmes for those who are experiencing homeless in the city. The Shelter Management Information System (SMIS) is being used to accept people into overnight services such as emergency shelters, respites, and other related services (such as hotel/motel program and warming centres). The Shelter System Flow data provides information about displaced populations who enter and exit the shelter system each month, including the number of unique people who have used the shelter system at least once in the previous three months and are recognised to be continually suffering homelessness (ie; they were not discharged to permanent housing).

This data sheds light on who is suffering homelessness and how the city's system is operating. It will also assist in tracking progress toward the goal of reducing homelessness in Toronto to rare, short, and infrequent incidents. Over time, the data will be expanded to include more people, such as those sleeping outside and those who use non-city-funded nighttime homelessness programs, in order to present a more complete overview of all those people who experience homelessness in Toronto. The Open Data collection will be released once a month, on the 15th of each month (or the next business day). When a new data set is created, an updated data set for the prior month will be included. The reason for this is that the discharge field in SMIS remains active for two weeks in order to improve the correctness of each client's ultimate discharge disposition. When the new data extraction is finished, the prior month's data will be replaced. This data was last updated on January 7th, 2022.

2.2 Methodology and Data Collection

This data captures people experiencing homelessness who are entering and leaving the City of Toronto shelter system each month. The data is gathered through daily reported data of the shelter and overnight services system which is based on a snapshot of the system at 4 a.m. Individuals counted in this data includes a count of all people served in a service area, sector, or program.The Open Data collection will be released once a month, on the 15th of each month (or the next business day). When a new data set is created, an updated data set for the prior month will be included. The reason for this is that the discharge field in SMIS remains active for two weeks in order to improve the correctness of each client's ultimate discharge disposition. When the new data extraction is finished, the prior month's data will be replaced (C. of Toronto 2021).

According to the collection process of the data, people who are entering the shelter system (Inflow) includes 3 types: Newly identified, Returned from Permanent Housing and Returned to Shelter. Newly Identified is defined as People who entered the shelter system for the first time. Returned from Permanent Housing is defined as people who were using the shelter system before moving to permanent housing have now returned. Returned to Shelter is defineded as people who had previously used the shelter

[2]https://github.com/BellaTang12/304-paper1

system but had not used it for at least three months have now returned. This may be referred to as "Returned from Inactive" in some other communities. People who are leaving the shelter system (Outflow) includes 2 types: Moved to Permanent Housing and No Recent Shelter Use. Moved to Permanent Housing is identified as people who have moved from the shelter system to permanent residence. No Recent Shelter Use is identified as people who have previously used the shelter system but have not done so in the last three months. This may be referred to as "Moved to Inactive" in other communities (C. of Toronto 2021).

Although the dataset contains information of homeless population in Toronto, it is not an accurate representation of the city's homeless population.There's biases in the way the data is collected. First, the data only includes persons who have utilized an overnight programme and excludes people who are merely sleeping outside or who use other types of homeless shelters. Second, The dataset does not include shelters that do not use SMIS and are financed by other levels of government. It is estimated that roughly 18% of people experiencing homelessness in Toronto are not being captured in this data, according to the most recent Street Needs Assessment (C. of Toronto 2021).

2.3 Data characteristics

The Toronto Shelter System Flow dataset contains data of all homeless people who have used shelters funded by city of Toronto and has been recorded by Shelter Management Information System (SMIS) from year 2020 to 2021. There are 180 observations and 18 variables in the original dataset. In the data cleaning process, all the rows with missing values are removed. Two new variables are created: total enter and total leave. The variable total enter is created by adding up all 3 types of people who enter the shelter: Newly identified, Returned from Permanent Housing and Returned to Shelter while variable total leave is created by adding up all 2 types of people who leave the shelter in each month: Moved to Permanent Housing and No Recent Shelter Use. Then, 7 columns are selected for further analysis. After data cleaning, there are 180 observations and 7 variables remaining in the dataset. The 7 variables are: reported data, population group, population group percentage, total enter, total leave, newly identified and actively homeless[3].

[3]https://github.com/BellaTang12/304-paper1

2.3.1 Population group and population percentage

According to information provided by Open data Toronto, the variable population indicates different population groups in this report. In the variable population, each row represents different groups: all population, chronic, refugees, families, youth, single adult and non-refugees (C. of Toronto 2021).All populations refers to the total number of people in the report, regardless of their demographics. Chronic (as in chronic homelessness) refers to people who fit one of the two requirements listed below, as defined by the federal government: The person has a minimum of 180 overnight stays in the last year (365 days); or the person has recurrent overnight stays with a cumulative duration of at least 546 nights in the previous three years. Families refers to people who are registered to stay in a family-designated overnight program. Youth refers to unaccompanied minors who are between the ages of 16 and 24 at the end of the reporting month and are not members of a family as defined above. Single Adult refers to a person who is single and living alone. Refugees refers to individuals who identify as refugees upon entering a shelter system or who have completed their entry into a refugee programme. Applies to all members of the household, as confirmed by the household leader. Non-Refugees refers to individuals who do not meet the description of a refugee as stated above. Indigenous refers to people who self-identify as First Nations (status, non-status, treaty, non-treaty), Metis, or Inuit in at least one of the SMIS intake(s) (Shelter Management Information System) (C. of Toronto 2021)[4].

The other variable population percentage refers to the the percentage of each population group (chronic, refugees, families, youth, single adult and non-refugees) (C. of Toronto 2021). The proportion is calculated from all the population. The table below is a numerical summary of total percentage for each population group. Below is a brief numerical summary of variable group percentage with respect to different groups:

Table 1: Summerise of Population group and population percentage

population_group	min	Q1	Q3	median	max	IQR	sd
Chronic	34.7	44.825	47.650	46.10	50.6	2.825	4.5112340
Families	15.0	16.200	26.100	19.00	28.1	9.900	4.8910577
Indigenous	11.3	11.575	11.725	11.70	11.8	0.150	0.1614330
Non-refugees	70.3	77.400	87.350	85.40	88.3	9.950	6.4427903
Refugees	11.7	12.650	22.600	14.60	29.7	9.950	6.4427903
Single Adult	62.6	64.650	73.925	71.55	75.5	9.275	4.7435922
Youth	9.1	9.300	9.700	9.45	10.3	0.400	0.3532202

From the table above, we can see that group of chronic has median value of 46.10 percent, which indicates that on average, half of the people using city funded shelter are experiencing chronic homeless. Since Chronic (as in chronic homelessness) is defined as people who has a minimum of 180 overnight stays in the last year (365 days) or has recurrent overnight stays with a cumulative duration of at least 546 nights in the previous three years. This shows that there's a certain number of people in Toronto who has been experiencing homeless for one year or even more than one year. According to the social service charitable organization, Fred Victor, 36% of homeless people have been homeless for more than one year (Victor 2021).

What's more, it is noticed that the group of single adult on percentage of makes up 71.55 percent of the total population who uses shelter in one month while the group of family only makes up 19.00 percent. It is obviously that single adult are more likely to face homeless problem than family. As for group of youth, we can see that it on average makes up 9.45 of the total population, which is still a large number since youth are expected to be very unlikely to be homeless. Refer to statistics provided by 2016 Canadian Observatory on Homelessness Press, young people between the ages of 13 and 24 make about 20% of Canada's homeless population, with at least 6,000 young people sleeping rough every night (C. H. Toronto 2021).

[4]https://github.com/BellaTang12/304-paper1

2.3.2 Total enter and total leave

Variable Total enter refers to the total number of people who uses the shelter system in one month, which include all three types of people who enter the shelter: Newly identified, Returned from Permanent Housing and Returned to Shelter. Total leave refers to the total number of people who leave the shelter system in one month, which include two types of people: Moved to Permanent Housing and No Recent Shelter Use (C. of Toronto 2021). The graphical summary of the two variables is shown as below[5]:

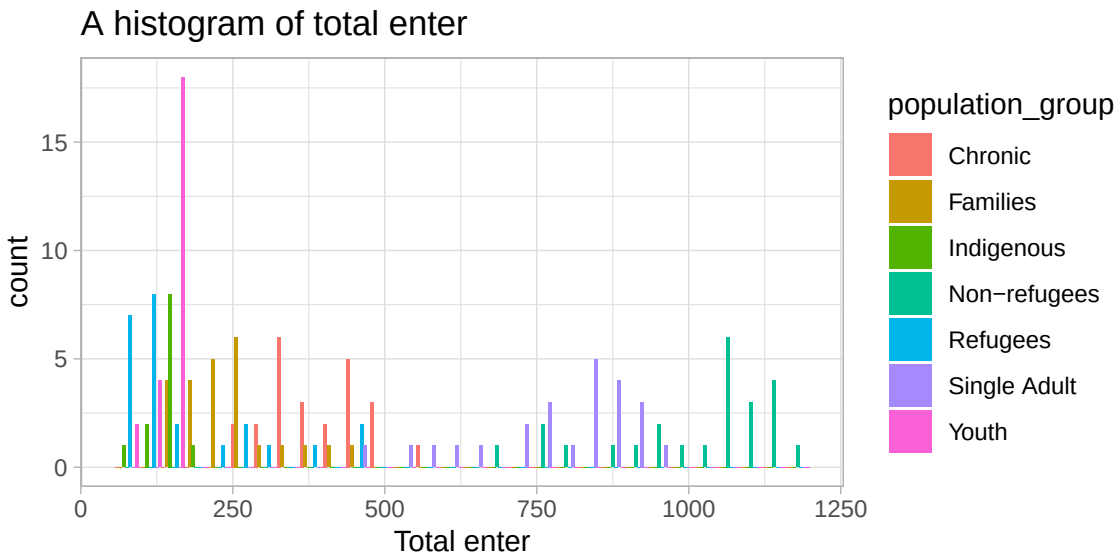
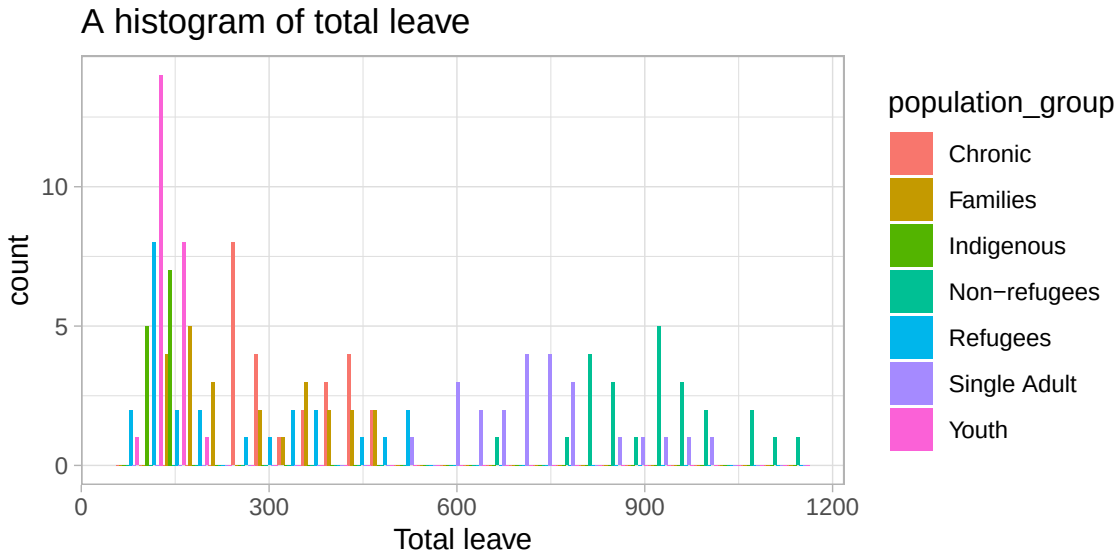


Figure 1: A histogram



[5]https://github.com/BellaTang12/304-paper1

The first two histograms shows the distribution of total enter and total leave with respect to different population groups. In the graphs, different population groups are highlighted with different color. From the two histogram, we can see that the count for youth shown by color pink are both high in total enter an total leave, which indicates that the population of youth are more likely to be homeless and use the shelter for a short time. As for population group of families, we can find that the total leave of familes is higher than total enter by comparing the two histogram. This indicates that families have a high possibility of getting rid of homeless than individuals. This may because families usually have more money to afford the rent and to move to a house.

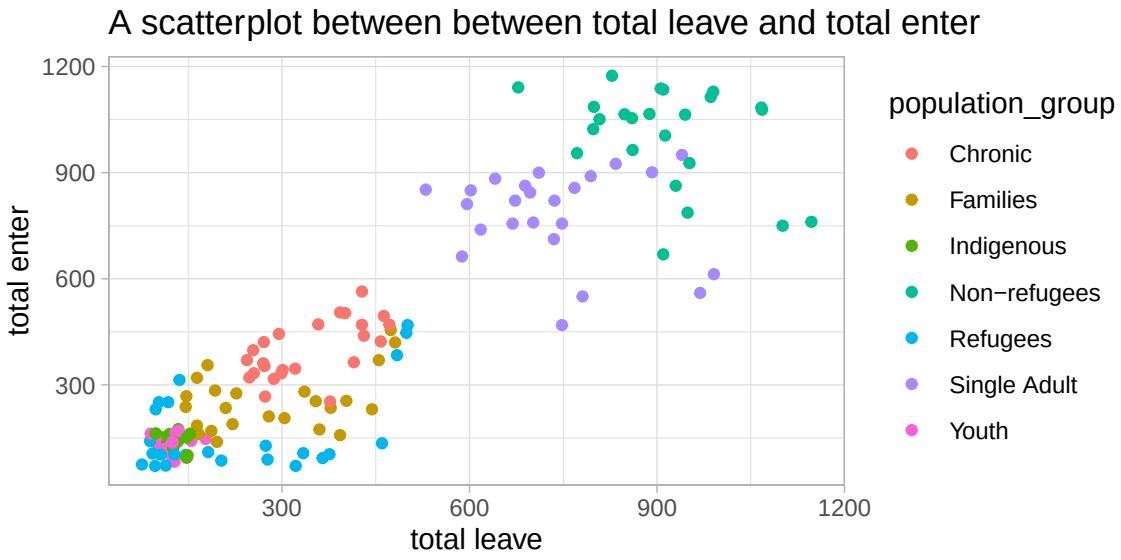


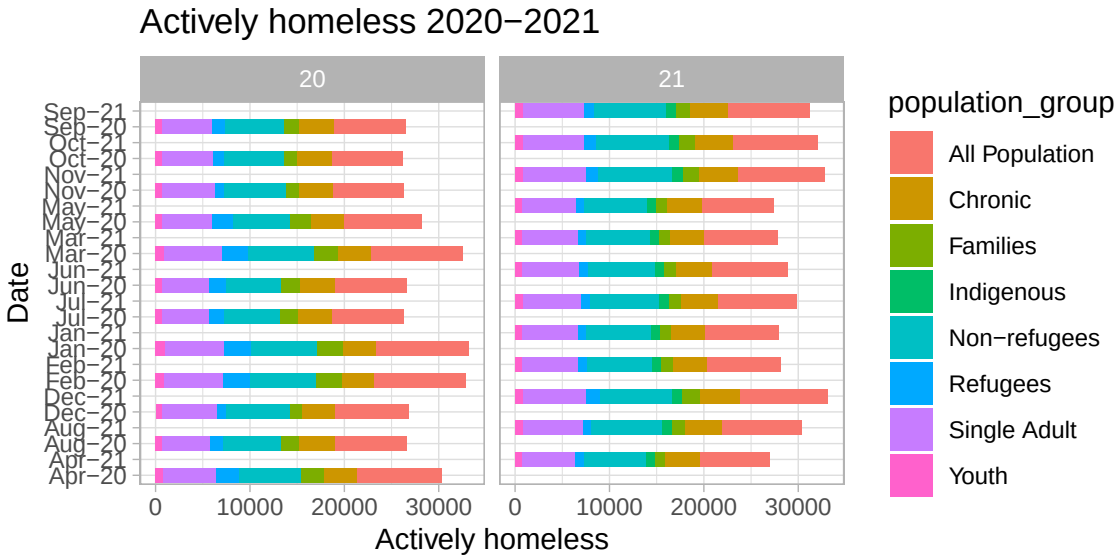
Figure 2: A scatterplot

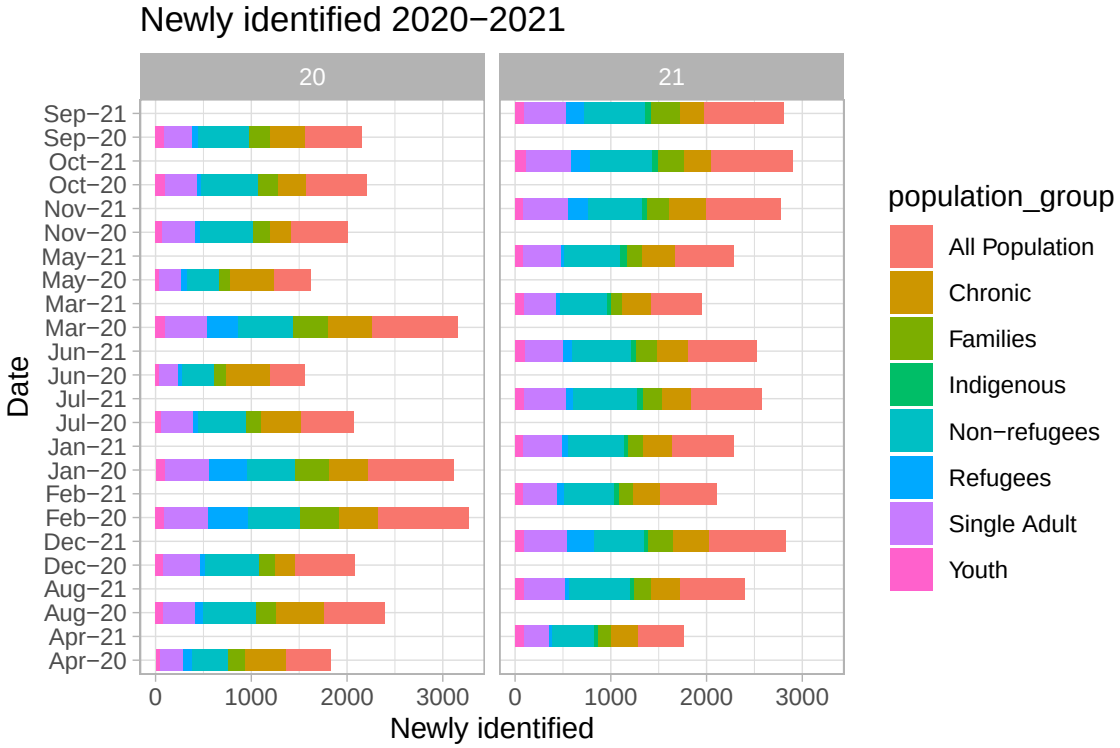
Then, the scatter plot shows the relationship between total enter and total leave of each population groups. From the scatter plot, we notices that the point of population of refugee, which is represented by color blue on the graph is very discrete. Some have very high total enter and very low total leave while some shows the exact opposite situation. This tells that the population of homeless refugees are behaving in a very unpredictable way. The number of refugees in Toronto may increase abruptly in some month. According to research conducted by the Homeless hub, Many newcomers and refugees reported high housing costs and low salaries as major obstacles to obtaining and maintaining homes. Many newcomers are unable to locate safe and acceptable homes due to low earnings and expensive rents. As a result, many of them are compelled to either share overcrowded accommodation or live in inadequate, hazardous, or unhealthy homes, which at last causes homeless problem (Hub 2017)[6].

[6]https://github.com/BellaTang12/304-paper1

2.3.3 Actively homeless and newly identified

The variable active homeless refers to people who have used the shelter system at least one time in the past three months and did not move to permanent housing. Variable newly identified refers to people who entered the shelter system for the first time (C. of Toronto 2021). Graphical summaries of the two variable is shown below[7]:





The first above graph shows the actively homeless population in Toronto by month from 2020 to 2021 and different population groups are represented by different colors. From the above plot we can see that the number of total actively homeless population didn't show any trend of increase of decrease. It is keep fluctuating around 30000. This indicates that the homeless problem in Toronto has either not been solved

[7] https://github.com/BellaTang12/304-paper1

or be more severe. Considering the effect of Covid-19 issue, this stable situation of homeless can be seen as a good sign of well functioning of Toronto city government.

The second chart above shows the change in newly identified population by month from year 2020 to 2021. Each population group are represented by different colors. From the above graph we can see that from September to November of 2021, the total population of newly identified homeless people is much higher that three month of 2020. The potential cause of this phenomenon may be the increase of rent on market. Since in September 2021, Universities in Toronto announced to start offline courses, which forces local students and international students to rent apartment and the rental price strictly increases. Some homeless people are not able to afford housing any longer because of this[8].

[8]https://github.com/BellaTang12/304-paper1

Reference

Gelfand, Sharla. 2020. *Opendatatoronto: Access the City of Toronto Open Data Portal*. https://CRAN.R-project.org/package=opendatatoronto.

Hub, The Homeless. 2017. "Neither Voluntary nor Inevitable: Hidden Homelessness Among Newcomers in York Region." https://homelesshub.ca/resource/neither-voluntary-nor-inevitable-hidden-homelessness-among-newcomers-york-region-2017.

Toronto, City of. 2021. "Shelter System Flow Data." https://www.toronto.ca/city-government/data-research-maps/research-reports/housing-and-homelessness-research-and-reports/shelter-system-flow-data/.

Toronto, Covenant House. 2021. "Youth Homelessness." https://covenanthousetoronto.ca/the-problem/youth-homelessness/.

Victor, Fred. 2021. "Facts about Homelessness in Toronto." https://www.fredvictor.org/facts-about-homelessness-in-toronto/.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.

Wickham, Hadley, Romain François, Lionel Henry, and Kirill Müller. 2021. *Dplyr: A Grammar of Data Manipulation*. https://CRAN.R-project.org/package=dplyr.

Zhu, Hao. 2021. *kableExtra: Construct Complex Table with 'Kable' and Pipe Syntax*. https://CRAN.R-project.org/package=kableExtra.