

Occupational Niche Preferences of Canada's Refugee and Non-Refugee Workers: Explorations Using Census Data¹

Fernando Mata
School of Sociological and Anthropological Studies, University of Ottawa
September 30, 2019
fmata@uottawa.ca

KEYWORDS: occupational niche preferences, refugees and non refugees, Canada

Overview

Using an admission class sample drawn from a special table from the 2016 Census of Canada, this paper explored the occupational niche preferences of refugee workers and non-refugee admission class workers who entered Canada between 1981 and 2016. The admission sample consisted of 90 ethnic groups representing approximately 2.1 million male and female workers of core working ages 25-64 and who reported some employment income in 2015. Occupational niches were identified using the occupational classification of 2016 (NOC 2016) which provided information on workers grouped into ten niches ranging from management and sciences to manufacturing and resources type of economic activities. Data explorations found that the Canadian immigrant workforce consists of a highly stratified arrangement of workers and that there is significant variability in terms of their occupational preferences according to admission class, gender, ethnicity and racial backgrounds. While economic class immigrants preferred to work in the Sciences and Management niches, about one in three refugee and family class individuals worked in either the Trades and/or Sales & Services niche. Although the latter niche appeared to be strategically important in terms of the economic survival of refugee and family class workers, particularly women, it contained the lowest paid jobs. Principal Component Analysis (PCA) and cluster analysis of the Census data found that two major dimensions explained more than half of the data variation: a gender-occupational and an admission class divide related one. In contrast to economic class workers, visible minority groups of various gender, admission classes and ethnic backgrounds were found in the most disadvantaged positions in terms of occupational status and their employment income returns. Some immigrant groups clustered around occupations typical of the "secondary" labour market of Canada. Overall, occupational niche preferences reflect the selection criteria established by Canadian immigration policy, the set of available job alternatives to immigrants and the specific employment barriers faced by refugees and non-refugee workers in the Canadian labour market.

1.0. Introduction

Canada's labour force is growing with steady flows of immigrants who enter as economic, family and refugee immigrants². These admission criteria reflect the major goals of immigration policy: the promotion of economic

¹ Paper to be presented to the conference "Inclusion: Third Annual Forum on Measuring Identities" November 21-22, 2019, Association for Canadian Studies, Gatineau, QC. The author would like to thank Statistics Canada for making available the data and their valuable support and guidance.

² In 2015 the federal government implemented the Express Entry System for selecting skilled immigrants in which employers take a much stronger role in

growth, the facilitation of family reunification and humanitarian obligations, with admission categories broadly matching the drivers. The first two classes are selected via a point system which assigns scores based on level of education, work experience, skills and knowledge of a Charter language (English or French). Immigrants with immediate family members already living in Canada need not meet specific skills or financial criteria, but are required to have a sponsor (typically the family member) who has agreed to provide financial support for a period of three to ten years following arrival. The third admission class comprises asylum seekers, government-sponsored and privately sponsored types of refugees. The first type of refugees apply for refugee status within Canada and are assessed on criteria based on international standards. The latter two types of refugees are resettled through a series of programs with a goal of providing refuge from persecution and a quick integration into the labour market.

Research conducted in Canada as well as in other immigrant-receiving countries have already provided evidence that refugees underperform in labour markets compared to other admission class categories (Constant and Zimmermann 2005, Hiebert 2009, Abbot and Beach, 2011, Aydemir 2011, Hyndman, 2011, Bevelander 2016; Mata and Pendakur, 2016; Wilkinson and Garcea, 2017). Government-assisted refugees, in particular, has the most challenges in terms of finding employment, keeping jobs and sustaining steady employment incomes compared to privately sponsored ones (Dikshya, D. 2015; Jedwab, 2018; Kaida, Hou and Stick, 2019). Many factors which explain the labour market disadvantages of refugees (e.g. lower human capital and official language proficiencies, non-recognition of foreign degrees, racial discrimination, etc.) also apply to other type of immigrants. Some factors, however, are more specific to them such as issues related to settlement and sponsorship conditions, lack of legal documents as well as traumatic experiences in their countries of origin (Krahn et al. 2000; Neupane 2012; van Selm 2003)

Occupational choice theory suggests that individual characteristics of workers such as past investments in human capital, labour market factors, social and cultural context as well as motivation influence decisions concerning various job alternatives (Alzeer, 2017). Immigrant economic outcomes in the host country seem to be closely tied to the workers' choices of occupational niches in the labour market (Colic and Tilbury, 2006; Jayaraman and Bauder, 2013). An occupational niche is a sector of the labour market characterized by sets of jobs requiring particular skills, education and/or training. While some niches constitute highly paid hubs of specialized work, others consist mostly of low-paid and low-status jobs. These jobs are characteristic of what is called the "secondary" labour market (Castles and Miller, 2003). Typical "secondary" jobs are those found in transportation, retail sales, domestic help, care of the aged, catering and cleaning. These jobs may be sometimes the only occupational alternatives available for refugee and non-refugee workers who want to move away from conditions of marginalization and/or welfare dependency (Valtonen, 2004).

In Canada, due to the point selection system, refugee immigrants are among the most likely to join the ranks of workers in the "secondary" labour market of Canada. Previous research has already shown that both the admission class at entry and the time in the host country are significant correlates of occupational choices, even after controlling for observable human

determining immigrant selection. Under this system, candidates who pass a human capital threshold enter a pool, of which those with the highest ranking are invited to apply for permanent resident status. A job offer (supported by a 'Labour Market Impact Assessment') from a Canadian employer will generally push a candidate into the 'invited' category (<http://www.cic.gc.ca/english/express-entry/>).

capital characteristics and region of origin of immigrants (Akresh 2006). Gender is another important driver of occupational preferences as it taps specific orientations towards careers, professional life and, in the case of women, the possibility of working in more flexible jobs that take into account family responsibilities (Jayaraman & Bauder, 2013). Level of education is another driver as it reflects human capital endowments which make certain workers better suited to work in more highly specialized types of jobs (Becker, 1993). Ethnic and racial background related factors are also drivers as some workers use ethnic-based networks to find jobs and, thus, tend to concentrate in occupational niches where workers of similar backgrounds are predominant (Lafortune and Tessada, 2011). Many workers of Non-European ethnic origins in Canada are members of visible minority groups³. As a result of occupational choices, job opportunities as well as various discrimination barriers, the immigrant labour force is heavily stratified along ethnic and racial lines creating a "colour-coded" vertical mosaic of its own (Satzehich and Liokadis, 2010).

In view of these theoretical considerations, four general research questions may be posed about the occupational niche preferences of refugee and non-refugee workers in Canada: 1) What are the most and least preferred occupational niches? 2) Are there any variations in their preferences by gender, period of arrival, ethnic, racial or other socio-demographic characteristics of workers? 3) What are the economic returns of occupational choices? and, 4) Are there similarities or dissimilarities between groups in terms of their occupational preferences and socio-demographic characteristics? Using an admission class sample of ethnic groups drawn from a special table of the 2016 Census of Canada, the purpose of this paper was to explore these four research questions. The study undertaken here is exploratory in nature but hopes to produce valuable background information useful to undertake a more comprehensive study using micro-data. The study proceeded in two major phases of analysis. The first phase covered general explorations using basic descriptive statistics related to occupational niche preference by admission class, gender, ethnic and racial background of workers. The second phase comprised the application of Principal Components Analysis (PCA) and k-means cluster methods to the data in order to identify admission class groups who have similar occupational preferences. This "tandem" approach of analysis (Barker, 1976; Everitt and Dunn, 2001; Ding and He 2004), calls for using results by using PCA to transform a data set into component scores and then performing K-means clustering on the component scores that explain most of the total data variation. PCA bi-plots⁴ are particularly useful in this respect as they visualize information allowing for a focus on individual groups by looking at their coordinate positions in a plane (see Greenacre, 2010).

2.0. Data Source, Sample and Measures

The data used for this analysis is an admission sample consisting of 90 ethnic groups drawn from custom table (E03181) of the 2016 Census of Canada. This custom table contained detailed information on workers' admission class, occupational groups, gender, periods of arrivals, education, income levels as well the reported ethnic origin of workers⁵. The sample of

³ 'Visible minority' is a term defined in the 1996 Employment Equity Act. This term refers to "persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour".

⁴ Biplots were produced using the PCA procedure of the computer software XLSTAT .

⁵ The ethnic origin of workers referred to the reported ethnic or cultural origins of the person's ancestors. which is usually more distant than a grandparent.

ethnic groups was drawn from the custom table and represented approximately 2.1 million male and female individuals of core working ages (aged 25-54 years old) and who had received some form of employment income during 2015⁶. The 90 ethnic groups, which were categorized into visible and non-visible minority ones, represented those groups with the largest count size within their respective admission class category. Economic class groups represented approximately 1.2 thousand workers while family class ones about 666 thousand. Refugee groups⁷ represented approximately 293 thousand (155 thousand male and 138 thousand females) The list of the 90 admission class groups⁸ of the sample as well as their represented populations is presented in Table 1.

Table 1: Ethnic Groups of the Admission Class Sample *

| Male Workers | | | | | |
|-----------------------|-----------------|---------------------|-----------------|----------------------|-----------------|
| Economic Class | N in'000 | Family Class | N in'000 | Refugee Class | N in'000 |
| 1. Chinese | 152.8 | 16. East Indian | 84.4 | 31. Chinese | 18.7 |
| 2. East Indian | 116.2 | 17. Chinese | 44.5 | 32. Vietnamese | 17.4 |
| 3. Filipino | 88.1 | 18. Filipino | 36.2 | 33. Polish | 13.8 |
| 4. French | 29.2 | 19. Jamaican | 17.3 | 34. Sri Lankan | 15.8 |
| 5. English | 28.9 | 20. English | 19.2 | 35. Iranian | 12.2 |
| 6. Russian | 27.0 | 21. Polish | 12.0 | 36. Afghan | 12.9 |
| 7. Iranian | 25.9 | 22. German | 13.4 | 37. Colombian | 7.7 |
| 8. Spanish | 21.9 | 23. Spanish | 13.2 | 38. Spanish | 8.2 |
| 9. Korean | 21.9 | 24. Vietnamese | 9.7 | 39. East Indian | 9.4 |
| 10. Romanian | 20.4 | 25. Punjabi | 12.0 | 40. Serbian | 6.0 |
| 11. German | 21.2 | 26. Haitian | 9.3 | 41. Salvadoran | 6.2 |
| 12. Ukrainian | 17.9 | 27. Portuguese | 9.1 | 42. Somali | 7.0 |
| 13. Pakistani | 21.5 | 28. Pakistani | 9.9 | 43. Ethiopian | 6.2 |
| 14. Portuguese | 15.3 | 29. French | 7.9 | 44. Iraqi | 8.9 |
| 15. Lebanese | 14.7 | 30. Sri Lankan | 6.0 | 45. Syrian | 4.6 |
| Total | 622.9 | Total | 303.9 | Total | 154.9 |
| Female Workers | | | | | |
| Economic Class | N | Family Class | N | Refugee Class | N |
| 46. Chinese | 153.8 | 61. East Indian | 94.2 | 76. Chinese | 17.1 |
| 47. Filipino | 141.8 | 62. Chinese | 73.0 | 77. Vietnamese | 12.8 |
| 48. East Indian | 85.8 | 63. Filipino | 35.7 | 78. Polish | 13.0 |
| 49. French | 25.1 | 64. Jamaican | 18.3 | 79. Sri Lankan | 10.9 |
| 50. English | 25.3 | 65. English | 15.8 | 80. Iranian | 9.4 |
| 51. Russian | 26.8 | 66. Polish | 17.5 | 81. Afghan | 11.9 |
| 52. Iranian | 22.5 | 67. German | 15.8 | 82. Colombian | 9.0 |
| 53. Spanish | 26.5 | 68. Spanish | 15.8 | 83. Spanish | 7.9 |
| 54. Korean | 20.9 | 69. Vietnamese | 18.9 | 84. East Indian | 7.1 |
| 55. Romanian | 20.0 | 70. Punjabi | 11.4 | 85. Serbian | 5.8 |
| 56. German | 18.5 | 71. Haitian | 10.6 | 86. Salvadoran | 6.0 |
| 57. Ukrainian | 16.9 | 72. Portuguese | 8.4 | 87. Somali | 8.9 |
| 58. Pakistani | 11.5 | 73. Pakistani | 7.5 | 88. Ethiopian | 5.9 |
| 59. Portuguese | 14.0 | 74. French | 8.7 | 89. Iraqi | 7.9 |
| 60. Lebanese | 9.0 | 75. Sri Lankan | 10.4 | 90. Syrian | 4.5 |
| Total | 618.1 | Total | 362.0 | Total | 138.0 |

The sample selection represented 79% of all economic class immigrants entering Canada between 1981 and 2016, 73% of all family class immigrants and 60% of all refugee class immigrants. The refugee class category consisted mostly of visible minority ethnic groups (87%) compared to 67% in the family class and 53% in the economic ones.

⁶ Employment income is defined as all wages, salaries and commissions from paid employment and net self-employment income from farm or non-farm unincorporated business and/or professional practice during the reference period (before deductions). It represents the combined effects of the total hours of work and hourly wages. Average incomes of individuals are calculated for those with income (positive or negative) by dividing the aggregate income of that group by the number of units in that group. Immigrants who never worked for pay or self-employment, or last worked for pay or self-employment prior to this time were excluded from the sample.

⁷ As the 2016 Census did not collect information of refugee types, breakdowns for government-assisted, privately sponsored and asylum seekers refugee, the data was not available to undertake intra-group refugee comparisons.

⁸ Due to sampling constraints and order to ensure sufficient minority counts, principal applicants (PA) and their dependents (D) were both aggregated in the economic class counts with corresponding ratios PA/D=6 to 4 in the male classifications and 3 to 7 in the female ones. Also about 61% of the family class comprised spouses or partners and 35% by either parents, grandparents or children. With respect to the refugee class, 62% consisted of resettled refugees (government or privately sponsored) while 38% consisted of protected persons (e.g. "asylum") and their dependents.

*- Represented N in thousands. Source: Admission Class Ethnic Sample, Special Table EO3181, Statistics Canada

The 2016 National Occupational Classification (NOC 2016) of Canada was the measurement instrument used to identify the preferences for occupational niches among refugee and non-refugee workers. The average percentage of workers working in the 10 basic niches (first digit numerical code) were calculated for each admission class group of the sample and were the subject of detailed analysis.

The NOC 2016 classified occupations according to the type of work performed and the education and/or skill levels required to perform these activities. The 10 codes of the NOC 2016 first digits used for this analysis are described as follows:

1. *Management niche*: comprising jobs such as legislators, senior management occupations and middle management occupations. While management occupations are defined as a skill type, they are also found throughout all other skill type areas of the classification.
2. *Business niche*: comprising jobs concerned with providing financial and business services, administrative and regulatory services and clerical supervision and support services. Some occupations in this category are unique to the financial and business service sectors.
3. *Sciences niche*: comprising jobs of a professional and technical nature including physical and life sciences, engineering, architecture and information technology. Occupations in this skill type category require post-secondary education in an appropriate scientific discipline.
4. *Health niche*: comprising jobs concerned with providing health care services directly to patients and occupations that provide support to professional and technical staff. Most occupations in this skill type category require post-secondary education in a related health care program.
5. *Education & Related niche*: comprising jobs covering a range of occupations that are concerned with law, teaching, counselling, conducting social science research, developing government policy, and administering government and other programs. Occupations in this skill type category usually require completion of a related post-secondary program.
6. *Arts & Related niche*: comprising jobs related to professional and technical occupations related to art and culture, including the performing arts, film and video, broadcasting, journalism, writing, creative design, libraries and museums. It also includes occupations in recreation and sport.
7. *Sales & Services niche*: comprising jobs related to sales occupations, personal and protective service occupations and occupations related to the hospitality and tourism industries. Occupations in this category can be linked, for the most part, to formal post-secondary or occupation-specific training programs.
8. *Trades niche*: types of jobs in this niche includes construction and mechanical trades, trades supervisors and contractors and operators of transportation and heavy equipment. These occupations are found in a wide range of industrial sectors, with many occurring in the construction and transportation industries.
9. *Resources niche*: comprising jobs related to supervisory and equipment operation activities in the natural resource based sectors of mining, oil and gas production, forestry and logging, agriculture, horticulture and fishing.

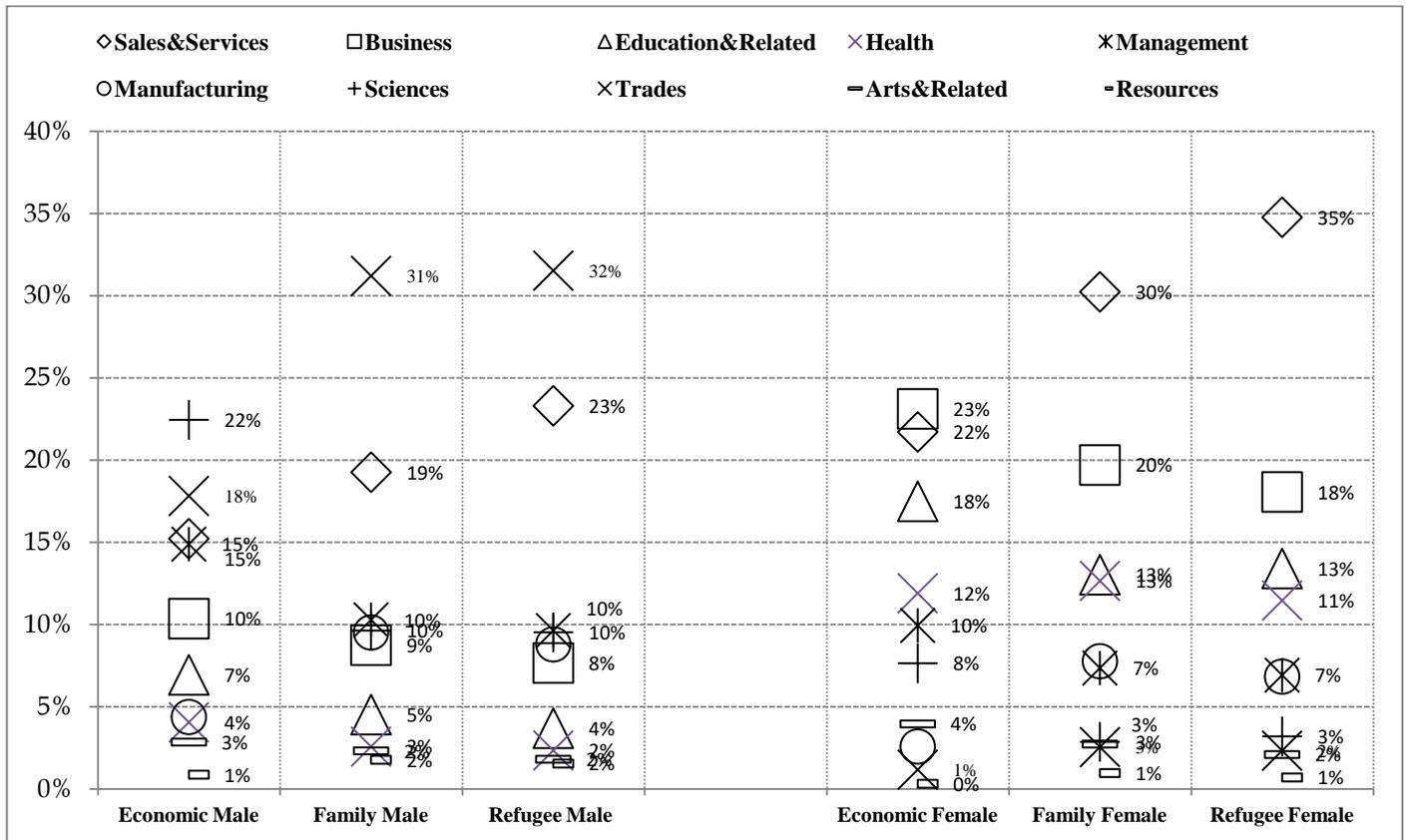
10. *Manufacturing niche*: This niche comprises jobs in supervisory and production related activities in manufacturing, processing and utilities. Occupations in this category are characterized by internal progression and on-the-job training.

3.0. Descriptive Data Explorations

3.1. Occupational Preferences, Admission Class and Gender

A first look at the 2016 admission class sample data revealed significant differences in terms of occupational niche preferences by admission class and gender (see Graph 1). At the time of the census, about one in three refugee and family class male individuals were found working in the Trades niches (32% and 31% respectively). Similar proportions were found for refugee and family class females with regards to the Sales & Services niche (35% and 30% respectively). In the case of economic class female workers both the Business and Sales & Services niches were found as the top occupational niche choices (23% and 22% respectively). One out of five economic class male workers (22%) chose the Sciences niche and in this particular group the distribution of occupational preferences was the most evenly distributed compared to the other groups.

Graph 1: Occupational Niche Distribution (%) by Admission Class and Gender, Admission Class Sample, Canada 2016



Source: Admission Class Sample, Special Table EO3181, Statistics Canada

3.2. Occupational Preferences and Arrival Cohorts

For both males and females workers, including refugees, the proportions of those working in the Sales & Services niche were found to be the highest among individuals of the more recent arrival cohort 2011-2016 compared to that of the older arrival cohorts 1981-1990, 1991-2000 and 2001-2010 respectively. This particular occupational niche appears to have strategic importance for recent immigrants in terms of their economic survival. About one in three male workers (32%) arriving through the refugee class within the 2011-2016 period participated in the Sales & Services niche compared to only 18% of those arriving in the 1981-1990 period. Among refugee females these proportions were 46% to 27% respectively. In contrast to the Sales & Services niche time pattern, regardless of the admission class and gender considered, participation in the Business niche was found the highest among those of immigrants of longer stay in the country compared to those of more recent arrival. Among refugee females, in particular, the percentage working in the Business niche peaked at 21% among those arriving within 1981-1990 period compared to only 10% for those arriving in the 2011-2016 one.

3.3. Ethnic and Racial Variations in Occupational Preferences

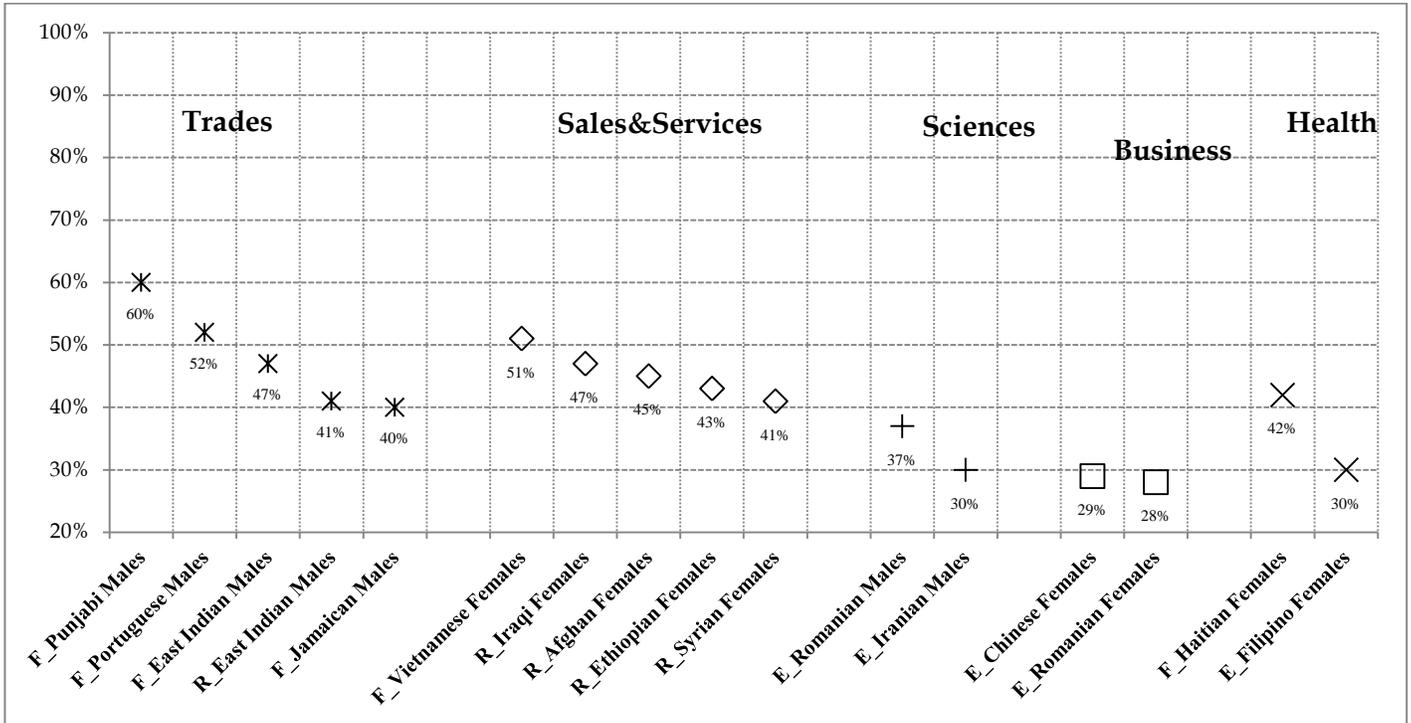
Occupational niche preferences varied significantly by the ethnic background of workers. The top 25 occupational preference choices of workers is presented in Graph 2. Some ethnic groups were more attracted to certain types of jobs compared to others. About 60% of all family class male workers of Punjabi backgrounds were found working in jobs corresponding to the Trade niche. In descending order of attractiveness, the corresponding percentages to family class Portuguese and East Indians males were 52% and 47% of the total number of workers reporting these ethnic backgrounds. The Sales & Services niche attracted mostly female workers coming from a variety of immigrant admission classes and ethnic ancestries but having in common the same visible minority status. For instance, about a half (51%) of all family class Vietnamese female workers chose to work in this particular niche. These percentages were also substantive for refugee women reporting Iraqi (47%), Afghan (45%), Ethiopian (43%) and/or Syrian ethnic backgrounds (41%). Preference for the Sciences niche was the highest among economic class males particularly among those reporting Romanian and Iranian ethnic backgrounds. With respect to the Business niche,

the highest preferences were observed for economic class females reporting Chinese and Romanian ethnic backgrounds. With respect to ethnic preferences to work in the Health niche, 42% of all Haitian and 30% of all Filipino females workers admitted under the family class were found working in this particular occupational niche. Visible minority women from these ethnic backgrounds were strongly attracted to work in occupations characteristic of this niche.

3.4. Top and Bottom Employment Income Earners

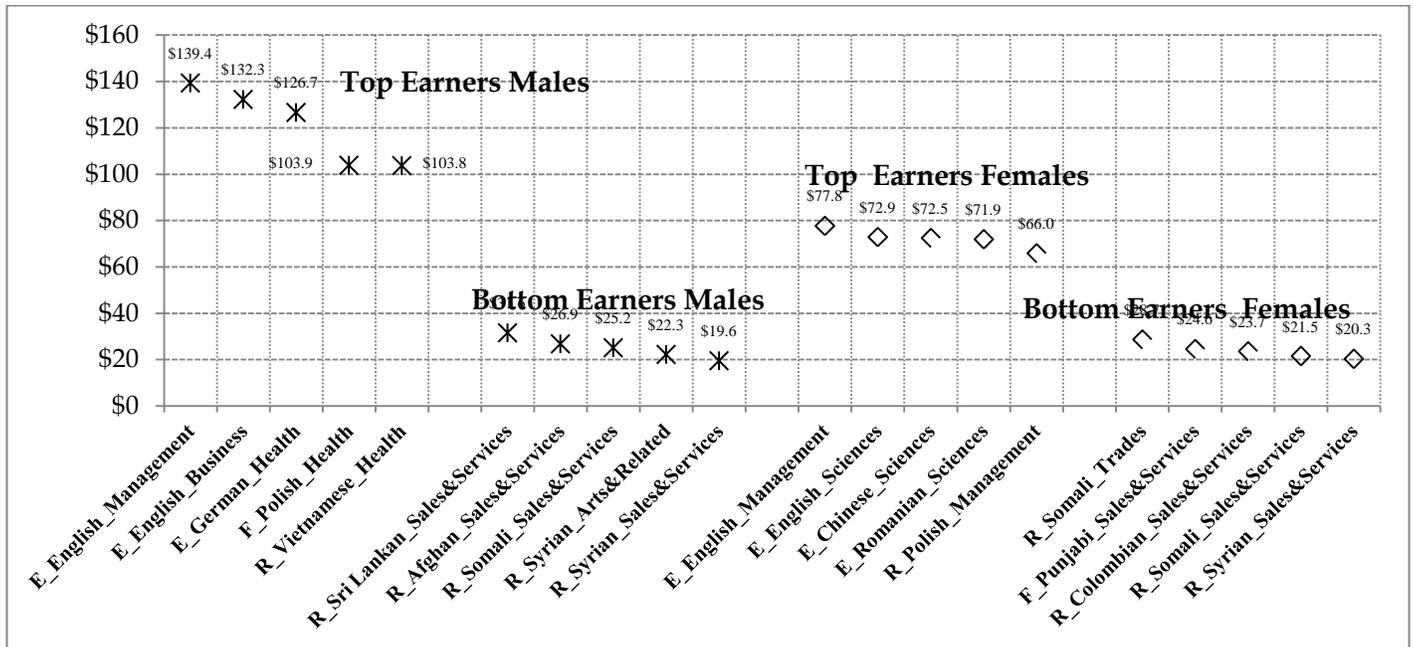
The economic returns of working in specific niches were substantially different for the members of the admission class groups of the 2016 sample. Graph 4 presents the top and bottom employment income earners of the 2016 admission class sample. Among the top male income earners, the highest average employment incomes were observed for economic class workers reporting English and German backgrounds and working in Management, Business and Health niches. Family class Polish workers and refugee class Vietnamese individuals working in the Health niche were also found among the top employment income earners. For all these workers, the average employment incomes exceeded the \$100 thousand mark.

Graph 2: Top Occupational Preferences (% working in niches) by Admission Class, Gender and Ethnic Backgrounds of Workers



Symbols :E=Economic Class, F=Family Class, R= Refugee Class. Source: Admission Class Sample, Special Table EO3181, Statistics Canada

Graph 3: Top and Bottom Employment Income Earners (Average in thousands \$Can) by Admission Class, Gender, Ethnic Backgrounds and Occupational Niches, Canada 2016



Symbols :E=Economic Class, F=Family Class, R= Refugee Class. Source: Admission Class Sample, Special Table EO3181, Statistics Canada

Visible minority refugee workers of Sri Lankan, Afghan, Somali and Syrian backgrounds were typically found in the list of bottom employment income male earners. Their average incomes were found below the \$32 thousand mark. The top earners among female workers were mostly those admitted under the economic class category with the exception of those of Polish background admitted under the refugee class. Among the bottom employment income earners, the least paid among female workers were those visible minority workers admitted under the refugee and family class who reported Punjabi, Somali, Colombian and/or Syrian ethnic backgrounds. These individuals earned average incomes below the \$29 thousand mark.

4.0. Multivariate Analysis Explorations

4.1. Explorations via Principal Components Analysis (PCA)

The first phase of the multivariate analysis explorations of the sample data involved using PCA analysis on the correlation matrix on measures related to occupational niche preferences and selected socio-demographic characteristics of workers. PCA is a statistical technique which builds a sequence of uncorrelated (orthogonal) and linear combinations called components (Everitt and Dunn, 2001). A total of 26 measures comprising binary (0,1) as well as continuous measures were used in the analysis⁹. Ten continuous measures tapped the preferences (in %) for occupational choices following the NOC 2016 classification. Two binary measures separated workers into two groups (males and females), two measures separated workers into visible and non-visible minority ethnic groups, while three binary measures tapped membership in the three

⁹ The zero order correlations between occupational preferences and binary measures revealed that preferences to work in the Management (r=.43), Sciences (r=.62), Trades (r=.84) and Resource niches (.36) were strongly and positively associated (sig. <.05) with the male gender. Preference for the Health (r=.71), Education & Related (r=.78) as well as Sales & Services (r=.52) were similarly found for the female one. Membership in the refugee class was found negatively associated with completion of a university degree (r= -.54) and average employment income earnings (r=-.26). There was also a strong positive correlation found between the visible minority status of the group and preference to work in the Sales & Service niche (r=.54) and the Manufacturing one (r=.43)

admission class (economic, family and refugee). Four binary measures tapped membership in the arrival cohorts: 1981-1990, 1991-2000, 2001-2010 and 2011-2016. Finally, as measures of human capital and economic returns of working in particular niches, also included in the PCA analysis were the average employment earnings (\$ in thousands) and the average percentage of workers holding a bachelor university degree or above.

PCA extracted two major components from the joint male and female correlation matrix¹⁰. The major principal components displayed an eigenvalue or latent root greater than 1. As a whole, they accounted for more than half (54.6 %) of the measures' total variance which represents an optimal result in terms of data reduction. The first component (F1) tapped a domain related to the gender-occupational divide (30.3%) and the second one (F2) an admission class divide (24.3%). The highest loadings of F1 corresponded to the male gender membership (+.97), preference for the Trades niche (+.86) and average employment incomes (+.75). The highest loadings for (F2) found related to Economic class membership (+.87), percentage university education (+.92) and preference for work in the Management niche (+.63). Both F1 and F2 loading on the visible minority characteristics of groups were -.21 and -.61 respectively.

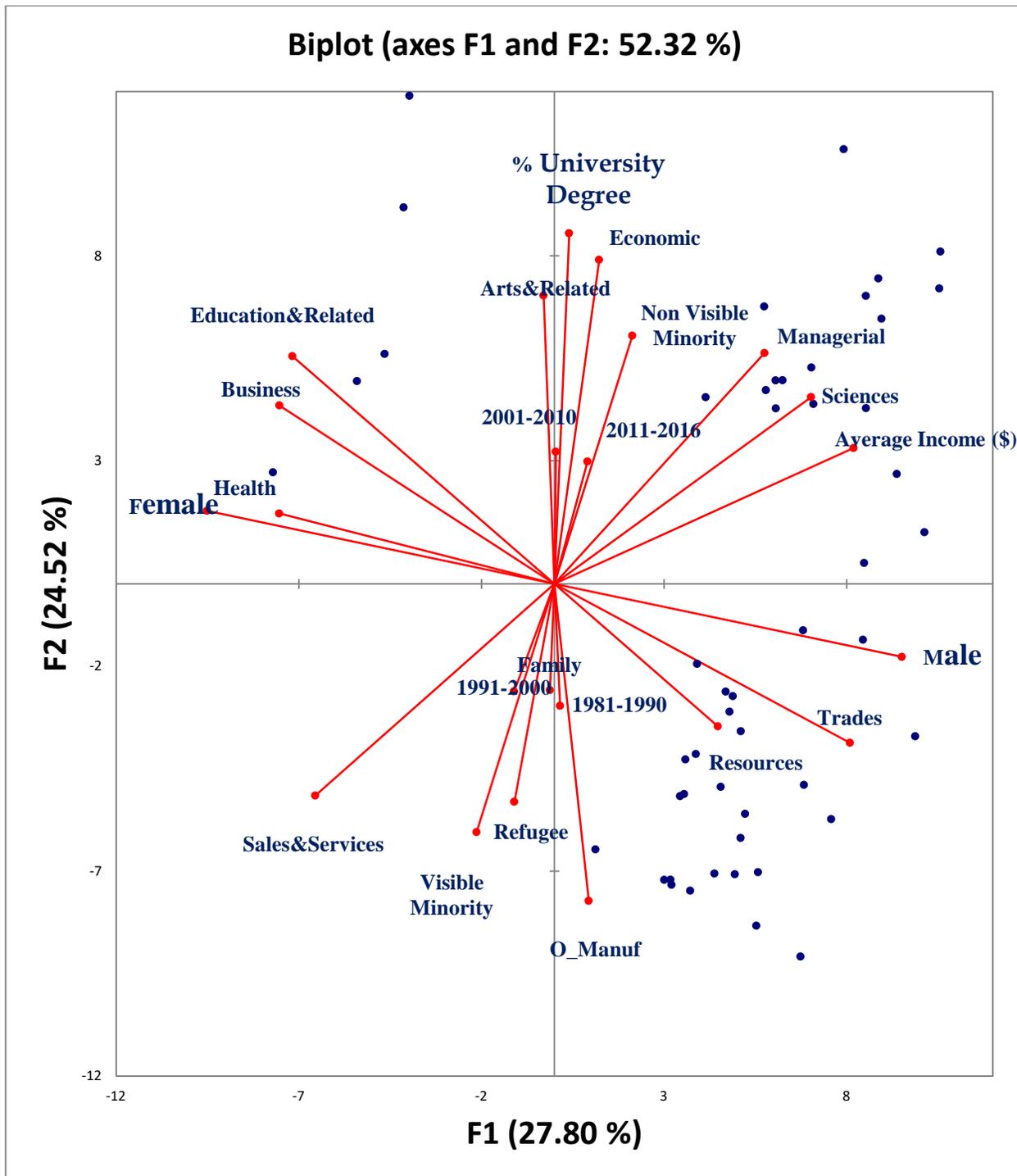
Based on the information contained in the component loadings associated to each indicator, component loadings and scores were calculated for each group in the two matrices. Due to the mathematical property of “orthogonality” (at right angles) present in the principal components, the class-ethnic groups were, then, located on PCA “space” based on the prior knowledge of their average component scores. PCA bi-plots are graphs where vectors representing indicators are presented as points in principal component space. Graph 3 presents the bi-plots representing the relationship's dimensions and vector measures. The bi-plot of the second component on the first component, which represents the major sources of variation in the data, is useful as it displays the correlations of variables in terms of various indicator vectors of different magnitudes, directions and positions. In the bi-plot, the length of indicators reflects the variances of the corresponding measuring variable and the angles between them indicate the size of their correlations, with small angles corresponding to high correlations. The relative positions of the data points corresponding to the groups indicate their similarities and differences in component space. The closer or farther position of the points relative to the lines measure a greater or lesser magnitude in terms of the attribute being measured.

In Graph 4, the bi-plot visualizes the relationships between occupational niche preferences and all its socio-demographic correlates in principal component space. It provides a stark picture of occupational preference polarizations by gender and admission classes. The shorter angles between measures' vectors in component space suggest that male workers are more likely to work in high income occupations in the area of management, sciences and trades which while women appear to be concentrated in lower paid occupations in the Health, Business, Education and Related as well as Sales & Services niche. The short angle between the refugee and family vectors suggests that occupational preferences are very similar between the two groups. Similarly, the

¹⁰ As PCA is not a predictive multivariate technique like regression analysis, collinear (linearly correlated) variables may be introduced in the analysis to better understand data patterns. In PCA bi-plots, collinear binary variables are represented as mutually opposing vectors (e.g. males vs. females, visible minority vs. non-visible minority, economic vs. family and refugee class immigrants). Collinearities in the data are also reflected in the number of eigenvalues extracted and in the factor/component loadings.

acute angle between the visible minority status of groups and the refugee class vectors, suggests an overrepresentation of visible minority workers within the refugee class categories. Another observation concerns the arrival cohort vectors vis à vis the admission category. Shorter angles between the economic class vector and more recent arrival cohort vectors (2000-2010 and 2011-2016) suggest that workers of these arrival periods have higher levels of human capital compared to earlier periods. Groups found in the lower sections of the left and right quadrants of the bi-plots deserved special attention as these are concentrated around low-status and low-paid occupational niches typical of what has been described as the "Secondary" labour market.

Graph 4: PCA biplot: Dimensions of Occupational Preferences and Socio-Demographic Measures, Canada 2016

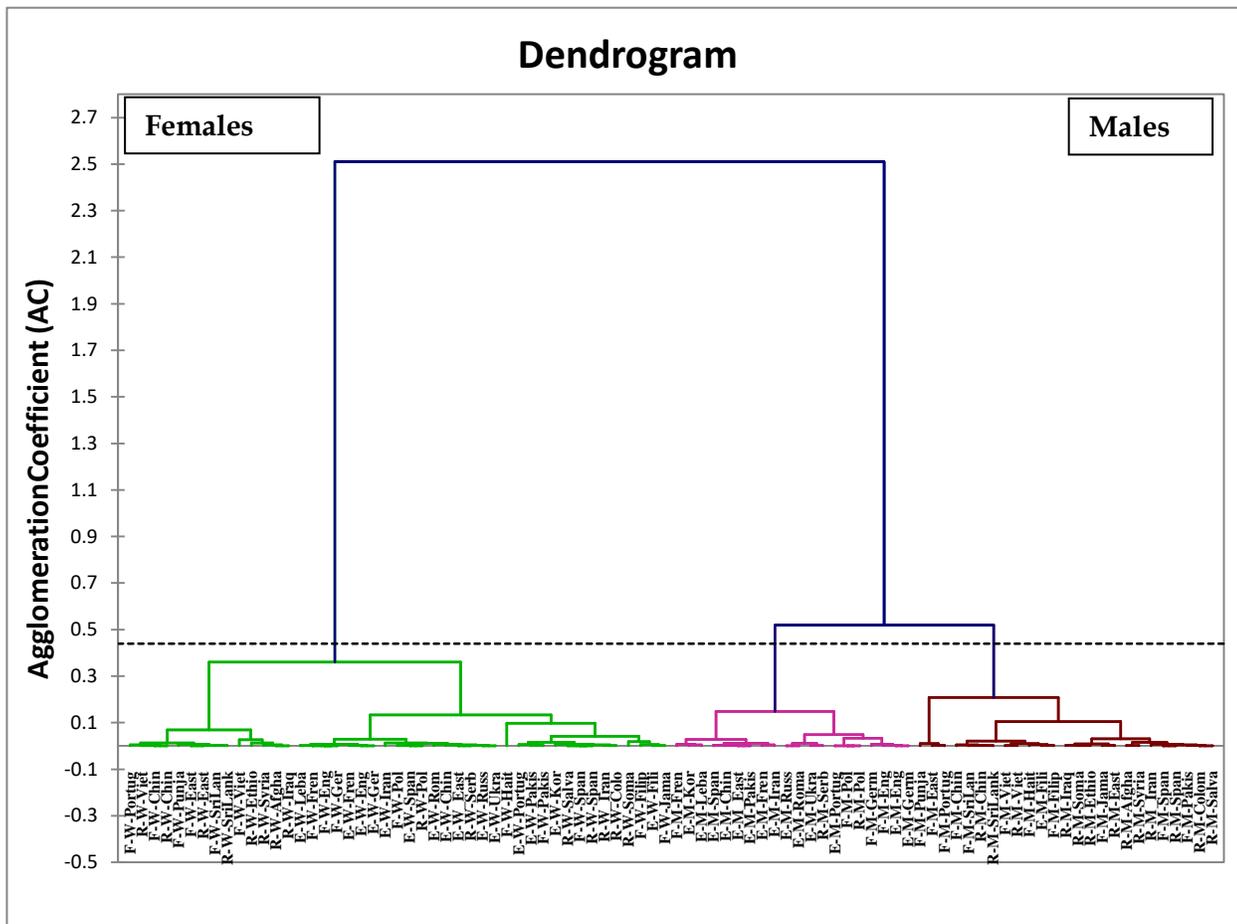


Source: Admission Class Sample, Special Table EO3181, Statistics Canada

4.2. Explorations via Hierarchical Cluster Analysis (HCA)

The second phase of multivariate analysis involved using Hierarchical Cluster Analysis (HCA) on the ethnic admission data. Here, based on the Euclidean distances dissimilarity matrix (90 x 90) defined by factor scores F1 and F2, cases were combined into clusters via a hierarchical agglomerative procedure. At each step of this procedure similar cases are combined into ever larger groups based on the average similarity between them (Jobson, 1992). The HCA dendrogram is presented on Graph 5. Inspection of the dendrogram suggests that female clusters had a higher level of occupational similarities compared to males (joined at an agglomeration coefficient <.40). A final fusion of the male and female clusters occurred only at the 2.5 mark of the agglomeration coefficient. Three major female cluster and a similar number among their male counterparts appeared as potential partitions for the groups in this preliminary phase of cluster analysis.

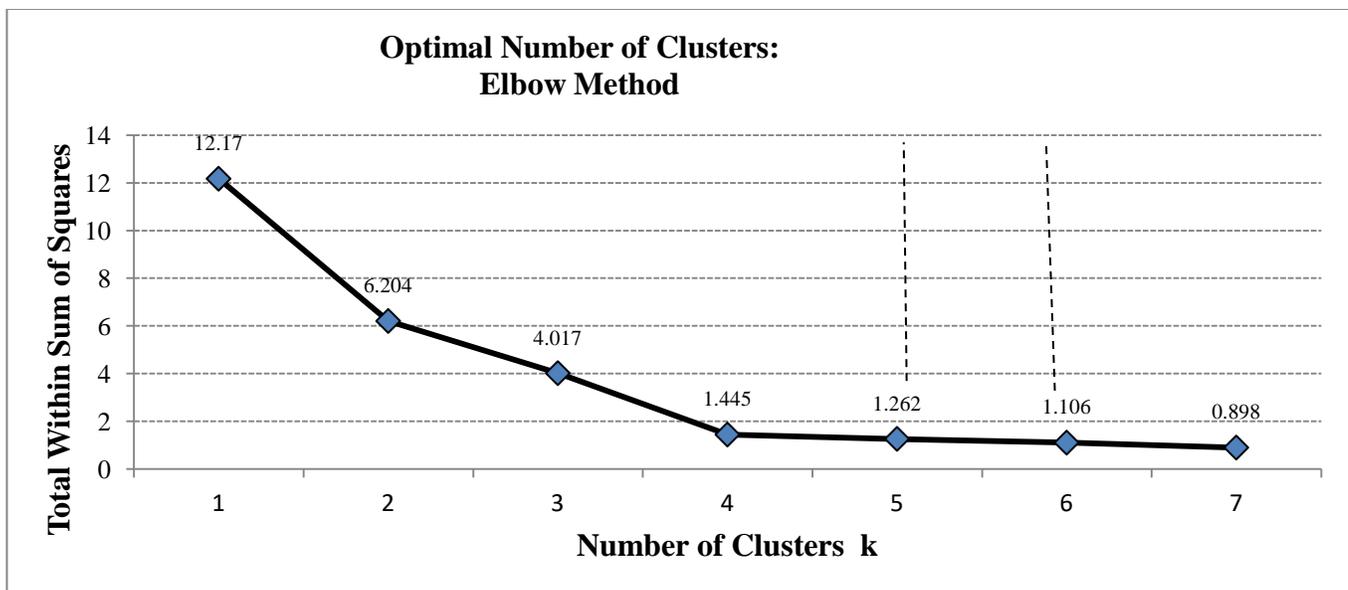
Graph 5:HCA Dendrogram, Ethnic Admission Data, Canada 2016



4.3. Explorations via k-means Cluster Analysis

As a final phase of multivariate analysis involved using k-means cluster analysis on the PCA Factor scores F1 and F2 to identify groups of similar occupational choice preferences. The k-cluster algorithm separated groups into k number of clusters through assignments and re-assignments on the basis of the shortest distance between the data unit and the centroid of the cluster (Saldkin and Ransmussen, 2010). Six solutions were tested: k=2 to 7. The "Elbow" method was selected as the criteria to choose the optimal number of clusters. This method looked at the reduction of the Within Sums of Squares (SSW) as new clusters are created searching for the number after which not major improvement is achieved (called "knee" or "elbow"). This was achieved after k=5. A plot of these WSS reductions is presented in Graph 6. A significant Wilk's lambda statistic (proportion of within to between variance) was associated with this particular partition k=5 ($\lambda=.04$, $p. <.05$).

Graph 6: "Elbow" Method Plot of Cluster Partition, Admission Class Sample Groups, Canada 2016



In the k=5 solution, Clusters 1 to 5 reflected the group similarities already found in PCA bi-plots (see the compositional aspects of the extracted clusters in table 2). Of particular interest was the composition of the male cluster 2 and the female clusters 4 and 5 where concentrations around low paid niches in the Trades and Sales & Services sectors were initially found. In these clusters (with the exception of economic class Filipino male workers located in cluster 2) there was an overwhelming presence of family and refugee class members. Cluster 4, the one that had the lowest within cluster variance and had the lowest average factor scores for both F1 and F2, comprised groupings of family class women of East Indian, Vietnamese, Punjabi and Sri Lankan ethnic backgrounds as well as refugee class women of Chinese, Vietnamese, Sri Lankan and East Indian ethnic backgrounds. The findings here suggest that the occupational predicaments faced by visible minority women admitted under the family and refugee class in Canada may be similar in nature.

Graph 6: k-5 Means Solution, Confidence Ellipses for Five Clusters

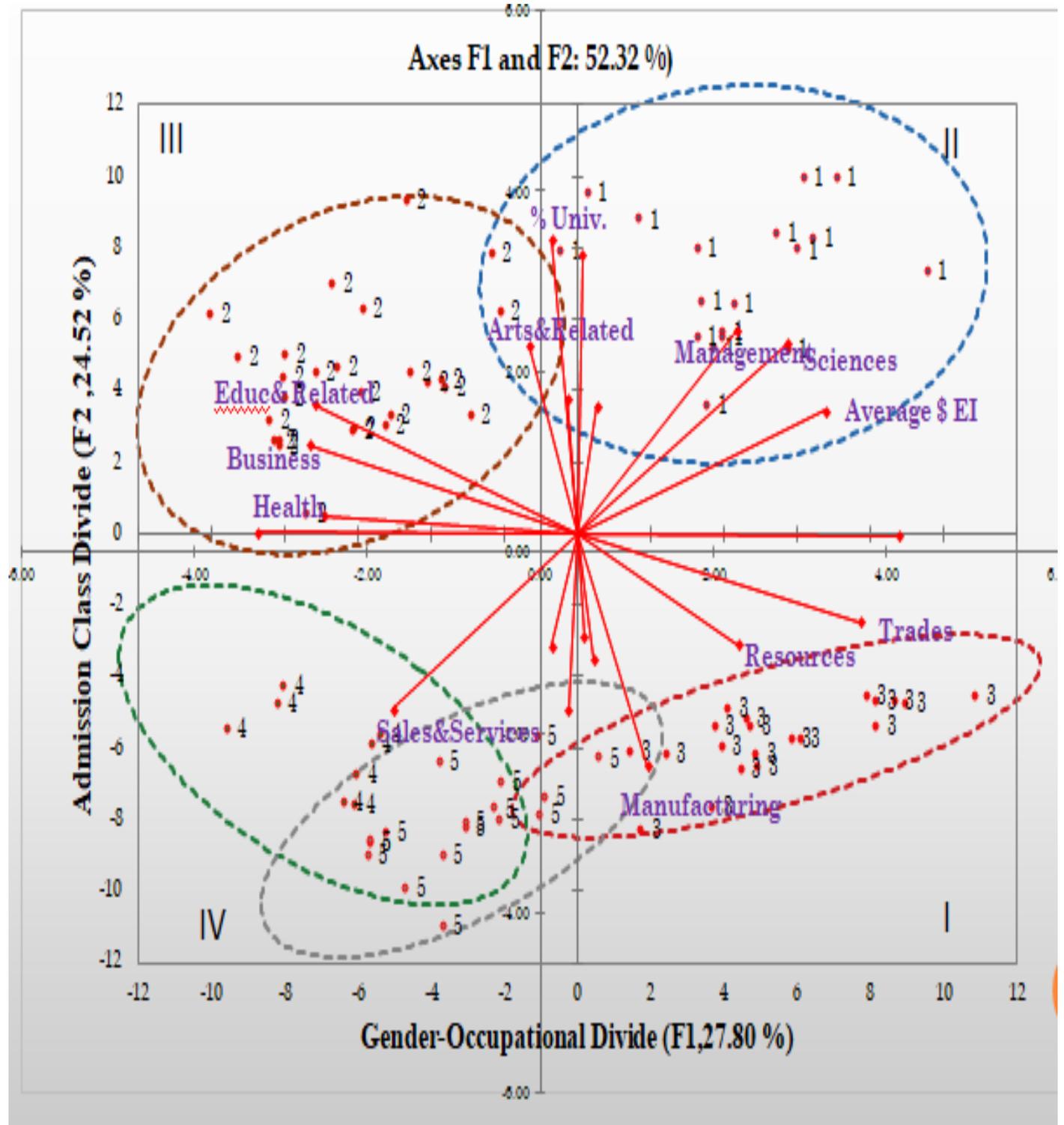


Table 2: k=5 Solution Cluster Composition, Admission Class Sample 2016

| Clusters | Male C1 | Male C2 | Female C3 | Female C4 | Female C5 |
|------------------------------|---|--|---|--|--|
| Cases | 18 | 27 | 20 | 8 | 17 |
| Centroid (a) F1 | 3.08 | 1.96 | -2.04 | -2.14 | -2.97 |
| Centroid (a) F2 | 2.23 | -2.19 | 2.73 | -2.51 | -0.91 |
| Within-class variance | 1.587 | 1.370 | 1.338 | 0.635 | 0.923 |
| Gender composition | 18 M | 27 M | 20 W | 8 W | 17 W |
| Admission Class Composition | 14 E, 4 F, 0 R | 1 E, 11 F, 15 R | 15 E, 4 F, 1 R | 0 E, 4 F, 4 R | 0 E, 7 F, 10 R |
| Visible Minority composition | 7 V, 11 N | 25 V, 2 N | 8 V, 12 N | 8 V, 0 N | 16 V, 1 N |
| Ethnic Minority Composition | E-M-Chinese E-M-East Indian E-M-French E-M-English E-M-Russian E-M-Iranian E-M-Spanish E-M-Korean E-M-Romanian E-M-German E-M-Ukrainian E-M-Pakistani E-M-Portuguese E-M-Lebanese F-M-English F-M-Polish F-M-German F-M-French | E-M-Filipino F-M-East Indian F-M-Chinese F-M-Filipino F-M-Jamaican F-M-Spanish F-M-Vietnamese F-M-Punjabi F-M-Haitian F-M-Sri Lankan F-M-Portuguese F-M-Pakistani R-M-Chinese R-M-Vietnamese R-M-Polish R-M-Sri Lankan R-M-Afghan R-M-Iranian R-M-Iraqi R-M-Colombian R-M-East Indian R-M-Spanish R-M-Somali R-M-Salvadoran R-M-Ethiopian R-M-Serbian R-M-Syrian | E-W-Chinese E-W-Filipino E-W-East Indian E-W-French E-W-English E-W-Russian E-W-Iranian E-W-Spanish E-W-Korean E-W-Romanian E-W-German E-W-Ukrainian E-W-Pakistani E-W-Portuguese E-W-Lebanese F-W-English F-W-Polish F-W-German F-W-French R-W-Polish | F-W-East Indian F-W-Vietnamese F-W-Punjabi F-W-Sri Lankan R-W-Chinese R-W-Vietnamese R-W-Sri Lankan R-W-East Indian | F-W-Chinese F-W-Filipino F-W-Jamaican F-W-Spanish F-W-Haitian F-W-Portuguese F-W-Pakistani R-W-Afghani R-W-Iranian R-W-Iraqi R-W-Colombian R-W-Spanish R-W-Somali R-W-Salvadoran R-W-Ethiopian R-W-Serbian R-W-Syrian |

(a) In cluster analysis centroids are vectors containing the means of components/factors in a particular cluster.

Symbols: M=Males, W=Females, E=Economic Class, F=Family Class, R=Refugee Class, V=Visible Minority Ethnic, N=Non Visible Minority Ethnic

5.0. Post-Explorations Reflections

Using 2016 tabular census data, this exploratory study aimed at addressing four major research questions related to the occupational niche preferences of immigrants entering Canada between 1981 and 2016. The main aim behind the analysis was to study how these preferences were linked to the conditions related to the admission to the country as well as to relevant socio-demographic demographic characteristics such as gender, period of arrival, education and ethnic background of workers. Due to custom table aggregations and the sample selection process of groups itself, only the national picture of occupational niche preferences could be obtained. A separate analysis for those receiving wage and salaries income from self-employment income was not possible either. Also, the use of the only the first digit code of the NOC 2016 limited the analysis to depictions of the general nature of economic activities where refugee and non-refugee workers were participating.

Notwithstanding the pitfalls associated with working with aggregated tabular data, the analysis confirmed the findings of other studies that the Canadian immigrant workforce consists of a highly stratified arrangement of workers according to various administrative and identity markers such as admission class, gender and ethnic/racial origins. This was illustrated by the two major dimensions found in the multivariate analysis of the data. Gender-occupational and admission class divides were detected in the data as occupational niche preferences clearly separated male and female workers between manual and non-manual fields of economic activities. Some occupational niches, however, appeared to be active hubs for groups admitted under different criteria but coming from specific ethnic backgrounds. Family and refugee class workers appeared to face a similar set of occupational predicaments. As expected, there were notable concentration of economic class immigrants in the higher paid and higher status jobs of the Sciences, Business and Trade niches. While the occupational choices of the former group are reflections of their relative advantage of skills and human capital endowments, those of refugee and family class workers reflected more limited occupational choices due to their deficits in terms of human capital, sponsorship conditions and, in the case of recent immigrants, familiarity with the job market.

The explorations undertaken also highlight the strategic importance of the Sales & Services niche in terms of the economic survival of refugee and family class immigrants in Canada. This occupational niche, which contains a wide span of low-paid menial jobs requiring no post-secondary education, was chosen by about one in three of family and refugee class female entrants. Cashiers, cleaners, caretakers, store clerks, taxi drivers and cooks are the typical jobs found in this particular occupational niche. Jobs in this Canadian "secondary" labour market offer temporary solutions to other alternatives such as being unemployed and/or welfare dependent. These type of jobs were performed mostly by female workers of Non-European ethnic origins such as Somali, Salvadoran, Sri-Lankan, Haitian, Syrian, Vietnamese and/or Filipino (cluster 4 and 5 members). The type of work performed by these groups is associated with labour market "vulnerability" (Chaykowsky and Slotsve, 2005), a condition which is characterized by a depth of low pay, few prospects for advancement and a considerable risk in terms of employment security. The case of female refugee workers of Sri Lankan, Salvadoran, Ethiopian, Iraqi, Somali and Syrian ethnic backgrounds are worthwhile of mentioning as they face similar occupational choices that have definite consequences in terms of their economic integration to Canada. The human capital and economic profiles of these groups suggests that these are highly economically vulnerable groups which need to be further studied in order to get more insight into the factors that drive poor labour market and economic outcomes.

The data explorations suggests that, regardless of their specific admission class or reported ethnic ancestries, visible minority workers were among the most severely affected by the low occupational status and economic returns of their economic field of activities. In this study, the ethnic ancestry of workers was used as an indicator to tap into the complex racial driver affecting specific immigrants' occupational choices in the Canadian labour market. The visible and non-visible minority workers of Canada comprise a micro-cosmos of individuals from various ethnic, language, colour/race, immigration/generation and religious backgrounds. Although a more fine detailed data disaggregation is always desirable, the task is daunting as no single indicator(s) by itself can be proven to be a reliable measure of the multifaceted racial construct as this has a high degree of abstraction and some portion of the variation in the construct will always remain unexplained. The best practice in this regard could be to rotate identity marker indicators as much as possible and adapt

them to the specific research task at hand while benefiting from the sustained progress made in data collection by the Census, Special Surveys and administrative data like the IMDB (Longitudinal Immigration Database).

A final post-explorations reflection is that occupational niche preferences are linked to the selection criteria established by Canadian immigration policy, the set of available job alternatives to immigrants and the specific employment barriers faced by refugees and non-refugee workers in the Canadian labour market. Both refugee and family class immigrants are struggling with limited occupational choices in face of highly specific jobs requirements that cannot be matched by foreign professionals' work experience/skills, higher levels of occupation-specific language skills and the lack of training to bridge this gap. They are locked in to performing jobs in the "secondary" labour market until conditions are ripe for occupational mobility. This situation may be unavoidable in the case of recent refugee immigrants such as the Syrian ones where the employment rates in 2016 only reached 24% and 9% for male and female of working ages (Houle, 2019). These conditions may improve when adequate official language training, skill training, better recognition of foreign credentials and markets transition programs to match immigrants' transferable skills and capabilities are available. These could be key in opening the job market and reaching a higher stage in terms of their integration to national, regional and local labour markets.

6.0. References

- Abbott, M. and Beach, Ch. 2011. Do Admission Criteria and Economic Recessions Affect Immigrant Earnings? IRPP Study 22. Montreal: Institute for Research on Public Policy. <http://irpp.org/wp-content/uploads/assets/research/diversity-immigration-and-integration/new-research-article/IRPP-Study-no22.pdf>
- Akresh, I. R. (2006). "Occupational mobility among legal immigrants to the United States," *International Migration Review* 40(4): 854–885
- Aydemir, A. 2011. "Immigrant Selection and Short-Term Labor Market Outcomes by Visa Category." *Journal of Population Economics* 24 (2): 451-475.
- Becker, G. S. 1993. *Human capital: A theoretical and empirical analysis, with special reference to education* (3rd ed.). Chicago: The University of Chicago Press.
- Barker, D. 1976. Hierarchic and non-hierarchic grouping methods: An empirical comparisons of two techniques. *Geografiska Annaler*, 5, 42–58.
- Bevelander, P. 2016. "Integrating Refugees into Labor Markets: Economic Integration of Refugees into their Host Country is Important and Benefits Both Parties." *IZA World of Labor* 269: 1-9.
- Castles, S and Miller, M.J. 2003. "The Age of Migration: International Population Movements in the Modern World" (3rd revised and updated edition), Basingstoke, New York: Palgrave Macmillan.
- Chaykowski, R.P and Slotsve, G.A. 2007. *The Extent of Economic Vulnerability in the Canadian Labour Market and Federal Jurisdiction: Is There a Role for Labour Standards?* / Published online: 6 November 2007 .Springer Science+Business Media B.V. 2007
- Colic-Peisker, V and Tilbury, F. 2006. "Employment niches for recent refugees: Segmented labour market in twenty-first century Australia", *Journal of Refugee Studies*, vol. 19, no. 2, pp. 203-229.

- Constant, A. Zimmermann, K.F. 2005. "Legal Status at Entry, Economic Performance, and Self-Employment Proclivity: A Bi-National Study of Immigrants." IZA Discussion Paper No. 1910. <http://hdl.handle.net/10419/33352>
- Ding, C and He, X (2004). K-means Clustering via Principal Component Analysis. Proceedings of the 21st International Conference on Machine Learning, Banff, Canada, 2004.
- Dikshya, D. 2015. "The Economic Outcomes of Government Assisted Refugees, Privately Sponsored Refugees and Asylum Seekers in Canada." Major Research Paper, Graduate School of Public and International Affairs, University of Ottawa.
- Eckstein, S. and Peri, G. 2018. "Immigrant Niches and Immigrant Networks in the U.S. Labor Market." *The Russell Sage Foundation Journal of the Social Sciences* 4(1): 1–17
- Everitt, B.S. and Dunn, G. 2001. *Applied Multivariate Analysis*. London: Hodder Arnold
- Greenacre, M. *Biplots in Practice*. 2010. Fundacion BBVA Publication, Bilbao, Spain.
- Hou, F. and Bonikowska, A.. 2016. "Selections before the Selection: Earnings Advantages of Immigrants Who Were Former Skilled Temporary Foreign Workers in Canada." *International Migration Review*. doi:10.1111/imre.12310
- Hiebert, D. 2009. The Economic Integration of Immigrants in Metropolitan Vancouver IRPP Choices 15 (7). Montreal: Institute for Research on Public Policy. <http://irpp.org/wp-content/uploads/assets/research/diversity-immigration-and-integration/the-economic-integration-of-immigrants-in-metropolitan-vancouver/vol15no7.pdf>
- Houle, René. 2019. Results from the 2016 Census: Syrian Refugees who Resettled in Canada in 2015 and 2016. Insights on Canadian Society. Ottawa: Statistics Canada. <https://www150.statcan.gc.ca/n1/en/pub/75-006-x/2019001/article/00001-eng.pdf?st=kto-D201>
- Hyndman, Jennifer. 2011. Research Summary on Resettled Refugee Integration in Canada. Ottawa: UN High Commissioner for Refugees (UNHCR). <https://www.unhcr.ca/wp-content/uploads/2014/10/RPT-2011-02-resettled-refugee-e.pdf>
- Jayaraman, S. and Bauder, H. 2013. Niche Employment or Occupational Segmentation? Immigrant Women Working in the Settlement Sector in Germany and Canada RCIS Working Paper No. 2014/3
- Jedwab, J. 2018. "GARs vs. PSRs: Explaining Differences in Outcomes for Recent Refugees to Canada." *Canadian Diversity* 15 (2): 38-46.
- Jobson, J.D. *Applied Multivariate Analysis, Vol II, Categorical and Multivariate Methods*, Springer-Verlag, 1992.
- Kaida, L, Hou, F and Stick, M.. 2019. The long-term economic integration of resettled refugees in Canada: A comparison of Privately Sponsored Refugees and Government-Assisted Refugees, *Journal of Ethnic and Migration Studies*, DOI: 10.1080/1369183X.2019.1623017
- Krahn, H. Derwing, T, Mulder, M. and Wilkinson, L. 2000. "Educated and Underemployed: Refugee Integration into the Canadian Labour Market." *Journal of International Migration and Integration* 1 (1): 59-84.
- Lafortune, J and Tessada, J. 2011. Smooth(er) Landing? The Dynamic Role of Networks in the Location and Occupational Choice of Immigrants , *Documentos de Trabajo* 427, Instituto de Economia. Pontificia Universidad Católica de Chile
- Mata, F. and Pendakur, R. 2016. Of Intake and Outcomes: Wage Trajectories of Immigrant Classes in Canada, *Journal of International Migration and Integration* , p.1-16,
- Neupane, D. Raj. 2012. "Finding a New Job in a New Home: The Labour Market Experiences of Government Assisted Refugees in Canada." Major Research Paper, Immigration and Settlement Studies, Ryerson University. <https://digital.library.ryerson.ca/islandora/object/RULA%3A1510/datastream/OBJ/view>

- Picot, G. , Zhang, Y, and Hou, F. 2019. Labour Market Outcomes among Refugees to Canada. Analytical Studies Branch Research Paper Series 419. Ottawa: Statistics Canada.
<https://www150.statcan.gc.ca/n1/en/pub/11f0019m/11f0019m2019007-eng.pdf?st=GgxIs5jF>
- Alzeer, S.R. 2017. "Occupational Choices Among Arab Americans In The U.U.: An Examination Of The Effects Of Gender, Educational Attainment, Generational Status, Country Of Origin, And Motivation" Wayne State University Dissertations. 1683.https://digitalcommons.wayne.edu/oa_dissertations/1683
- Satzewich, V. and Liokadis, N. 2010. "Race"&Ethnicity in Canada: A Critical Introduction. Oxford University Press.
- Steinley, D.2006.K-means clustering: A half-century synthesis, *British Journal of Mathematical and Statistical Psychology* (59): 1–34
- Valtonen, K. 2004. 'From the Margin to the Mainstream: Conceptualizing Refugee Settlement Process', *Journal of Refugee Studies* 17(1): 70–96.
- van Selm, Joanne. 2003. "Public-Private Partnerships in Refugee Resettlement: Europe and the US." *Journal of International Migration and Integration* 4 (2): 157-175.
- Wilkinson, L. and Garcea, J. 2017. *The Economic Integration of Refugees in Canada: A Mixed Record?* Washington, DC: Migration Policy Institute. https://www.migrationpolicy.org/sites/default/files/publications/TCM-Asylum_Canada-FINAL.pdf