



Higher Education  
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of Ontario

An agency of the Government of Ontario

# **Diving into the Trades: An In-depth Look at 10 Apprenticeship Programs In Ontario**

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Published by

## The Higher Education Quality Council of Ontario

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*Cite this publication in the following format:*

*Chatoor, K. & Brumwell, S. (2020) Diving into the Trades: An In-depth Look at 10 Apprenticeship Programs in Ontario. Toronto: Higher Education Quality Council of Ontario*



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# Table of Contents

Introduction ..... 3

The Profiles ..... 4

Methodology..... 4

Discussion ..... 6

## Introduction

The skilled trades represent a diverse number of occupations that require on-the-job training, and often formal in-school education, and they are present in a wide range of sectors. Those who work in the trades require a specialized set of skills and knowledge and Ontario's apprenticeship system serves as a gateway to careers in the skilled trades. Understanding the apprenticeship system is key to understanding the concerns and challenges facing the trades sector. The Journey of Ontario Apprentices: From High School to the Workforce, a report recently published by the Higher Education Quality Council of Ontario (HEQCO), used newly available data to follow apprentices from their high school years through their apprenticeships and into the labour force. The study found considerable variation in the experiences and outcomes of apprentices between and within major trade groups.

Historically, these four major trade types — automotive, industrial, construction and service trades — were a way to categorize trades based on a combination of industry and associated tasks. HEQCO's first report highlighted something that is perhaps difficult but extremely important to acknowledge: We don't know as much about the trades as we should. In this report, we take an in-depth look at 10 of the most common apprenticeship programs in Ontario using the 2016 Canadian census and the National Apprenticeship Survey (NAS). The purpose of this report is to build upon our initial work, provide a detailed profile of these trades, and build a better understanding of how Ontario's apprenticeship system is performing. We describe the tasks associated with each trade, and provide insight into issues of equity, outcomes and the geographic distribution of tradespeople across Ontario.

What makes this report unique is that we seek to understand trades exclusively from the context of those who participated in apprenticeships in Ontario. The goal of this report is to better understand the experiences of participants in Ontario apprenticeship programs. As a result, the findings in this report reflect only those who participated in or completed an apprenticeship program in Ontario. This distinction is important because many individuals in the labour market work in occupations that fall under trades, or in industries associated with trades, despite having never completed or participated in an apprenticeship program. While this group is important from a labour market and workforce perspective, they are not included in this analysis because our goal is to provide a picture of the role and importance of Ontario's apprenticeship system for those who experienced it and those who are considering participating in it.

We also acknowledge the labour market context within which this analysis is situated. Changes due to automation, severe economic disruptions, and concerns about the skills required to succeed in our future economy continue to emerge. It is therefore as important as ever to understand how the systems designed to help Ontarians gain the skills required to enter and succeed in the labour market are working. We hope



this report can serve as a resource to begin to understand the value and importance of the apprenticeship system in Ontario as well as how we can improve it.

## The Profiles

This report profiles the following 10 Ontario trades, which were chosen based on the largest sample sizes in the available data:

- Automotive services
- Electrician
- Plumbing
- Carpentry
- Hairstyling
- Welding
- Millwrights
- Food services
- Machinists
- Refrigeration and heating

The profiles include information on the general responsibilities of those working in these professions, as well as a brief overview of the skills apprentices are taught. Our profiles are informed by two types of analyses. The first part of each profile examines the experiences of individuals leading up to and during their apprenticeship. This includes information on pre-apprenticeship activities, work experience, the challenges faced by apprentices during their program and the completion rate. The second part of the profile examines their experiences after the apprenticeship, such as where apprentices live, their labour market outcomes and the demographic makeup of apprentices. Readers should note that this report only looks at individuals who participated in apprenticeship programs; we will refer to them in this report as “apprentices” so as to avoid confusion with individuals who work in trades but did not complete an apprenticeship.

## Methodology

The analysis in this paper is based on different methods of classifying trade types depending on the data set used. This is because National Occupation Classification (NOC) codes, the Classification of Instructional Programs codes (CIP) and the Government of Ontario use three different coding and classification systems. For a detailed description of the trade classification approach used in this analysis, please refer to HEQCO’s companion report, *The Journey of Ontario Apprentices: From High School to the Workforce*.

We used the NAS to determine the completion rates reported in this paper. It is important for readers to note that the NAS is a survey of a specific cohort of Canadians who were participating in an apprenticeship program. It is not longitudinal. Rather, it provides a snapshot of apprentices at the time of the survey. Completion as discussed in this report is therefore a measure of those within the NAS cohort who had

completed their apprenticeship program as a percentage of all apprentices who both completed and discontinued their program at the time the survey was conducted. It is possible that some discontinuers from the NAS cohort have since completed or may eventually complete their apprenticeship, which would not be captured in this data set.

## **The National Apprenticeship Survey**

The National Apprenticeship Survey (NAS) is a comprehensive data set that includes apprentices' self-reported experiences about and attitudes toward their apprenticeship, as well as administrative data. In this report, we use the NAS to look exclusively at individuals in Ontario. The NAS is a survey administered at the end of an apprentice's connection to a program: either upon completion or discontinuation. It asks apprentices about their activities before they embarked on apprenticeship training and their experiences during the apprenticeship. A description of the structure of the NAS is described below.

NAS Survey respondents were selected on the basis of their apprentice status in 2011, 2012 or 2013. In the 2015 NAS, there were two groups of apprentices:

**Completers:** individuals who were registered apprentices and who completed their apprenticeship programs between 2011 and 2013.

**Discontinuers:** individuals who were registered apprentices and who discontinued their apprenticeship programs between 2011 and 2013.

Each of the above individuals is linked to administrative tax files from 2011-2014. This linkage allows us to look at the employment and salary outcomes of apprentices for the four years after they completed or discontinued their apprenticeship. The NAS also contains comprehensive demographic information. Although the NAS is national, in this report, we only look at Ontario apprentices.

## **Census**

The 2016 census is the most recent detailed enumeration of Canadians and includes very large sample sizes. It was used in this analysis when looking at the broader Ontario population. When assessing labour market outcomes for the general population, we looked at individuals aged 20–64 who were active in the workforce and not enrolled in education. This applies to all data shown in this report including spatial mapping. We used census divisions to create the spatial map of population distribution. Census divisions were grouped when necessary due to sample size. These groupings were constructed to reflect Statistics Canada's economic regions. When using census data, it is not possible to identify individuals who participated in an

apprenticeship but did not complete it. Therefore, all data derived from the census includes only individuals who completed an apprenticeship.

Readers may refer to Appendix A for a detailed breakdown of data sources and sample sizes for information provided in the profiles.

## Discussion

The experiences and outcomes of apprentices in the 10 trades profiled in this study varied considerably.<sup>1</sup> Below, we summarize the notable differences — and common trends — we observed across our profile metrics. As a reminder, the discussion below reflects only those who participated in an Ontario apprenticeship program.

### *Many apprentices participated in pre-apprenticeship programs*

Our analysis demonstrates that most people who eventually became apprentices engaged in pre-apprenticeship programs while in high school. Hairstylists and food-service workers appeared to be the exception, with less than 40% of apprentices from these trades reporting participation in such programs.

We looked at the types of pre-apprenticeship programs or trade-related experiences offered by Ontario secondary schools: vocational classes, co-op programs and the Ontario Youth Apprenticeship Program (OYAP). Vocational classes were the most common pre-apprenticeship activity: More than 60% of automotive-services workers, carpenters, millwrights and welders reported having participated in them. On average, 37% of apprentices in our profiled trades reported participating in secondary school co-op programs, while 22% participated in OYAP.

Evaluating the percentage of all Ontarians who participate in these programs and whether or not this participation eventually leads to participation in an apprenticeship program could shed light on the value of these programs as well as how big an impact they have in encouraging young Ontarians to participate in apprenticeship programs.

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<sup>1</sup> Readers may refer to Appendix B for data used to construct the profiles.

### ***Most apprentices begin their training several years after being in the workforce***

In most trades, apprentices were far more likely to enter an apprenticeship from the workforce rather than directly from school. Except for hairstylists (44%), electricians (42%) and machinists (38%), a majority of apprentices in our profiled trades reported having worked in a related trade before enrolling in an apprenticeship program. This was especially true in carpentry (74%) and food services (80%). These findings suggest there may be value in outreach efforts to recruit apprentices from working populations in addition to those in school, particularly in industries where individuals are already working in areas related to the trades.

### ***Of all those who participated in an apprenticeship, 20% had previously completed a postsecondary credential***

About one-fifth of apprentices across the 10 profiled trades said they had attained a postsecondary credential before starting an apprenticeship. In some trades it is common to complete a college or university credential before starting an apprenticeship. This is true for food-services workers, refrigeration and heating tradespeople, and millwrights. In each of these groups, at least 40% of new entrants already held a postsecondary credential. On the other hand, only 10% of automotive tradespeople and 13% of plumbers enter their field with a postsecondary credential.

### ***Finding first jobs and apprenticeship sponsors can be challenging when progressing through an apprenticeship***

For every trade profiled in this report, at least one-quarter of apprenticeship participants said they had experienced difficulty progressing through their apprenticeship program. This was especially true for welders (46%) and millwrights (48%). Respondents from these trades also reported the most difficulty in finding a job at the beginning of an apprenticeship, with 34% of apprentices in both trades reporting this as a difficulty.

This is a significant obstacle given that finding employment is essential in order to enter and progress in an apprenticeship. This issue may be especially important during times of economic disruption when the job market is difficult. Further work examining the role this issue plays in the ability of individuals to enrol in apprenticeships could help lead to smoother transitions into apprenticeships for Ontarians.

### *Completion rates vary across trades*

What is striking across the 10 trades profiled in this report is the heterogeneity of completion rates. In other words, completion rates are highly variable among the selected trades. For example, in electrician and plumbing apprenticeships, well over three-quarters of apprentices completed the program. On the other hand, just 32% of welding, 31% of food-services apprentices and 33% of machinist apprentices reported completing the program. While we are unable to make conclusions about why differences in completion rates exist within the scope of this report, these are among the most significant of our findings and warrant further investigation.

The need to understand why completion rates are so varied is particularly relevant when considered within the context of our findings regarding the challenges faced by apprentices during their program.

Understanding how completion rates are affected by factors such as difficulty pursuing and completing an apprenticeship, or socioeconomic factors, could help us to understand why these differences exist. More importantly, improved understanding could help the sector to find meaningful and grounded solutions to address the issue. Because of the heterogeneity of completion rates we observed across the 10 trades, we must reiterate that in order to improve completion rates, policy-makers will need to assess apprenticeship programs on a trade-by-trade basis.

### *Women, minorities and immigrants are underrepresented*

There is much variation in the demographic composition of those who completed an apprenticeship of the 10 profiled trades. Women accounted for 91% of hairdressers and 32% of food-services workers, but only 1% to 3% of the other eight trades. Immigrants — who account for 29% of Ontario's working-age population — accounted for 37% of food-services workers, but only 10% of automotive-services workers and 13% of plumbers. Racialized minorities — who account for 30% of Ontario's working-age population — accounted for 29% of food-services workers and 25% of machinists, but only 10% of electricians and 11% of carpenters.

Within the scope of this report, we cannot determine why these communities are underrepresented in certain trades. It is clear, however, that further work needs to be done to understand why these differences exist and if different or new initiatives may be needed to increase recruitment of underrepresented groups to the trades.

### *Some trades are heavily dominated by older workers*

To understand the aging of the workforce, we used the census to look at the age distribution of those who completed an apprenticeship in Ontario. Across the 10 profiled trades, those aged 50 years old and over outnumbered those aged 35 and under. These findings are not entirely surprising: The overall Canadian population, including Ontarians, is aging, and individuals are more likely to complete apprenticeships at an older age compared to students completing college and university programs. However, certain trades have lopsided age distributions, as is the case with machinists (where there are 35 young machinists for every 100 older machinists) and millwrights (where there are 34 young millwrights for every 100 older millwrights).

With changes occurring in many industries' structures and other technological changes (e.g., automation), it may be worth examining if these changes are affecting observed differences in age in certain trades. To explore the concern over potentially aging sectors, one possible next step would be to assess enrolment trends in some of the trades with older populations, and also assess the future outlook of certain occupations and industries in the context of the future of work.

### *Fewer apprentices live in the Greater Toronto and Hamilton Area*

Another factor that may be contributing to the perceived shortage of tradespeople is the issue of where they reside. We created a general metric of how many apprenticeship completers live in each region per 10,000 individuals in the workforce. Just under half of all Ontario residents live in the Greater Toronto and Hamilton Area (GTHA), the province's largest metropolitan area, yet this region has the lowest number of tradespeople per 10,000 people. In Ottawa, Ontario's second largest metropolitan area, the number of tradespeople per capita was also lower than in other regions of Ontario. This suggests that shortages of tradespeople may be a regional problem as opposed to a broader provincial one.

In some cases, the differences may reflect the location of regional industries. For example, Halton Region has the highest concentration of machinists in Ontario (18 per 10,000 individuals), which likely reflects the region's proximity to the province's manufacturing sector. Within the GTHA, higher proportions of people who completed an apprenticeship resided in Hamilton and Halton than in Toronto and its immediate suburbs. This demonstrates that even within regions there are differences in terms of where tradespeople are most likely to live.

### *Income varies widely across trades*

Incomes earned by tradespeople vary widely depending on the trade. For example, the mean income of a millwright was \$79,000 per year compared to \$25,000 for a hairstylist. Potential earnings can affect whether an individual pursues a given trade. While income may not be the primary motivating factor for choosing a specific trade, the high level of income variability could be critical factor for someone developing their education and career goals. Our report does not attempt to explain why the heterogeneity in income outcomes exists. Labour market outcomes, especially income earnings, are influenced by multiple factors in complex ways. This is an issue that warrants a separate analysis.

### *Income is not all that matters*

Unemployment rates and low-income status could be deciding factors for those considering a career in the trades. Incidence of low-income status ranged from 4% for individuals who completed a millwright apprenticeship to 19% for those who completed a food services or hairstyling apprenticeship. These findings can serve as a strong incentive to enter some trades while at the same time pointing out that a severe disparity exists among them.

For many Ontarians, having steady employment is also a critical concern. Unemployment rates were as low as 3% for those who completed an automotive-services apprenticeship and as high as 10% for welders. Across the 10 profiled trades, however, most trades had unemployment rates below the provincial average, which was about 7% in 2016.

Other labour market outcome measures are also important to consider. For example, self-employment is a metric that may be of special interest to individuals who want to work in an environment where they can be their own boss. The findings show that those who completed apprenticeships in carpentry (24%), hairstyling (29%) and refrigeration and heating (19%) were the most likely to report that they were self-employed.

We also looked at whether individuals who completed an apprenticeship worked in the trade they trained for. In every apprenticeship profiled in this report except for hairstyling, a majority of individuals said they worked in the trade for which they had studied. However, there is broad variability among the 10 profiled trades, ranging from as low as 37% for hairstylists to 84% for food-services workers. In carpentry and welding programs, three-quarters of apprentices worked in related trades.

## Conclusion

This report profiles 10 trades and the individuals who participated in these apprenticeship programs in Ontario. It is meant to serve as a companion report to HEQCO's previously published study on apprentices, *The Journey of Ontario Apprentices: From High School to the Workforce*.

Together, the reports show that there is considerable variation in the experiences and outcomes of apprentices between and within trades. About one-quarter of participants in the 10 profiled trades reported difficulty progressing through their apprenticeships. Many had trouble finding a job and an apprenticeship sponsor, both of which are essential to progressing through and completing an apprenticeship. Among our most important findings is the wide variation in completion rates. Although completion rates varied widely across trades, they were markedly low for some programs, such as welding, food services and machinist. Likewise, women, minorities and immigrants were underrepresented in most trades profiled here, and older workers outnumbered younger ones.

The report also reveals regional differences in terms of where tradespeople reside. Based on this sample of apprentices, they are far more likely to live in rural and smaller population centres, whereas most of Ontario's population resides in large urban areas. This may explain, in part, the perception that there is a shortage of tradespeople in the province today.

Our findings shed light on factors that may be contributing to reports of shortages in the skilled trades. They also identify several areas where policy-makers could focus efforts to address workforce imbalances.

What is clear is that apprenticeship programs can provide a pathway to a prosperous career for many Ontarians and that ensuring the health of this system would be of benefit to all Ontarians.





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# AUTOMOTIVE SERVICES

Automotive service technicians are responsible for the maintenance, diagnostics and repair of vehicles such as cars and trucks. They are trained in work practices related to engine systems; wheel alignment; axles and steering mechanisms; ignition; fuel management; electronics and emissions; drivetrain systems; suspension; and braking and air conditioning systems.

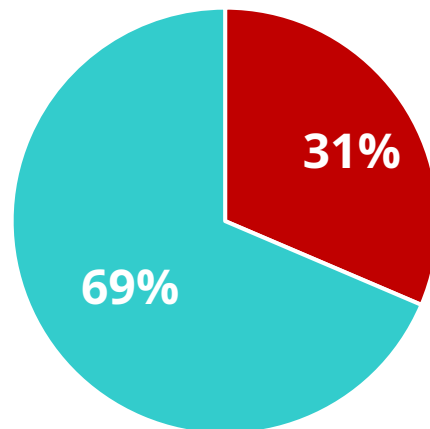
## High School Activities

**35%**   
OYAP

**65%**   
Vocational class

**47%**   
Co-op program

- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**56%**

Completion rate of automotive services apprentices

**33%**

Percentage of automotive services apprentices who say they had difficulty progressing through an apprenticeship program

**24%**

Percentage of automotive services apprentices who say they had difficulty finding work at the start of an apprenticeship program



**56%**

Percentage of automotive services apprentices who worked in a related trade before starting an apprenticeship

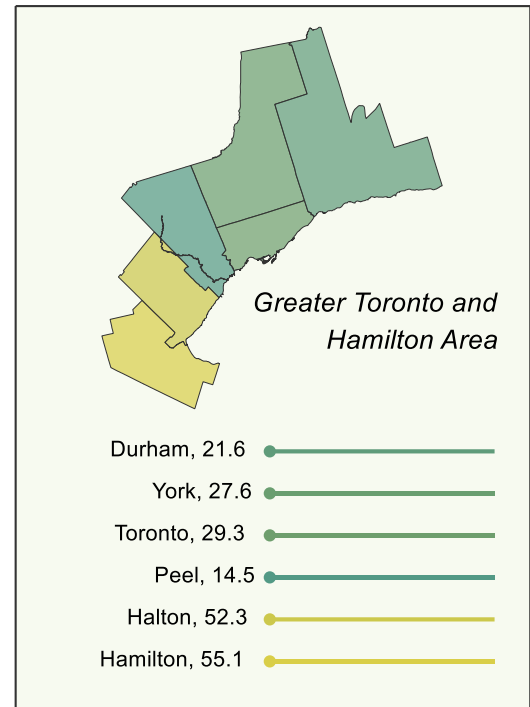
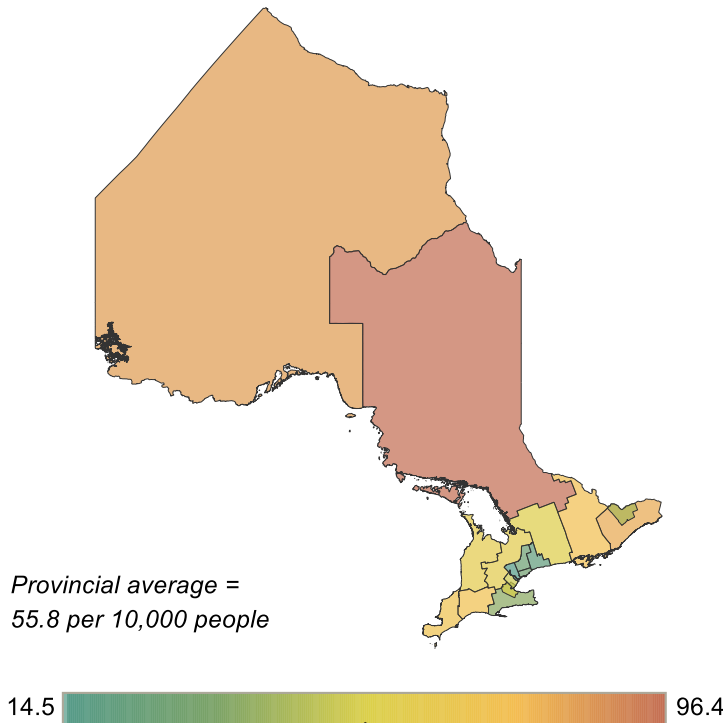


**19%**

Percentage of automotive services apprentices with a postsecondary credential at the start of an apprenticeship

# AUTOMOTIVE SERVICES

Automotive services tradespeople per 10,000 people, Ontario



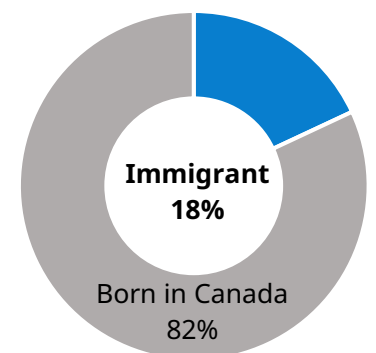
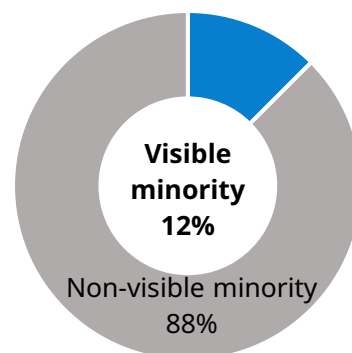
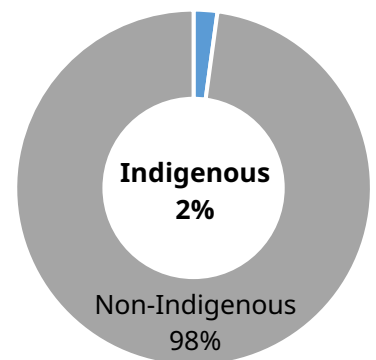
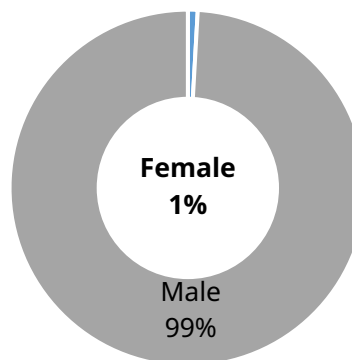
## \$51,400

Average income of automotive service technicians in 2014

## 64:100

The ratio of automotive service technicians under the age of 35 to those over the age of 50

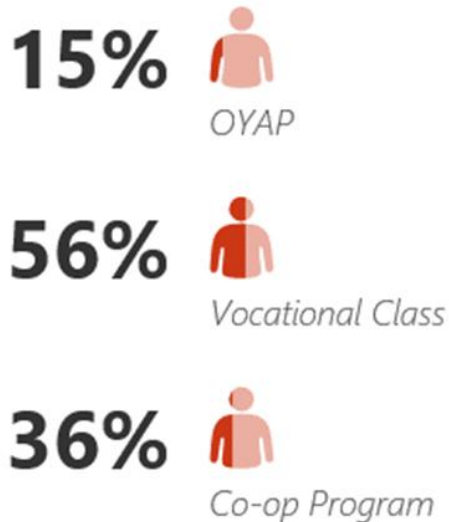
### Post-apprenticeship activities



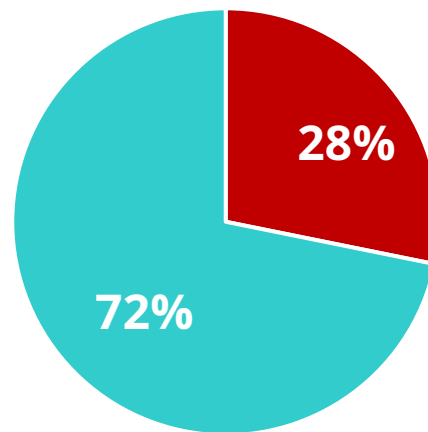
# ELECTRICIANS

Electricians are responsible for laying out, inspecting, assembling, installing, troubleshooting, repairing and maintaining electrical fixtures, apparatus, control equipment and wiring for electrical systems. Electricians may work in industrial, construction or domestic settings. They are trained in codes; legislation and regulations; blueprints; drawings and specifications; electrical theory; transformers; generators and electronics; conductors and cables; installation methods; job planning; and electric equipment maintenance.

## High School Activities



- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**75%**

Completion rate of electrician apprentices

**37%**

Percentage of electrician apprentices who say they had difficulty progressing through an apprenticeship

**29%**

Percentage of electrician apprentices who say they had difficulty finding work at the start of an apprenticeship



**44%**

Percentage of electrician apprentices who worked in a related trade before starting an apprenticeship

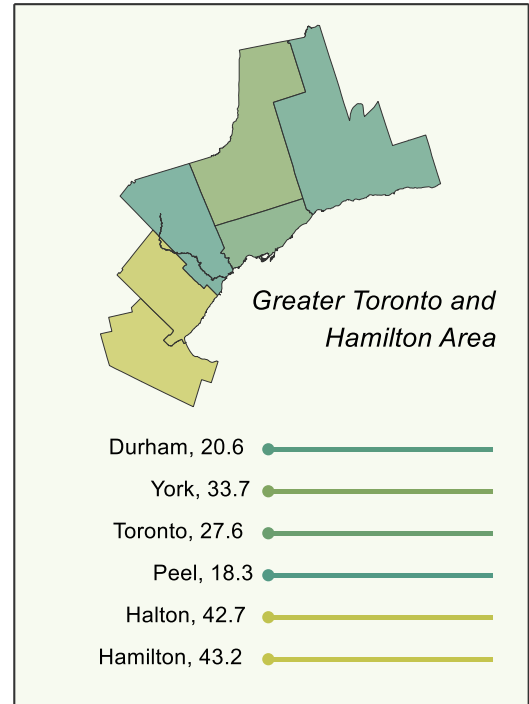
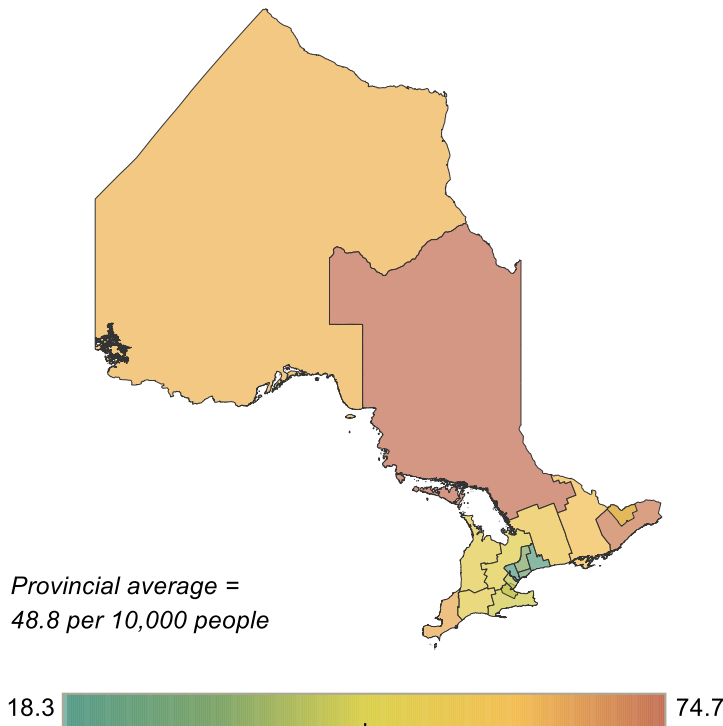


**33%**

Percentage of electrician apprentices with a postsecondary credential at the start of an apprenticeship

# ELECTRICIANS

Electricians per 10,000 people, Ontario



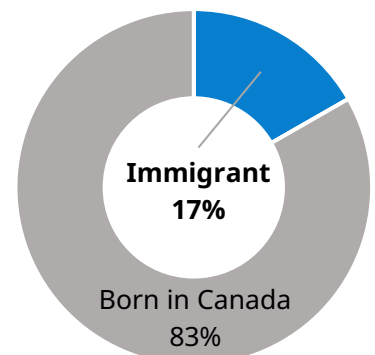
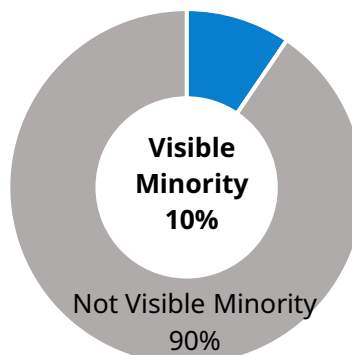
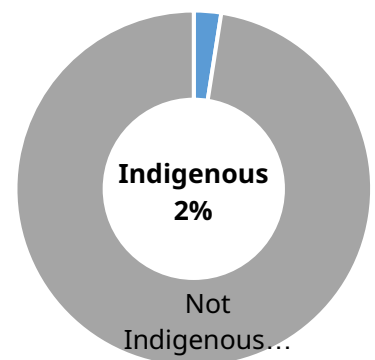
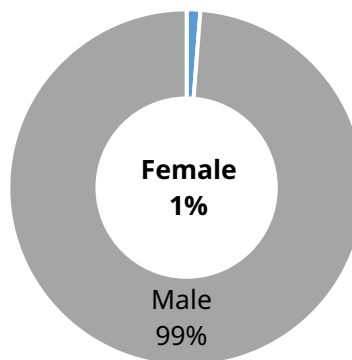
**\$76,700**

Average income of electricians in 2014

**73:100**

The ratio of electricians under the age of 35 to those over the age of 50

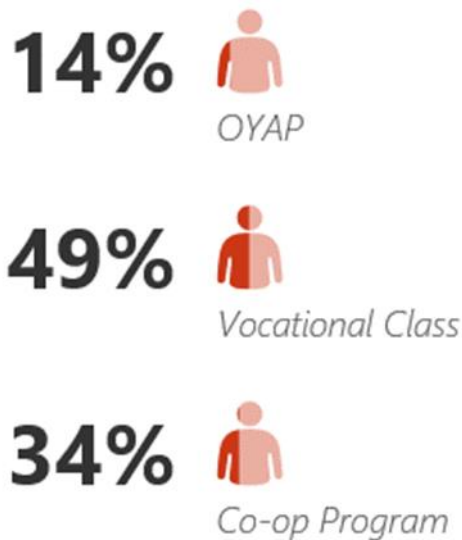
## Post-apprenticeship activities



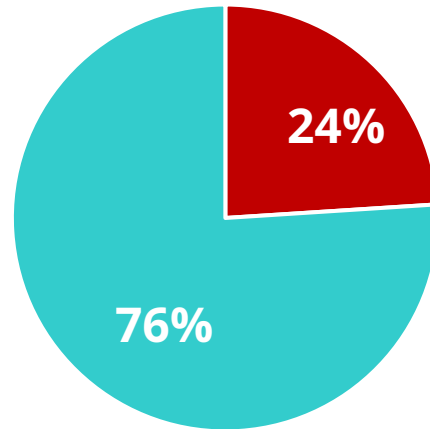
# PLUMBERS

Plumbers are responsible for the installation, repair and maintenance of equipment used for water distribution, drainage and waste disposal. Some of the practical tasks they are trained in include workplace safety; rigging and hoisting; pipe and fitting materials; and piping methods. Their training also includes properties of water and heat transfer; codes, regulations and standards; sewage disposal systems; water distribution systems; and drainage systems.

## High School Activities



- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**81%**

Completion rate of plumbing apprentices

**26%**

Percentage of plumbing apprentices who say they had difficulty progressing through an apprenticeship

**18%**

Percentage of plumbing apprentices who say they had difficulty finding work at the start of an apprenticeship



**54%**

Percentage of plumbing apprentices who worked in a related trade before starting an apprenticeship

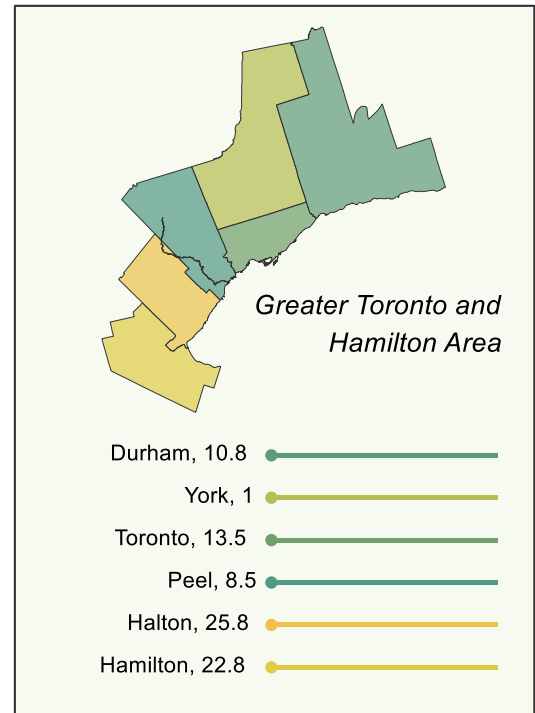
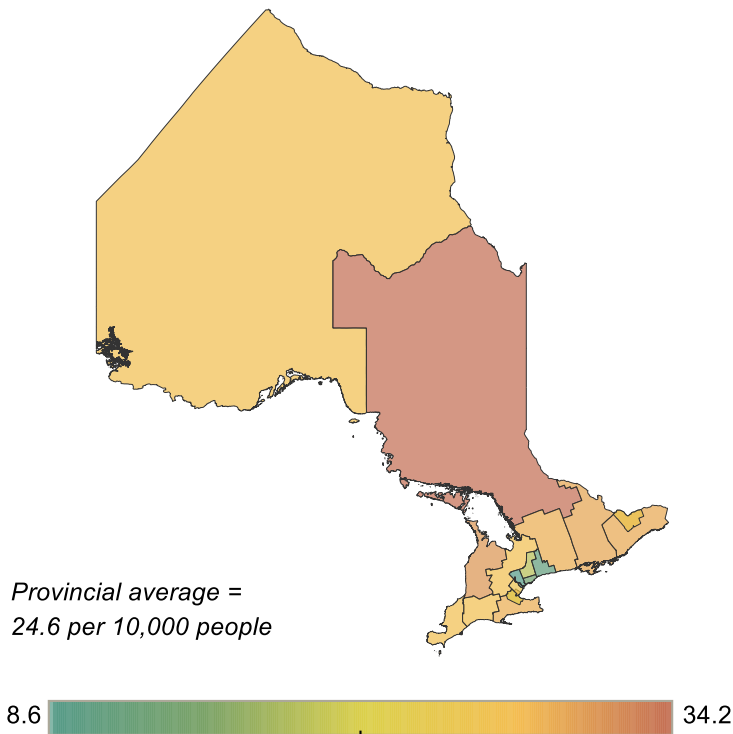


**21%**

Percentage of plumbing apprentices with a postsecondary credential at the start of an apprenticeship

# PLUMBERS

## Plumbers per 10,000 people, Ontario



**\$63,900**

Average income of plumbers in 2014

**73:100**

The ratio of plumbers under the age of 35 to those over the age of 50

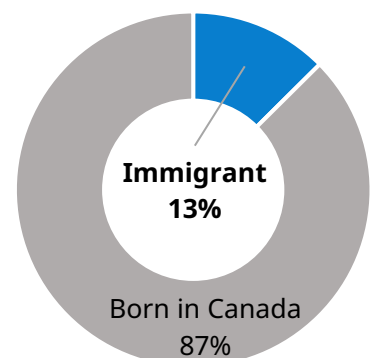
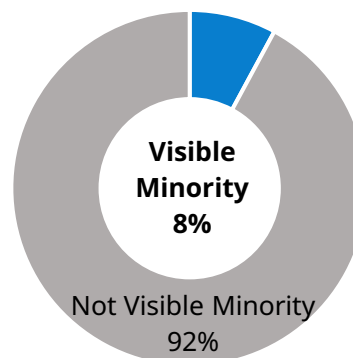
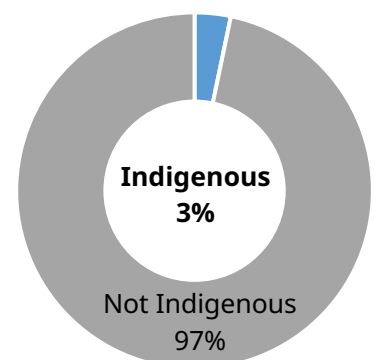
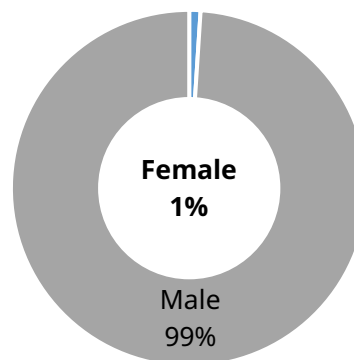
### Post-apprenticeship activities

**58%**  *Working in a Related Trade*

**7%**  *Unemployed*

**17%**  *Self-Employed*

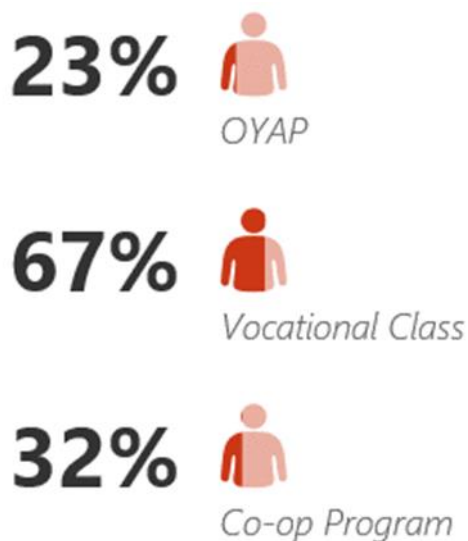
**7%**  *Low Income (LINC)*



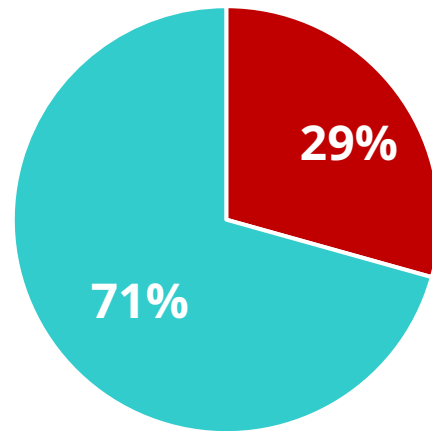
# CARPENTERS

Carpenters are responsible for the construction, renovation or repairing of structures made out of wood, steel, concrete and other materials in residential, commercial or industrial sectors. They are trained in safety; planning and building codes; metal cutting and welding; construction in the context of excavation; foundations; drainage systems; concrete structures; roofs, walls, ceilings and floors; and exterior and interior finishing.

## High School Activities



- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**58%**

Completion rate of carpentry apprentices

**36%**

Percentage of carpentry apprentices who say they had difficulty progressing through an apprenticeship

**19%**

Percentage of carpentry apprentices who say they had difficulty finding work at the start of an apprenticeship



**74%**

Percentage of carpentry apprentices who worked in a related trade before starting an apprenticeship



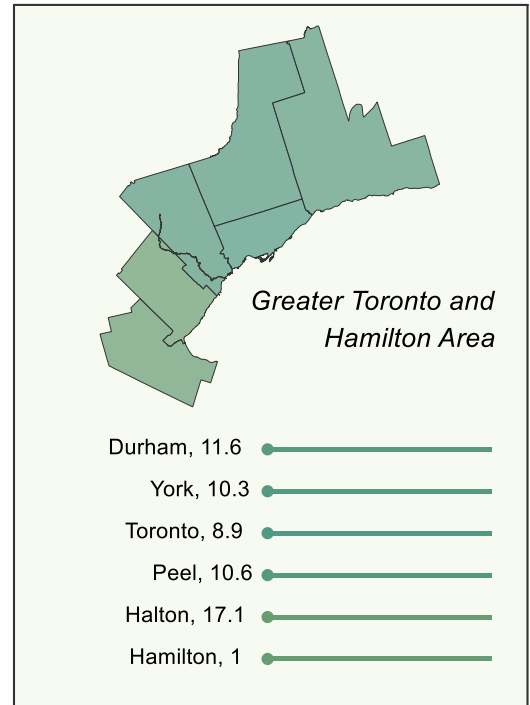
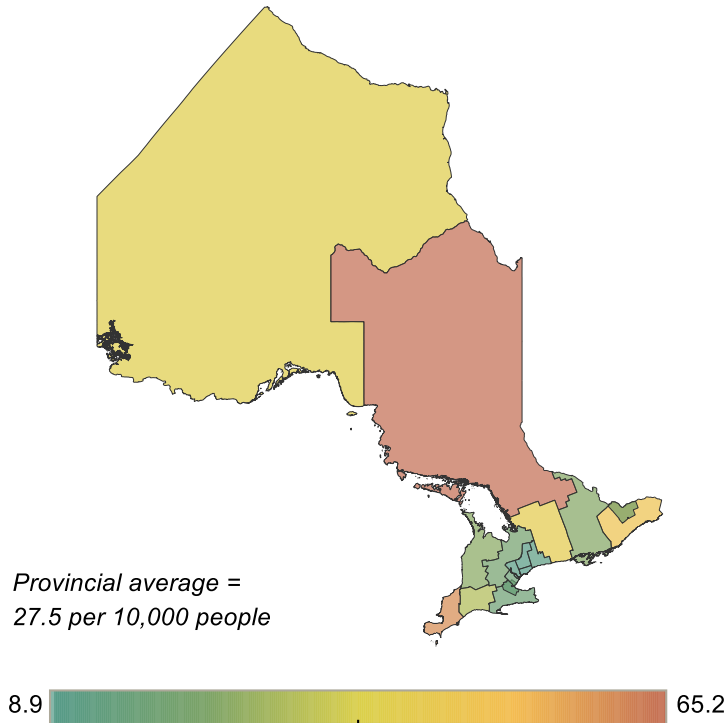
**21%**

Percentage of carpentry apprentices with a postsecondary credential at the start of an apprenticeship



# CARPENTERS

Carpenters per 10,000 people, Ontario



## \$47,800

Average income of carpenters in 2014

## 90:100

The ratio of carpenters under the age of 35 to those over the age of 50

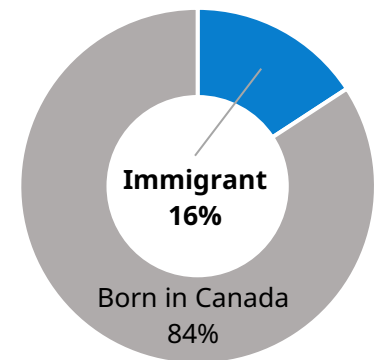
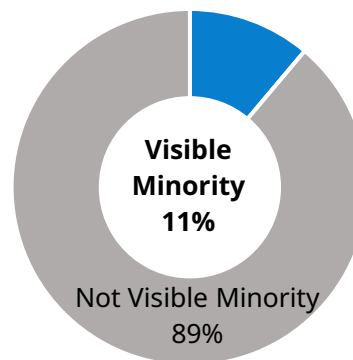
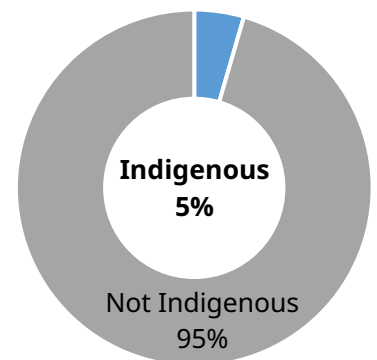
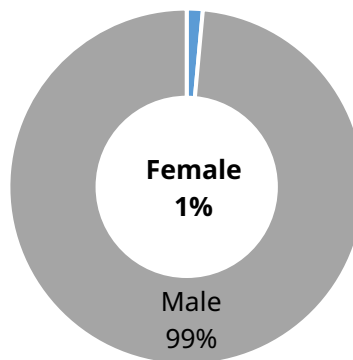
### Post-apprenticeship activities

**75%**  *Working in a Related Trade*

**8%**  *Unemployed*

**24%**  *Self-Employed*

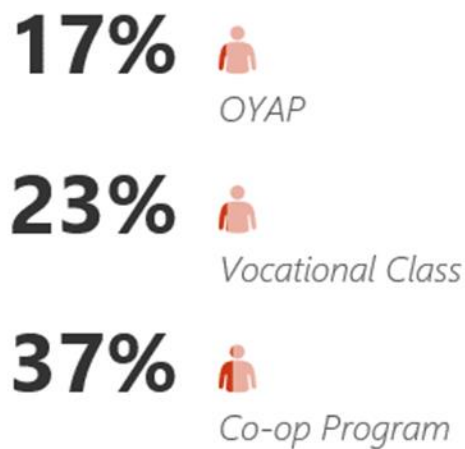
**10%**  *Low Income (LINC)*



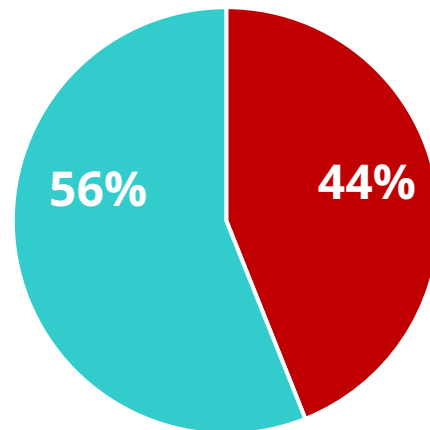
# HAIRSTYLISTS

Hairstylists are responsible for hairstyling services such as cutting, designing, colouring and straightening. They are trained in applied health and safety procedures; treatment of hair and scalp; salon functions; cutting and styling hair; chemical waving and relaxing of hair; and colouring and lightening

## High School Activities



- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**71%**

Completion rate of hairstylist apprentices

**29%**

Percentage of hairstylist apprentices who say they had difficulty progressing through an apprenticeship

**17%**

Percentage of hairstylist apprentices who say they had difficulty finding work at the start of an apprenticeship



**42%**

Percentage of hairstylist apprentices who worked in a related trade before starting an apprenticeship

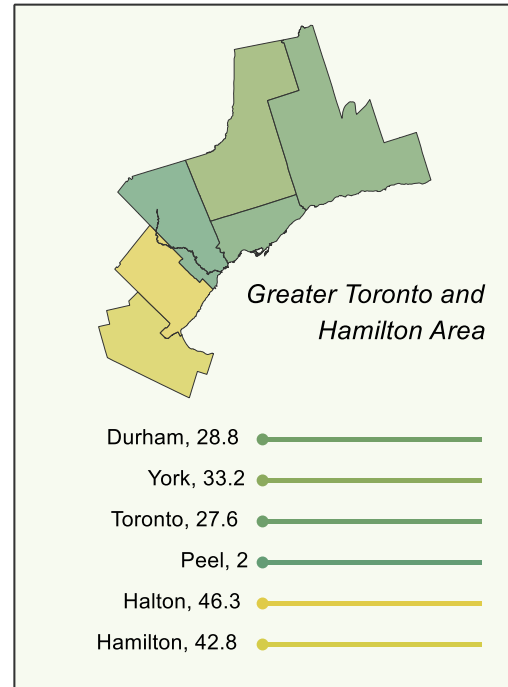
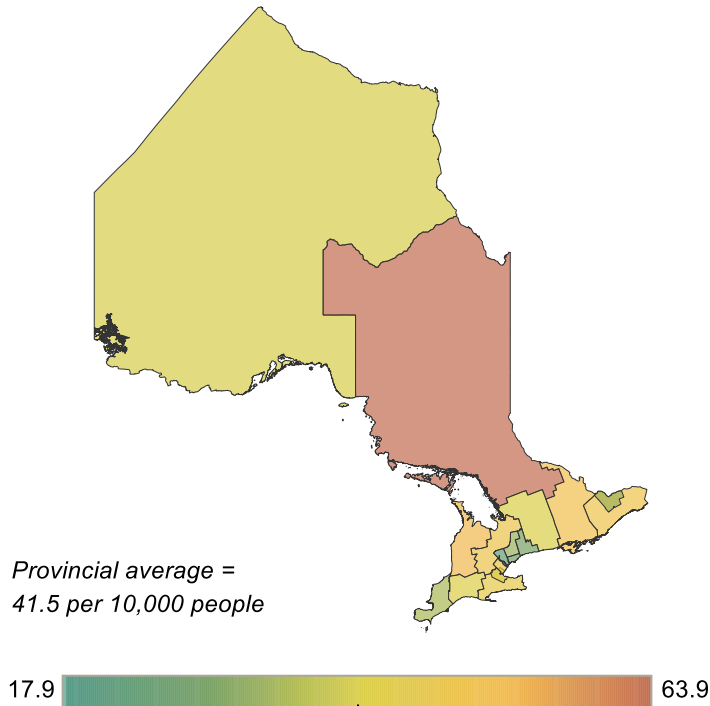


**29%**

Percentage of hairstylist apprentices with a postsecondary credential at the start of an apprenticeship

# HAIRSTYLISTS

## Hairstylists per 10,000 people, Ontario



**\$24,500**

Average income of hairstylists in 2014

**69:100**

The ratio of hairstylists under the age of 35 to those over the age of 50

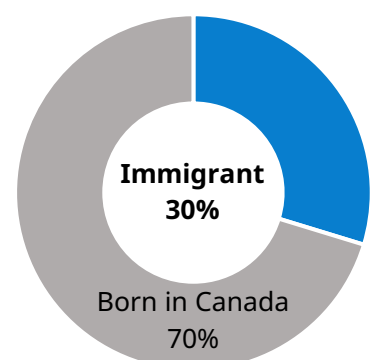
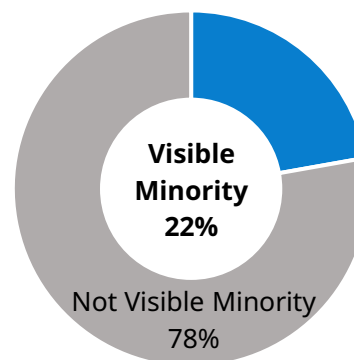
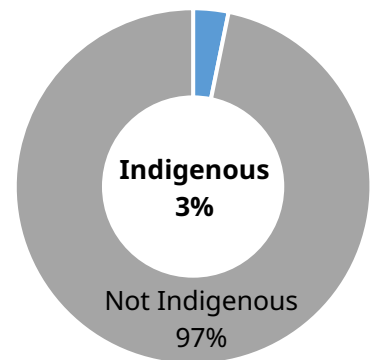
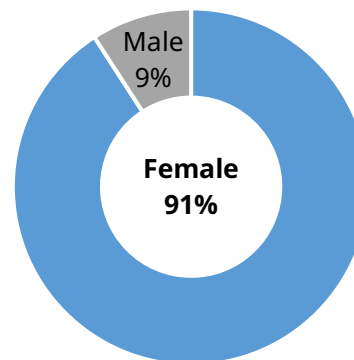
## Post-apprenticeship activities

**37%** Working in a Related Trade

**5%** Unemployed

**29%** Self-Employed

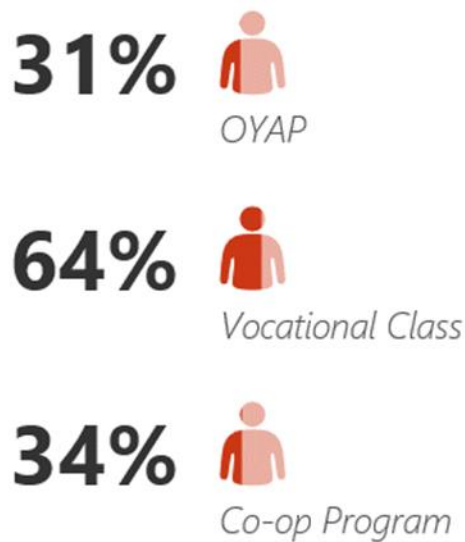
**19%** Low Income (LINC)



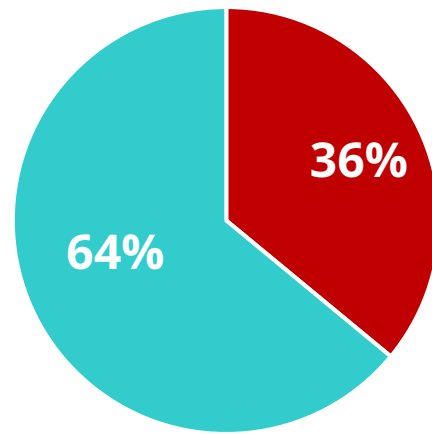
# WELDERS

Welders are responsible for permanently joining pieces of metal or manufactured parts using heat, pressure and/or metal filler. Welders can be involved in building structures and repairing parts in addition to carrying out special processes such as welding studs and brazing. They are trained in safety procedures; quality; welding theory; different types of welding (shielded, gas metal, gas tungsten, plasma, submerged); as well as fitting, fabrication, brazing, and thermal cutting.

## High School Activities



- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**32%**

Completion rate of welding apprentices

**46%**

Percentage of welding apprentices who say they had difficulty progressing through an apprenticeship

**34%**

Percentage of welding apprentices who say they had difficulty finding work at the start of an apprenticeship



**61%**

Percentage of welding apprentices who worked in a related trade before starting an apprenticeship

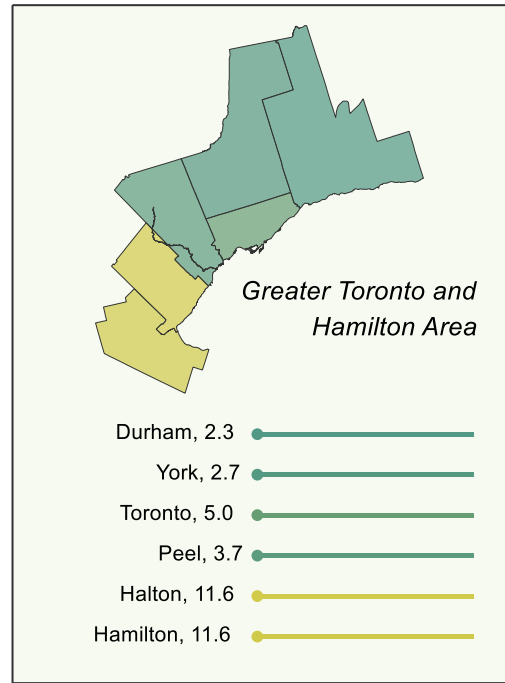
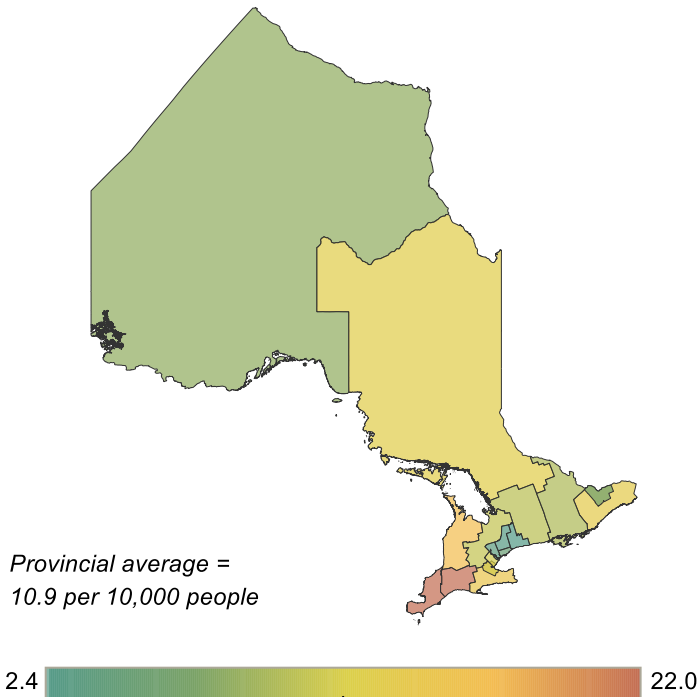


**23%**

Percentage of welding apprentices with a postsecondary credential at the start of an apprenticeship

# WELDERS

Welders per 10,000 people, Ontario



## \$58,700

Average income welders in 2014

## 71:100

The ratio of welders under the age of 35 to those over the age of 50

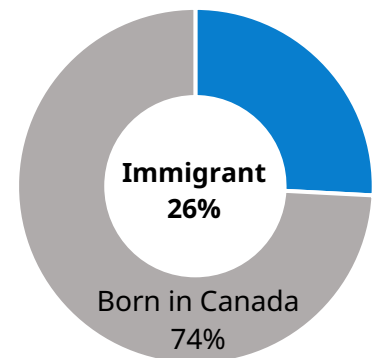
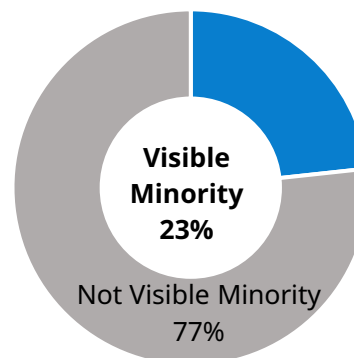
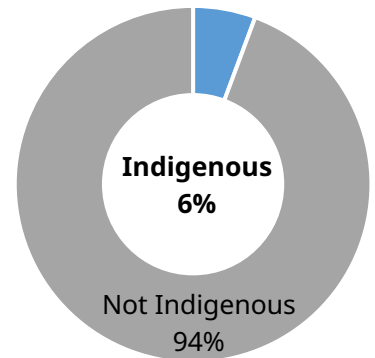
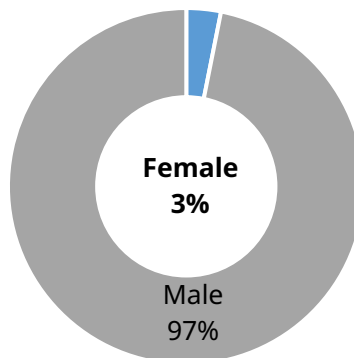
### Post-apprenticeship activities

**74%**  *Working in a Related Trade*

**10%**  *Unemployed*

**9%**  *Self-Employed*

**12%**  *Low Income (LINC)*



# MILLWRIGHTS

Millwrights are responsible for laying out, receiving and installing machinery, mechanical equipment and automated and robotic systems. Millwrights may also be responsible for mechanical, pneumatic, hydraulic, cooling and exhaust systems. They work in industries such as construction and manufacturing. They are trained in workshop practice and technology; preventative and predictive maintenance; welding; brazing and soldering; machine technology; rigging and hoisting; electrical controls; and drawing and schematics.

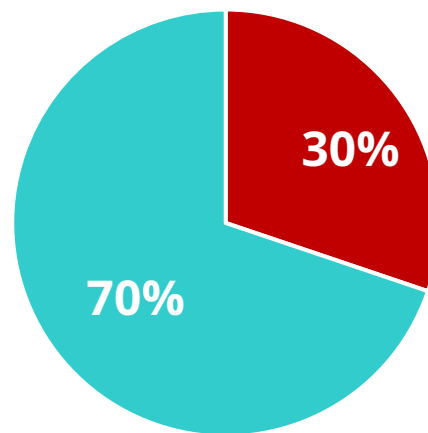
## High School Activities

**14%**   
OYAP

**69%**   
Vocational Class

**33%**   
Co-op Program

- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**60%**

Completion rate of millwright apprentices

**48%**

Percentage of millwright apprentices who say they had difficulty progressing through an apprenticeship

**34%**

Percentage of millwright apprentices who say they had difficulty finding work at the start of an apprenticeship



**58%**

Percentage of millwright apprentices who worked in a related trade before starting an apprenticeship

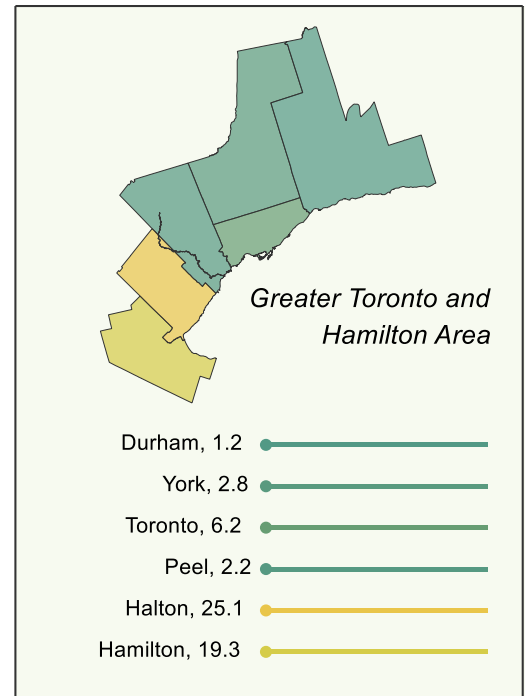
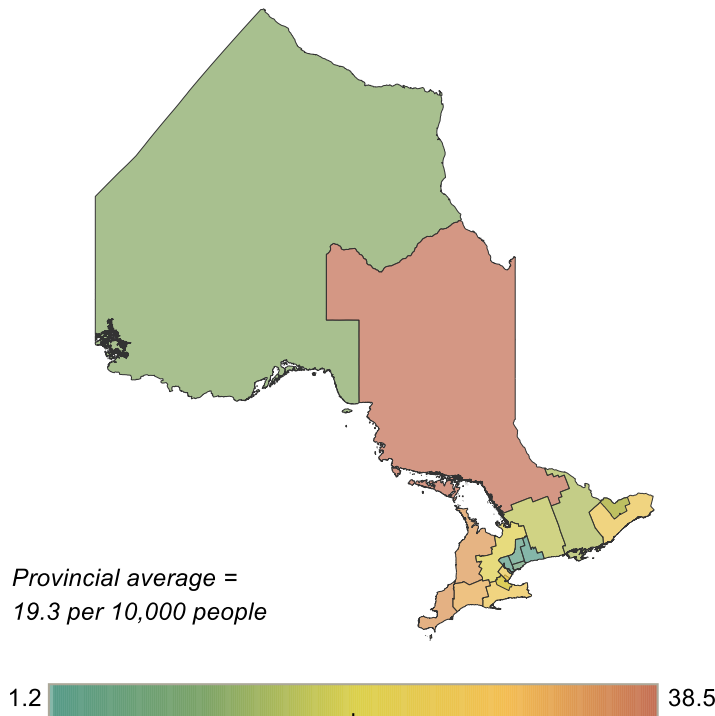


**46%**

Percentage of millwright apprentices with a postsecondary credential at the start of an apprenticeship

# MILLWRIGHTS

Millwrights per 10,000 people, Ontario



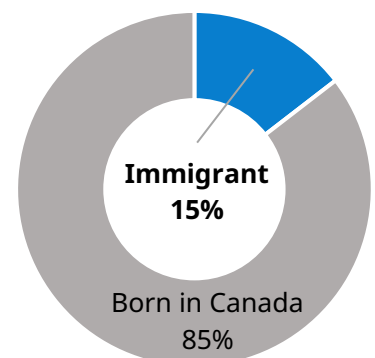
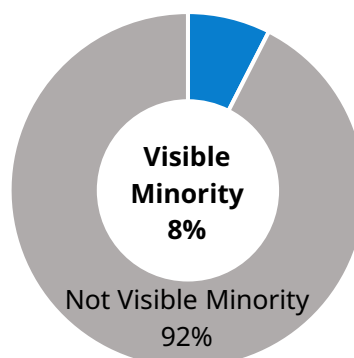
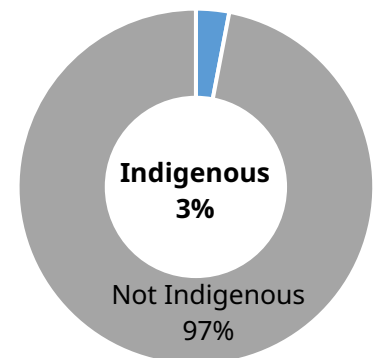
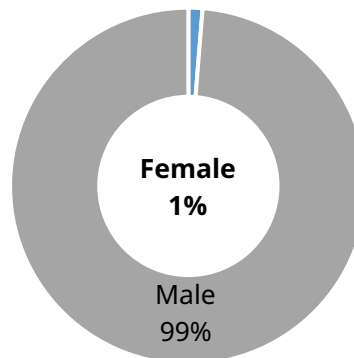
## \$78,600

Average income of millwrights in 2014

## 36:100

The ratio of millwrights under the age of 35 to those over the age of 50

### Post-apprenticeship activities



# FOOD SERVICES

Individuals who work in food services include cooks, baker-pâtissiers, institutional cooks and assistant cooks. Institutional cooks prepare meals using bulk-cooking methods for long-term care homes, hospitals, corporate environments and correctional facilities. Baker-pâtissiers prepare and bake items such as pies, tarts, cakes and bread for commercial, retail or restaurant settings. Food services workers are trained in culinary techniques; food theory; bake and pastry theory; kitchen management; sanitation; quantity food preparation; basic nutrition; and various production methods.

## High School Activities

**28%**



OYAP

**33%**



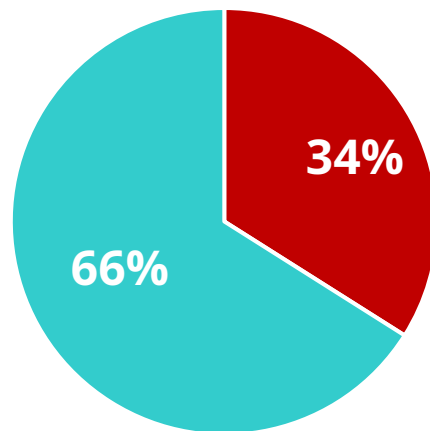
Vocational Class

**39%**



Co-op Program

- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



**31%**

Completion rate of food services apprentices

**39%**

Percentage of food services apprentices who say they had difficulty progressing through an apprenticeship

**16%**

Percentage of food services apprentices who say they had difficulty finding work at the start of an apprenticeship



**80%**

Percentage of food services apprentices who worked in a related trade before starting an apprenticeship



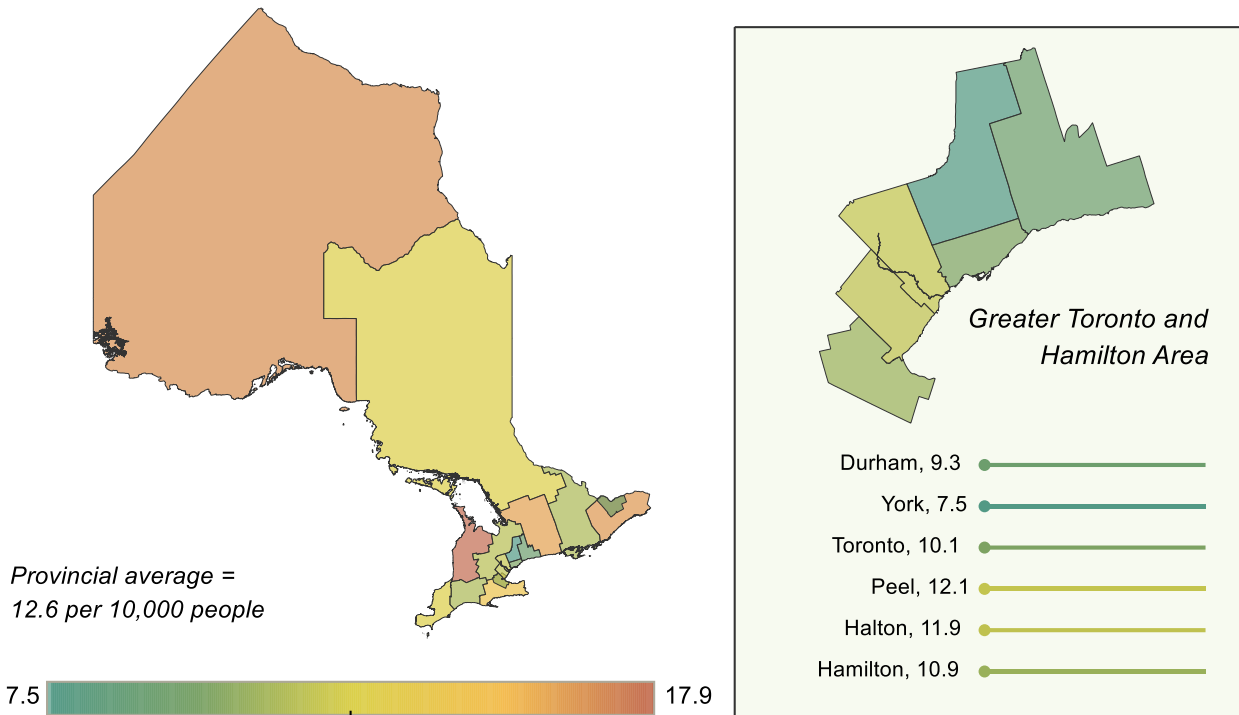
**40%**

Percentage of apprentices in food services with a postsecondary credential at the start of an apprenticeship



# FOOD SERVICES

Food services tradespeople per 10,000 people, Ontario



## \$31,800

Average income of food service workers in 2014

## 73:100

The ratio of food service workers under the age of 35 to those over the age of 50

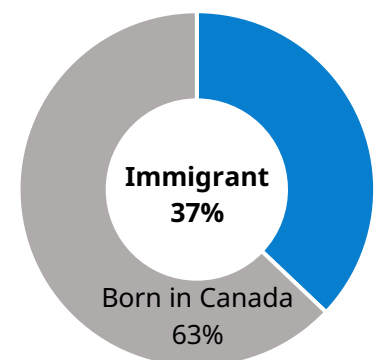
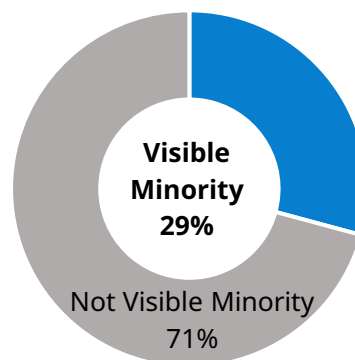
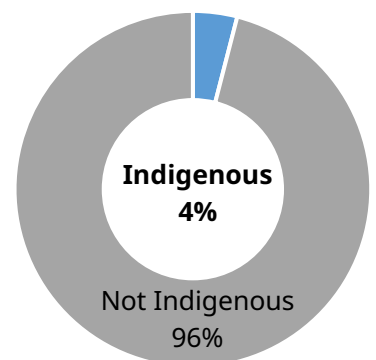
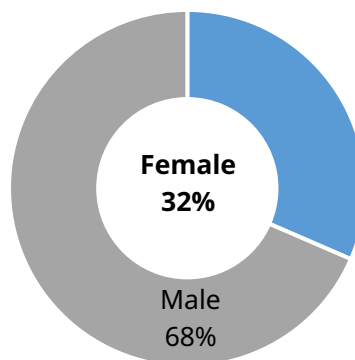
### Post-apprenticeship activities

**84%** *Working in a Related Trade*

**8%** *Unemployed*

**10%** *Self-Employed*

**19%** *Low Income (LINC)*



# MACHINISTS

Machinists are responsible for cutting, shaping and finishing metal to make precision machine parts and components that are associated with manufacturing. They are trained in applied safety practices; applied calculations; charts and tables; engineering drawings; computer aided design (CAD); data; metallurgy; metrology; benchworking techniques; metal cutting; drilling; milling and grinding; and computerized numerically controlled technology (CNC).

## High School Activities

19%



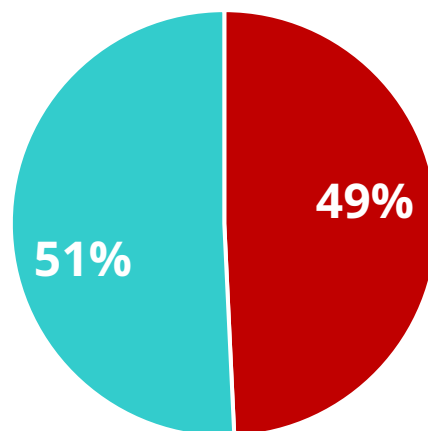
OYAP

41%



Co-op Program

- Attended school before starting apprenticeship
- In workforce before starting apprenticeship



33%

Completion rate of  
machinist apprentices

49%

Percentage of machinist  
apprentices who say they  
had difficulty progressing  
through an apprenticeship

24%

Percentage of machinist  
apprentices who say they  
had difficulty finding work  
at the start of an  
apprenticeship



51%

Percentage of  
machinist apprentices  
who worked in a  
related trade before  
starting an  
apprenticeship

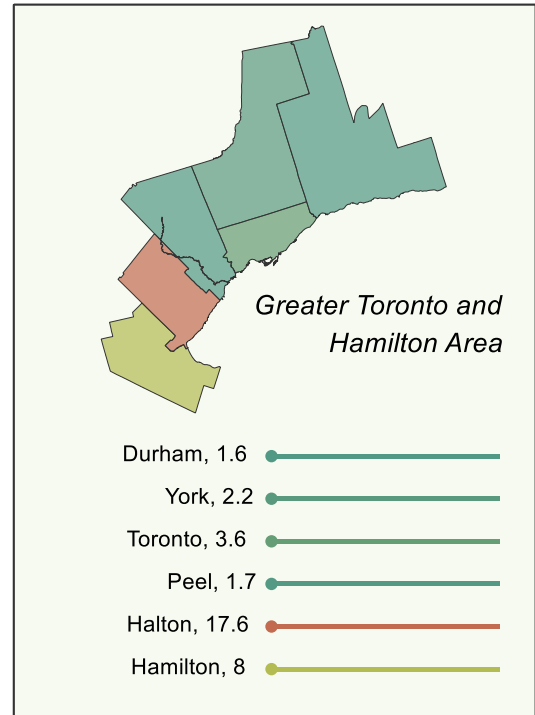
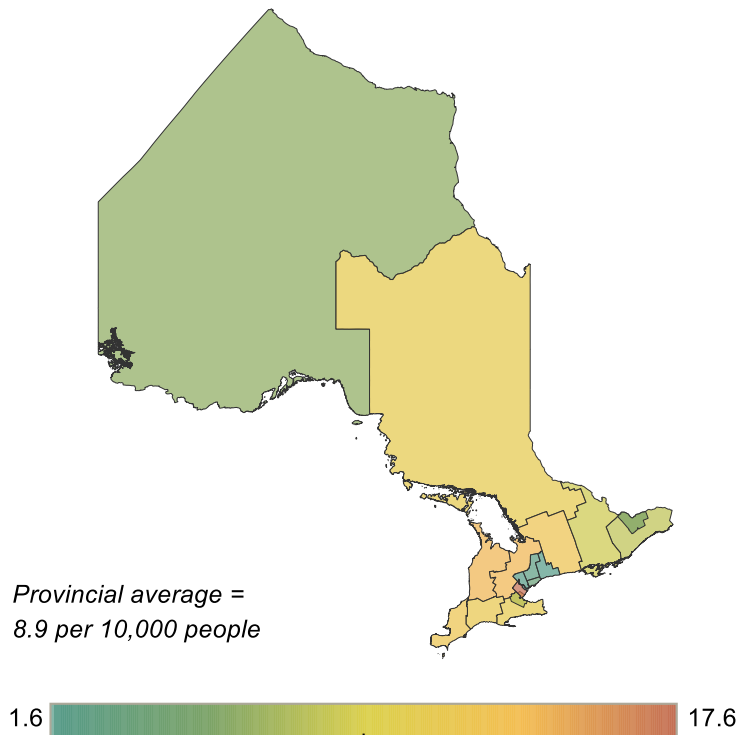


38%

Percentage of  
machinist apprentices  
with a postsecondary  
credential at the start  
of an apprenticeship

# MACHINISTS

## Machinists per 10,000 people, Ontario



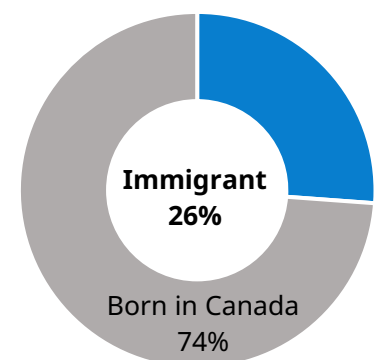
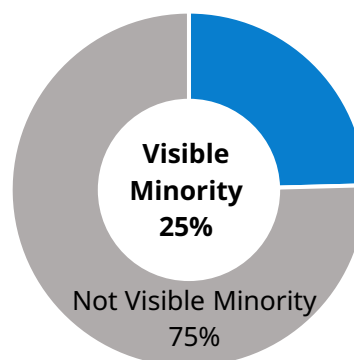
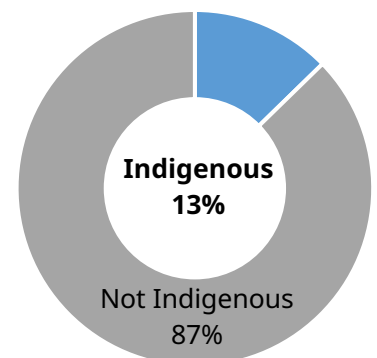
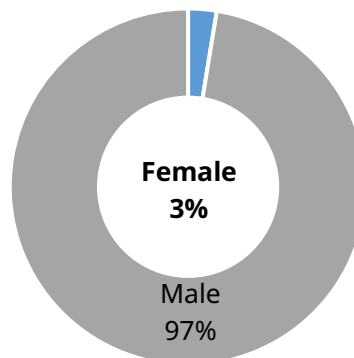
**\$55,300**

Average income of machinists in 2014

**34:100**

The ratio of machinists under the age of 35 to those over the age of 50

## Post-apprenticeship activities



# REFRIGERATION AND HEATING

Refrigeration and heating system mechanics are responsible for refrigeration, cooling, and combined heating and cooling systems. They may work in residential, industrial, commercial and institutional settings. They are trained in workplace health and safety; applied trade mathematics; engineering drawings; mechanical cooling fundamentals; electrical fundamentals; pipe joining; welding, applied psychrometric heat load calculations; pressure enthalpy and refrigerants; and mechanical cooling cycles.

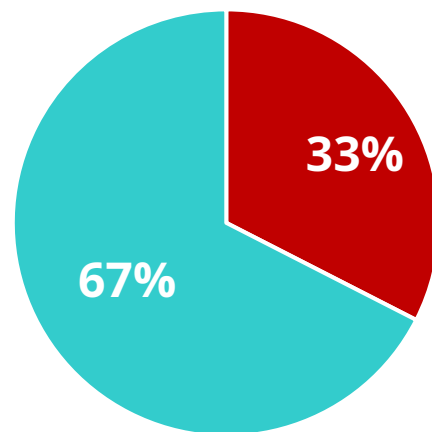
## High School Activities

**24%**   
OYAP

**58%**   
Vocational Class

**39%**   
Co-op Program

■ Attended school before starting apprenticeship  
■ In workforce before starting apprenticeship



**60%**  
Completion rate of  
refrigeration and heating  
apprentices

**31%**  
Percentage of refrigeration  
and heating apprentices  
who say they had difficulty  
progressing through an  
apprenticeship

**20%**  
Percentage of refrigeration  
and heating apprentices  
who say they had difficulty  
finding work at the start of  
an apprenticeship



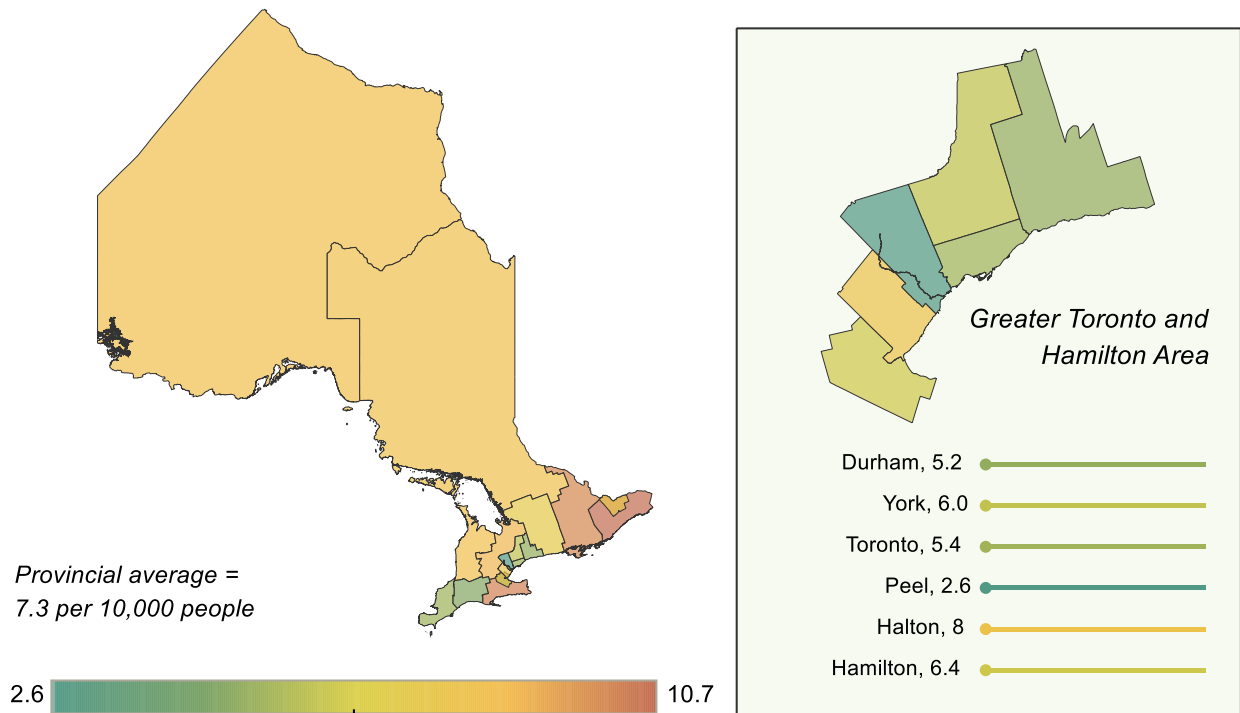
**67%**  
Percentage of  
refrigeration and  
heating apprentices  
who worked in a  
related trade before  
starting an  
apprenticeship



**42%**  
Percentage of  
refrigeration and  
heating apprentices  
with a postsecondary  
credential at the start  
of an apprenticeship

# REFRIGERATION AND HEATING

Refrigeration and heating tradespeople per 10,000 people, Ontario



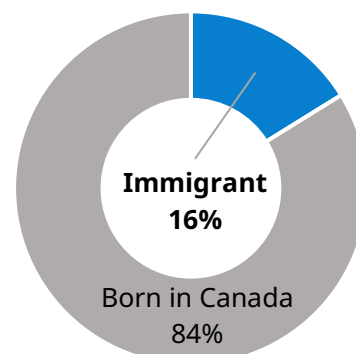
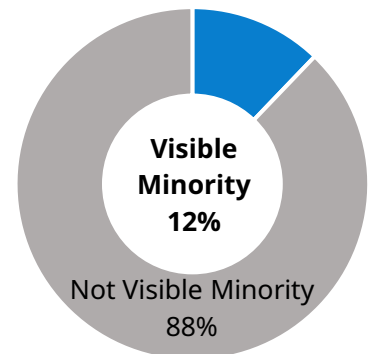
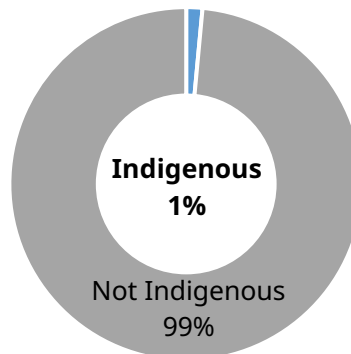
## \$59,900

Average income of refrigeration and heating technicians in 2014

## 78:100

The ratio of refrigeration and heating technicians under the age of 35 to those over the age of 50

### Post-apprenticeship activities





Higher Education  
Quality Council  
of Ontario

An agency of the Government of Ontario

# **Diving into the Trades: An In-depth Look at 10 Apprenticeship Programs In Ontario Appendix**

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Higher Education Quality Council of Ontario



Published by

## The Higher Education Quality Council of Ontario

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Toronto, Ontario M5J 0B6

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*Cite this publication in the following format:*

*Chatoor, K., Brumwell, S. (2020) Diving into the Trades: An In-depth Look at 10 Apprenticeship Programs In Ontario Appendix.* Toronto: Higher Education Quality Council of Ontario



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## Appendix A

Table A1 itemizes the variables we have isolated for analysis for each of the 10 trade profiles and includes information on the data source and sample size. The 10 trades were chosen because they have the highest number of registered apprentices in Ontario's system.

**Table A1: Variables included in profiles by data source and sample size**

<b>Variable</b>	<b>Source</b>	<b>Sample Size (NAS) or Population Estimates (census)</b>
Gender	<b>2016 Canadian census</b>	<b>139,000</b>
Indigenous status	<b>2016 Canadian census</b>	<b>143,000</b>
Visible-minority status	<b>2016 Canadian census</b>	<b>143,000</b>
Immigrant status	<b>2016 Canadian census</b>	<b>143,000</b>
Under 35 to over 50 age ratio	<b>2016 Canadian census</b>	<b>100,000</b>
Education before apprenticeship	2015 National Apprenticeship Survey	4,400
OYAP	2015 National Apprenticeship Survey	3,500
Vocational classes in high school	2015 National Apprenticeship Survey	3,500
Co-op	2015 National Apprenticeship Survey	3,500
Workforce experience	2015 National Apprenticeship Survey	4,300
Apprenticeship straight out of school	2015 National Apprenticeship Survey	4,200
Completion rate	2015 National Apprenticeship Survey	4,500
Difficulty finding work at start of apprenticeship	2015 National Apprenticeship Survey	4,400
Difficulty progressing in apprenticeship	2015 National Apprenticeship Survey	4,400
Working in related trade	2015 National Apprenticeship Survey	2,900
Income	2015 National Apprenticeship Survey	4,500
Unemployment	<b>2016 Canadian census</b>	<b>119,000</b>
Low-income status	<b>2016 Canadian census</b>	<b>143,000</b>
Self-employment status	<b>2016 Canadian census</b>	<b>127,000</b>
Spatial map (tradespeople/capita)	<b>2016 Canadian census</b>	<b>3,900,000</b>



## Appendix B

The following tables provide a summary of data used in the trade profiles.

**Table B1: Activities Before Apprenticeship**

Trade	Participate d in OYAP	Vocation al class	Participate d in co-op	Attende d school	In workforc e	Worked in related trade	PSE credenti al
Automotive services	35%	65%	47%	31%	69%	56%	19%
Electricians	15%	56%	36%	28%	72%	44%	33%
Plumbers	14%	49%	34%	24%	76%	54%	21%
Carpenters	23%	67%	32%	29%	71%	74%	24%
Hairstylists	17%	23%	37%	44%	56%	42%	29%
Welders	31%	64%	34%	36%	64%	61%	23%
Millwrights	14%	69%	33%	30%	70%	58%	46%
Food services	28%	33%	39%	34%	66%	80%	40%
Machinists	19%	0%	41%	49%	51%	38%	31%
Refrigeration and heating	24%	58%	39%	33%	67%	67%	42%
<b>Average</b>	<b>22%</b>	<b>54%</b>	<b>37%</b>	<b>32%</b>	<b>68%</b>	<b>55%</b>	<b>29%</b>

Source: NAS, 2015.

**Table B2: The Apprenticeship Experience**

Trade	Difficulty progressing in apprenticeship	Difficulty finding work at start of apprenticeship	Completion rate
Automotive services	33%	24%	56%
Electricians	37%	29%	75%
Plumbers	26%	18%	81%
Carpenters	36%	19%	58%
Hairstylists	29%	17%	71%
Welders	46%	34%	32%
Millwrights	48%	34%	60%
Food services	39%	16%	31%
Machinists	49%	24%	33%
Refrigeration and heating	31%	20%	60%
<b>Average</b>	<b>35%</b>	<b>23%</b>	<b>63%</b>

Source: NAS, 2015.

**Table B3: Demographics of Apprentices**

Trade	Female	Indigenous	Visible minority	Immigrant	Age ratio (20–35 years old : 50–64 years old)
Automotive services	1%	2%	13%	18%	0.64
Electricians	1%	2%	10%	17%	0.73
Plumbers	1%	3%	8%	13%	0.73
Carpenters	1%	5%	11%	16%	0.90
Hairstylists	91%	3%	22%	30%	0.69
Welders	3%	6%	23%	26%	0.71
Millwrights	1%	3%	8%	15%	0.36
Food services	32%	4%	29%	37%	0.73
Machinists	2%	3%	13%	25%	0.34
Refrigeration and heating	0%	1%	12%	16%	0.78
<b>Average</b>	<b>20%</b>	<b>3%</b>	<b>14%</b>	<b>20%</b>	<b>0.69</b>

Source: Census, 2016.

**Table B4: What Happens After Completing an Apprenticeship?**

Trade	Working in a related trade	Unemployed	Self-employed	Low Income	Average income
Automotive services	72%	3%	17%	8%	\$51,400
Electricians	50%	7%	15%	6%	\$76,700
Plumbers	58%	7%	17%	7%	\$63,900
Carpenters	75%	8%	24%	10%	\$47,800
Hairstylists	37%	5%	29%	19%	\$24,500
Welders	74%	10%	9%	12%	\$58,700
Millwrights	67%	4%	7%	4%	\$78,600
Food services	84%	8%	10%	19%	\$31,800
Machinists	59%	4%	10%	7%	\$55,300
Refrigeration and heating	58%	4%	19%	7%	\$59,900
<b>Average</b>	<b>61%</b>	<b>6%</b>	<b>21%</b>	<b>11%</b>	<b>N/A</b>

Source: Census, 2016; NAS, 2015.



Higher Education  
Quality Council  
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