Do access awards make a difference to student equity? Comparing the neighbourhood-level median income for commencing students at UAlberta between 2018-2020, with Edmonton Community Foundation sponsored postsecondary students.

Oscar Baron-Ruiz & Dr. David Peacock

Community Service-Learning. Faculty of Arts. University of Alberta

Contact: Dr. David Peacock, 780-492-9252 or peacock1@ualberta.ca

Summary

This research is an aspect of a longitudinal research project aimed at exploring the impacts of an Edmonton Community Foundation (ECF) award for low-income students with a history of community engagement. The authors sought to map participating students' access to post-secondary education, their ongoing community engagement activities while studying, and then their graduate job outcomes. Within this goal, we partnered with staff from Performance, Analytics and Institutional Research (PAIR) at UAlberta to gain further enrolment data of a much larger group of students coming into the university to help us gain a better sense of the schools and socio-economic background from which they came. Did ECF awards benefit students from across Edmonton, including from low SES areas?

PAIR shared information from the registration records of students entering the UAlberta into Undergraduate Programs from 2016 to 2020. The data recorded the high school background of all applicants. Using spatial analysis methods (GIS), we developed maps that geolocated the Edmonton area Public and Catholic high schools within their neighbourhoods, coded according to socio-economic indices from Census data. We then used UAlberta data from years 2018, 2019 and 2020, those years corresponding to our data collected from ECF award applicants, to identify which schools were most, and least, likely to have students apply and be accepted to the University of Alberta.

The main result was a map (***Figure 1***) showing median household income distributed in the 280 populated neighbourhoods in the City of Edmonton, overlapped by symbols with the approximate location of Edmonton's Public (EPSB) and Catholic (ECSD) Senior High Schools. Those symbols had different sizes representing the proportion (%) of undergraduate applicants that accepted an admission offer to the University of Alberta during 2018, 2019, and 2020. In general, we could identify that Old Scona (a competitive entry EPSB) school and Archbishop MacDonald school (ECSD) have the highest proportion of

their students, of all schools, being accepted for studies at the University of Alberta. 74% of year 12 students from Old Scona went on to study at UAlberta over the period in question, while the figure for Archbishop MacDonald was 57%.

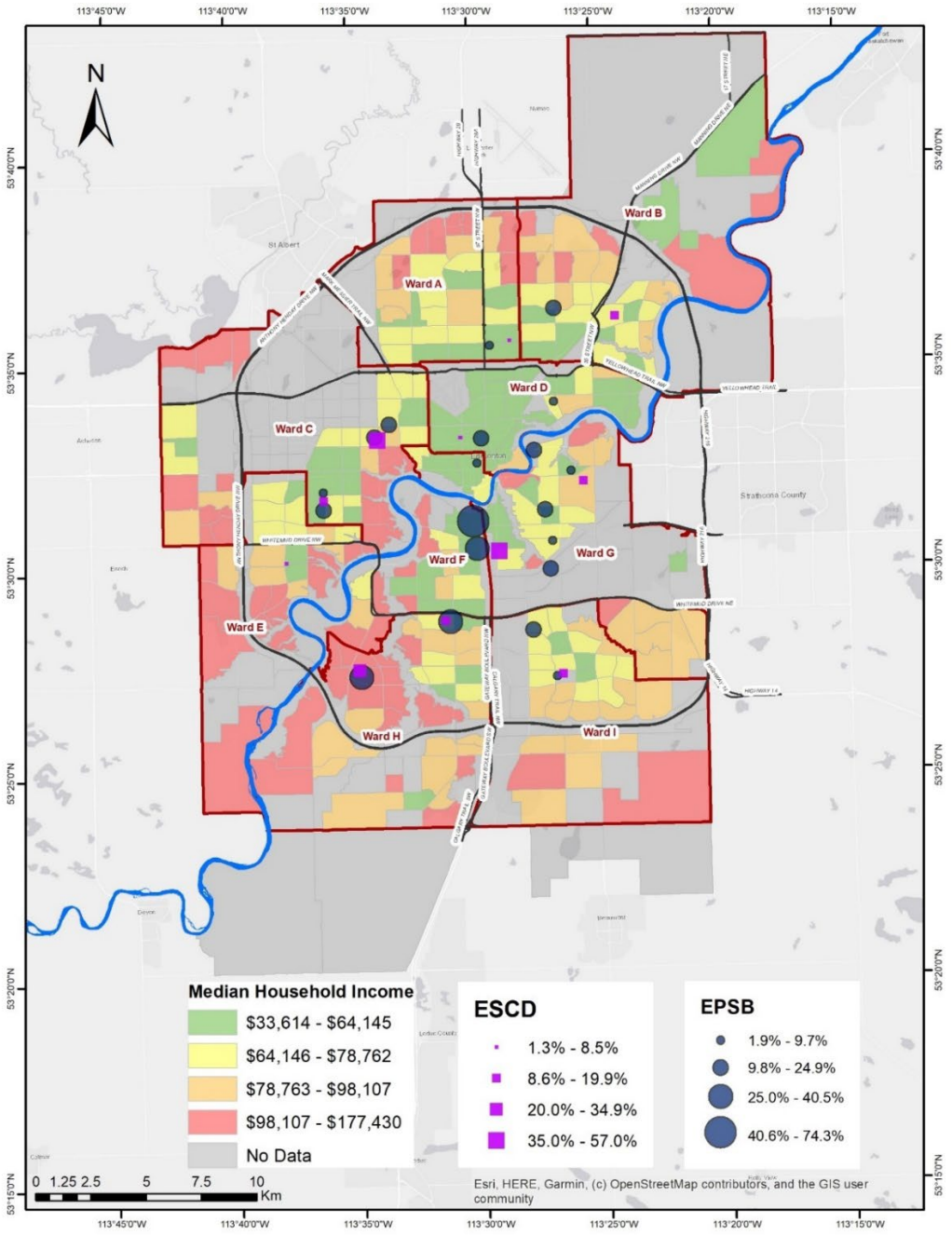

Figure 1. The map was the main result in the first report. It shows the median household income distributed by neighbourhoods (Polygons) in the City of Edmonton. Data based on 2016 Federal Census data. The geometric symbols depict the approximate location of Edmonton's Public (Blue circles) or Catholic (Purple squares) Senior High Schools. The symbols size represents the proportion (%) of undergraduate applicants that accepted an admission

offer to the University of Alberta during 2018, 2019, and 2020 normalized by Year 12 schools' population. Year 12 statistics obtained from Alberta Education.

The analysis offered a useful representation of where our students are coming from (high school), which was an initial picture of student pathways to post-secondary education. Yet the neighbourhood location of schools does not always reflect the socioeconomic status of the students. A 'magnet' school effect is clearly operating in Edmonton when students from across the city travel to a school such as Old Scona. After some discussion, we identified that more detailed spatial information, such as the postal code of the students' registered at the UAlberta, was needed to better map neighbourhood level mean income level to compare with the location of residences of participant students in our research project. After negotiations and important provisions for student privacy and anonymity, PAIR provided the research team the postal code of every student registered at the UAlberta from Fall 2018 to Fall 2021. This new database included 9,404 records of students from the Province of Alberta who had registered at the University of Alberta upon completion of secondary school.

Methods

Using geospatial analysis, we developed crucial context maps for our study, including: 1) a heat map that depicts different levels of student population density across the City of Edmonton, and 2) Geolocation of ECF and UAlberta student populations within their neighbourhoods. Neighbourhoods were coded according to socio-economic indices from Federal census data. We used data from years 2018, 2019 and 2020, those years corresponding to our data collected from ECF award recipients, to compare socio-economic background of students' areas of residence in the Province of Alberta at the time of their application to the University of Alberta, and that of ECF awarded students entering UAlberta. More details appear below in the appendix.

Results

Probably without great surprise, we identified that students, who manage to enter the University of Alberta upon completion of secondary school, come from most privileged areas of the City of Edmonton. We found the 70% of registered students from 2018 to 2020 living in neighbourhoods categorized as high and medium-high income and 10% from low-income areas in Edmonton.

In contrast to the broader UAlberta student population, the majority of ECF awardees entering their first year of university were concentrated in the medium income SES zones of the city, representing 36%, followed by medium-high zones with 30%, low-income 19%, and high-income areas with 15%.

Maps on the following pages summarize our analysis of the data from PAIR. ***Figure 2*** shows a heat map representing the levels of student population concentration across the city. This is an image of the original datasets; we spatially plotted the addresses of 6,750 UAlberta commencing students and 281 ECF award winners across Edmonton. Most of the students entering the University of Alberta come from the most populated areas of the city. However, there is a greater concentration of students from the southwest of the city. The ECF's awardees were concentrated in the downtown and in the vicinity of the University of Alberta, followed by students living to the east and south of the city.

Figure 3 depicts the 402 neighbourhoods registered in the city. These neighbourhoods were classified, according to the median household income recorded in the 2016 Federal Census, into four quartiles; low ($33,614 - $64,145), medium, medium-high ($78,763 - $98,762), high income households ($98,107 - $177,430). Low- and medium-income neighbourhoods predominate in the central and northern areas of Edmonton; the medium-high and high-income regions are located further from downtown, with an important concentration in the south of the city, and especially near the North Saskatchewan river. Neighbourhoods without information are sparsely populated zones or industrial areas or education facilities such as the University of Alberta campus.

In general, students registered at the UAlberta come from all areas all the city but are particularly concentrated in the southwest part (as also observed on ***Figure 2***), which is an area dominated by medium-high and high-income neighbourhoods. Lower density areas for UAlberta students are concentrated in the peripheries of the city and in the low- and medium-income areas of downtown, southeast, and north side. ***Figure 3*** also shows that ECF awarded students are amply distributed in the centre-east and north side of Edmonton and to a lesser extent in the south.

With the information produced, we will be able to exemplify the "Journey to University" as a form of social mobility. The geospatial methods allow us to highlight the journey from the students' neighbourhood to campus. While this is a literal journey across space, it is also a socioeconomic and cultural journey for many students.

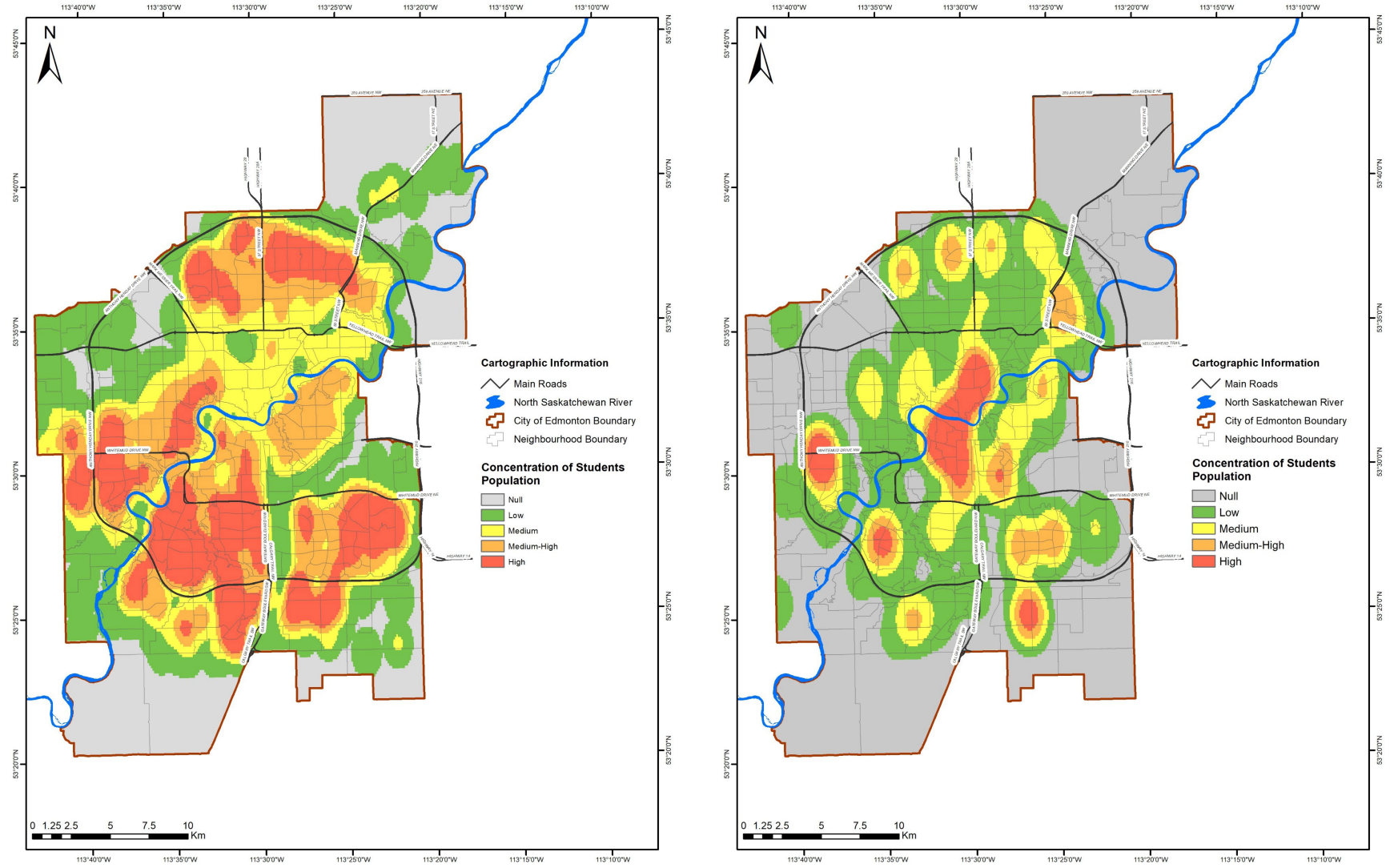

Figure 2. Heat maps of the distribution of ECF's awarded students from 2018 to 2020 (Right) and the Edmonton's high school students that during the academic year 2018, 2019, and 2020 selected the University of Alberta as their post-secondary education institution (Left).

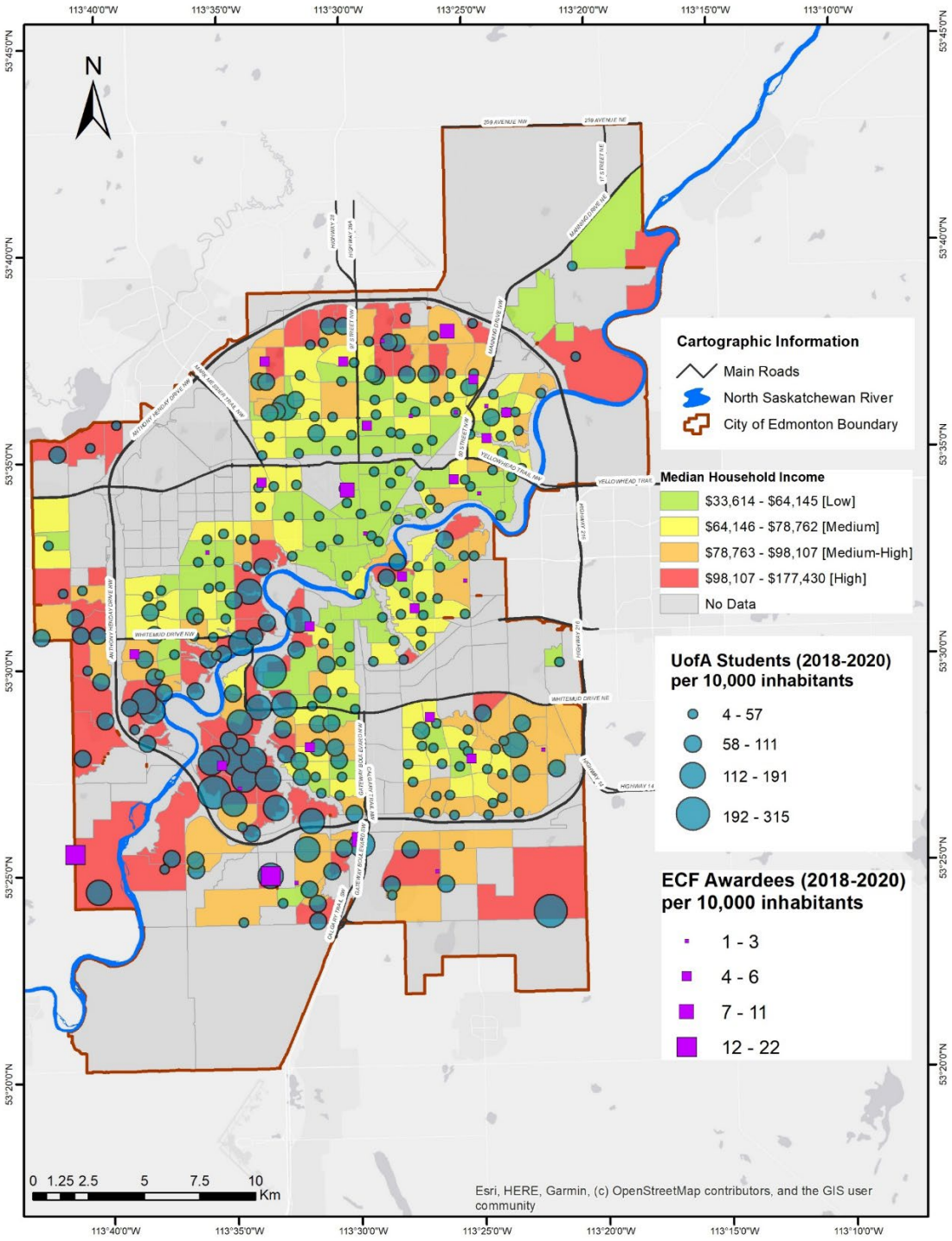

Figure 3. The map shows the median household income distributed by neighbourhoods (Polygons) in the City of Edmonton. This information was built from the 2016 federal census data. The violet squares depict the approximate location and density of the "first year postsecondary education" students that were ECF sponsored from 2018 to 2020. The graduated dark-cyan circles are used as a magnifier of the distribution and density of high school students that selected the UAlberta as the institution for their undergraduate program during the academic years 2018, 2019, and 2020. Student density has been standardized per 10,000 inhabitants as population control, as some neighbourhoods are much denser than others population-wise.

Final Comment

Community Service-Learning thanks the Performance, Analysis and Institutional Research (PAIR) staff for their assistance and data sharing. this information has offered a crucial benchmark to compare the with the ECF award winners. The UAlberta student population data was an important to the project because this is an institution chosen by 60% of the ECF's awardees between 2018 and 2020.

We hope we have given you some alternative, geospatial ways to understand an element of the UAlberta student body's socio-economic composition.

Appendix 1: Procedures

UAlberta Dataset

The Performance, Analytics and Institutional Research (PAIR) staff shared Postal Code and High School attended of students entering the UAlberta into Undergraduate Programs from 2018 to 2021. This enabled to spatially represent all students entering the U of A, providing a picture of students' pathways to post-secondary education.

term	PostalCode	FSA	Original_Last_School	CNT_ADMTS
Fall 2018	T0A 3A2	T0A	Argyll Centre	1
Fall 2018	T0B 0V0	T0B	L'Academie Vimy Ridge Academy	1
Fall 2018	T0C 1N0	T0C	Ross Sheppard School	1
Fall 2018	T0E 0X0	T0E	Centre High	1
Fall 2018	T0G 0S0	T0G	Metro Continuing Education	1
Fall 2019	T5N 3B7	T5N	Ross Sheppard School	1
Fall 2019	T5N 3H5	T5N	Metro Continuing Education	1
Fall 2019	T5N 3H6	T5N	Archbishop MacDonald High Sch	1
Fall 2019	T5N 3J3	T5N	Ross Sheppard School	1
Fall 2019	T5N 3J3	T5N	Strathcona School	1
Fall 2020	T5N 1S9	T5N	Ross Sheppard School	1
Fall 2020	T5N 1T6	T5N	Centre High	1
Fall 2020	T5N 1T6	T5N	St Francis Xavier High School	1
Fall 2020	T5N 1V2	T5N	Victoria School	1
Fall 2020	T5N 1V5	T5N	Ross Sheppard School	1
Fall 2021	T1Y 2T3	T1Y	Province - Alberta	1
Fall 2021	T1Y 4G3	T1Y	Province - Alberta	1
Fall 2021	T2E 9A3	T2E	Province - Alberta	1
Fall 2021	T2J 1A8	T2J	Lillian Osborne School	1
Fall 2021	T2L 1R6	T2L	Province - Alberta	1

Figure 4. Sample of data received.

Figure 4 shows a sample of the data received containing postal codes of all students registered at the University of Alberta from 2018 to 2021 and previous education institutions attended. This database contained 9,404 records. With the support of two interns at CSL and using google maps and online postal codes databases, such as "zip-codes" [https://www.zip-codes.com/] and "ServiceObjects" [https://www.serviceobjects.com/blog/free-zip-code-and-postal-code-database-with-geocoordinates/], this database was filled out with the corresponding longitude and latitude coordinates of every postal code.

All postal codes were mapped and clipped to Edmonton. Then, the information was filtered to students who previous educational institution attended corresponded only to a Senior High School. Records were reduced to 6,750 students. From this reduced dataset, we identified that there were 285 students whose address was located in neighbourhoods for which the Census had not reported income data (e.g. industrial areas, campus areas). We subtracted those students from the total number (6, 465) of UAlberta students, leaving 6, 285 students from Edmonton that commenced their post-secondary education at UAlberta from 2018-2020 after finishing their secondary education.

The previous data adjustment was also applied to the 281 ECF's award winners mentioned at the beginning of the report. Again, we selected only those entering their first year of post-secondary education. This allowed the comparison with the filtered UAlberta dataset. A total of 47 awardees were considered and represented in ***Figure 3***. The other awardees were already College or University students or were continuing their education through a graduate program.

The spatial representation of both populations was completed through two spatial tools:

1) **Heat maps:** A heat map is a representation of the density of features on a map that uses colour-coded systems to differentiate regions. Coloured areas show differences in density, in this case, student population density around Edmonton. This spatial tool is useful to visualize a large number of geographic features, such as students' addresses, and directs the viewer towards the map's zones that matter most.

2) **Graduated symbols:** Graduated symbols are points that show a quantitative difference in the mapped population through a variation in size. The student population was standardized with respect to the census in each neighbourhood, applying the following formula as population control, to account for varied the varying density of population in certain neighbourhoods.

$$Population\ Standard = \frac{Student\ Population}{Neighbourhood\ Population} \times 10{,}000\ inhabitants$$

Results of data processing

1. *Maps*

Two maps were developed. The map in ***Figure 2*** shows the heat maps of the distribution of ECF's awarded students from 2018 to 2020 and the Edmonton's high school students that during the academic year 2018, 2019, and 2020 selected the University of Alberta as their post-secondary education institution. The second map shown in **Figure 3** displays the median household income distributed by neighbourhoods in the City of Edmonton; the approximate location and density of high school students that selected the UAlberta as the institution for their undergraduate program during the academic years 2018, 2019, and 2020; and the distribution and density of the "first year postsecondary education" students that received an award from ECF during 2018 to 2020.

2. Statistics

Figure 5 represents the statistics shown in the "Results" section at the beginning of this report. According to ***Figure 5*** (Top), UAlberta had 70% of its registered students from 2018 to 2020 living in neighbourhoods categorized as high and medium-high income, while 10% of students came from low-income areas in Edmonton. Students progressing from high school to the University of Alberta, in the main, come from the Edmonton neighbourhoods with the highest median levels of income.

The ECF awarded students (47) are concentrated in the medium and medium-high income SES neighbourhoods, representing 36% (17) and 30% (14) of these students, respectively. 19% of these students came from low-income neighbourhoods (9), while 15% (7) came from high-income areas with. See ***Figure 5*** (bottom).

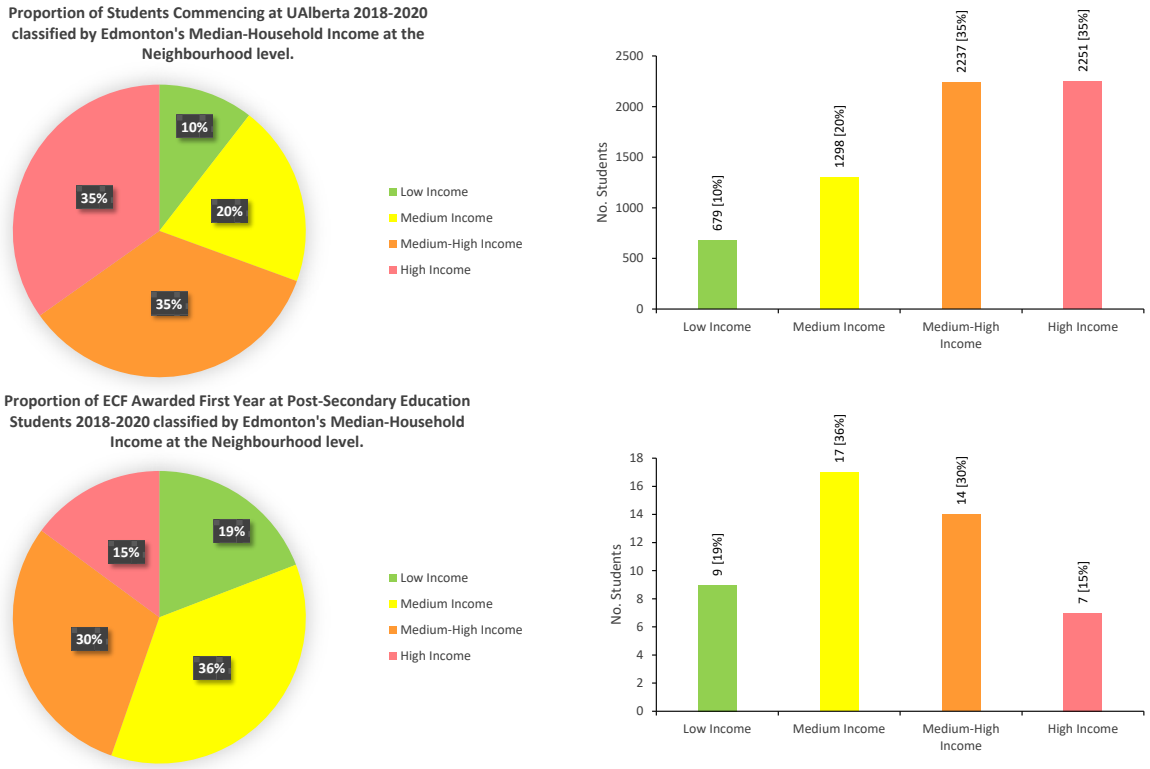

Figure 5. Neighbourhood level median income for households from which commencing students at the University of Alberta (2018-2020) resided at the time of their application to university (top); and for ECF's "first year postsecondary education" awarded students (2018-2020) (bottom).

Of course, it is important to remember that low-income people can live in higher income neighbourhoods, and high-income people can live in low-income neighbourhoods. Our mapping of the wider group of UAlberta students makes no reference to their individual income or SES level. There are aggregate figures and characteristics which cannot be simply ascribed to individuals (ecological fallacy). Nonetheless, we are suggesting that in aggregate, UAlberta students from Edmonton coming directly from high school are much more likely to live in a neighbourhood with a medium-high to high level median income than not. ECF awarded students, who declare financial need in their applications to receive the awards, are more equitable distributed across the city.