**Average weekly wage ratio**

**In Canada**

Name: Jian-Min, Wu

Date: 2023/10/17

Reference: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1410034002>

**● Introduction**

Canada has a vast land area and a variety of resources and cultures, creating a variety of life styles and appearances. This made me wonder about the living standards of people under different conditions. After all, living standards will directly affect a person's quality of life and happiness, which is also a major meaning of life. Therefore, in this paper, I try to find documents and issues that can reflect people's living standards. I hope that this document can present the overall level of Canada as much as possible.

After thinking about the above, I decided to define this issue from the most intuitive perspective – wage level. wage level will differ due to many factors such as gender, age, geographical location and occupation, and the result of wage level is related to everyone's quality of life and happiness. There is a huge correlation. Although money mainly reflects material needs, I believe that it does have an obvious connection with spiritual needs.

In order to achieve my goal, I need to first set up various key analysis indicators. I decided to set the average wage rate as the key indicator, and selected several variables worthy of analysis and insights, including year, audience profile, province and occupation. This report will explore the impact of each various on the results through independent analysis and mutual analysis. For example, if we only observe wage levels by occupation and cross-compare the results with occupation and province, are there any different insight between these two methods?

In the final deliverable, I hope to clearly and profoundly reflect meaningful results and insights, which means making trade-offs between complexity and intuition. Through this report, we can better understand Canada’s wage levels under different geographical and cultural conditions allow us to further gain a glimpse into the living standards of the people in this land.

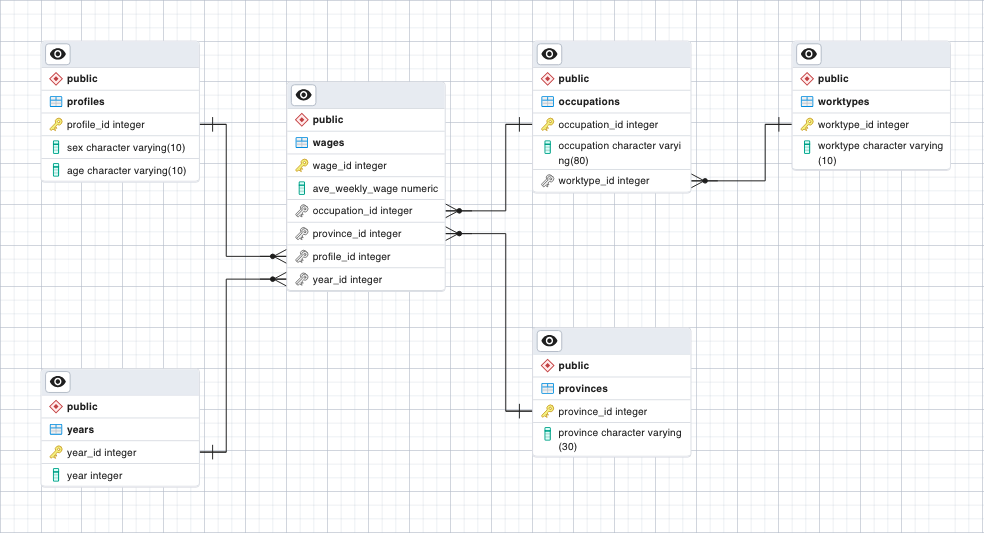
**● Data-set**

* wages: Contains average weekly wage data.
* years: Contains annual data for the past five years.
* profiles: Contains information about gender and age.
* provinces: Contains information for each province in Canada.
* occupations: Contains occupational information based on Canadian NOC.
* worktypes: Contains work type information of occupation.

**● Data source cleanup**

1. Remove unnecessary information: Including data date and some descriptions.
2. Remove unnecessary variables: This report will focus on the 'Average Weekly wage' analysis, so I have removed the hourly and median wage data.
3. Adjust variable name: Change the column title to the parameter name after.
4. Fill in data: Fill in the blank parts of the row data, mainly copy and paste the corresponding data.
5. Delete data: Some wage data does not display numerical values. Delete the row of invalid data.
6. Adjust data information: Simplify redundant data, for example: change '25 to 54 years' in the age column to '25 to 54'.
7. Split table: Split the entire table into different parts, with wages as the central table and connected to multiple tables including occupations and provinces etc.
8. Set foreign key value: After splitting the table, provide corresponding primary key/foreign key values ​​for each table for subsequent query use.

**● ERD diagram**



**● SQL query**

-- 1. Observe key statistics on average wage

SELECT MAX(ave\_weekly\_wage) AS max\_avewage,

AVG(ave\_weekly\_wage) AS avg\_avewage,

MIN(ave\_weekly\_wage) AS min\_avewage,

PERCENTILE\_CONT(0.25) WITHIN GROUP (ORDER BY ave\_weekly\_wage) AS per25\_avewage,

PERCENTILE\_CONT(0.5) WITHIN GROUP (ORDER BY ave\_weekly\_wage) AS med\_avewage,

PERCENTILE\_CONT(0.75) WITHIN GROUP (ORDER BY ave\_weekly\_wage) AS per75\_avewage

FROM wages;

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **max\_avewage** | **avg\_avewage** | **min\_avewage** | **per25\_avewage** | **med\_avewage** | **per75\_avewage** |
| **2454.99** | 895.2708927483240000 | 106.47 | 516.3075 | 852.51 | 1217.26 |

|  |
| --- |
| Insight: The gap between the maximum and minimum average weekly wages in Canada is more than 2,000, a multiple of approximately 24 times. However, the numerical difference between the average and the median is not large, reflecting that the overall data points are not heavily tilted towards one end. In addition, the 25th and 75th percentile values ​​may be used as indicators for subsequent analysis. |

-- 2. Comparison of average wage in the past five years

SELECT y.year, AVG(w.ave\_weekly\_wage) AS average

FROM wages w

INNER JOIN years y

ON w.year\_id = y.year\_id

GROUP BY y.year

ORDER BY y.year;

|  |  |
| --- | --- |
| **year** | **average** |
| **2018** | 851.2343478260870000 |
| **2019** | 863.1481363636360000 |
| **2020** | 911.7411661341850000 |
| **2021** | 907.7807485029940000 |
| **2022** | 940.4369444444440000 |

|  |
| --- |
| Insight: Through the changes in average wage values ​​in the past five years, we can find that most of the time, salaries have grown year by year (the growth rate is about 1-5%), except for 2021 (may be related to covid 19). |

-- 3. Ranking of average weekly wage by province

SELECT p.province, AVG(w.ave\_weekly\_wage) AS ave\_wage

FROM wages w

INNER JOIN provinces p

ON w.province\_id = p.province\_id

GROUP BY p.province

ORDER BY ave\_wage DESC;

|  |  |
| --- | --- |
| **province** | **ave\_wage** |
| **Alberta** | 1035.3421856287400000 |
| **Newfoundland and Labrador** | 1025.2979591836700000 |
| **Saskatchewan** | 950.7300967741940000 |
| **British Columbia** | 925.2510416666670000 |
| **Prince Edward Island** | 922.0463265306120000 |
| **New Brunswick** | 918.2035950413220000 |
| **Nova Scotia** | 880.8961702127660000 |
| **Manitoba** | 844.2271511627910000 |
| **Ontario** | 807.2302083333330000 |
| **Quebec** | 801.5512660944210000 |

|  |
| --- |
| Insight: From the analysis results of each province, it is pointed out that Alberta occupies the first place in the provincial ranking, with a gap of about 200 yuan from Quebec, which ranks last. Interestingly, Alberta’s population and GDP are not the highest in Canada. We can observe the province in the future. occupational distribution. |

-- 4. Wage changes in the highest population province 'Ontario' by year

SELECT y.year, AVG(w.ave\_weekly\_wage) AS Ontario\_wave\_wage

FROM wages w

INNER JOIN years y

ON w.year\_id = y.year\_id

WHERE w.province\_id = (SELECT province\_id FROM provinces WHERE province = 'Ontario')

GROUP BY y.year

ORDER BY y.year;

|  |  |
| --- | --- |
| **year** | **ontario\_wave\_wage** |
| **2018** | 773.7778571428570000 |
| **2019** | 784.2532352941180000 |
| **2020** | 805.9209615384620000 |
| **2021** | 825.0272727272730000 |
| **2022** | 840.5676315789470000 |

|  |
| --- |
| Insight: Ontario is the province with the highest population and highest GDP in Canada. It can be found that although the province's wage has shown positive growth every year, the wage every year has lagged behind Canada's overall value. |

-- 5. Wage levels by gender and age group

SELECT p.sex, p.age, AVG(w.ave\_weekly\_wage) AS ave\_wage

FROM wages w

INNER JOIN profiles p

ON w.profile\_id = p.profile\_id

GROUP BY p.sex, p.age

ORDER BY ave\_wage DESC;

|  |  |  |
| --- | --- | --- |
| **sex** | **age** | **ave\_wage** |
| **Males** | 54 over | 1125.8251417769400000 |
| **Males** | 25 to 54 | 1072.8315129683000000 |
| **Females** | 54 over | 925.0761814744800000 |
| **Females** | 25 to 54 | 920.8458069164270000 |
| **Males** | 15 to 24 | 581.5870574162680000 |
| **Females** | 15 to 24 | 542.1933492822970000 |

|  |
| --- |
| Insight: Observing the wage levels of various age groups and genders, I found that men aged 25-54 and over 54 years old accounted for relatively high salaries, which made me further want to confirm the wage ratio of men and women in Canada. (See next analysis for details) |

-- 6. Comparison of gender wage levels by age group

WITH wage\_gender AS(

SELECT p.sex, p.age, AVG(w.ave\_weekly\_wage) AS ave\_wage

FROM wages w

INNER JOIN profiles p

ON w.profile\_id = p.profile\_id

GROUP BY p.sex, p.age

)

SELECT AVG(ww.ave\_wage / wm.ave\_wage) AS gender\_wage\_ratio

FROM (

SELECT \*

FROM wage\_gender

WHERE sex = 'Females'

) AS ww

INNER JOIN wage\_gender wm

ON wm.age = ww.age

WHERE wm.sex = 'Males';

|  |
| --- |
| **gender\_wage\_ratio** |
| 0.87076153253430000000 |

|  |
| --- |
| Insight: Continuing the above analysis, if the age factor is not taken into account, it can be found that the average wage of Canadian women is 87% of that of men. This result is something that Canada, which values ​​gender equality, can work on. |

-- 7. Ranking of full-time occupations by average weekly wage

SELECT ot.occupation, AVG(w.ave\_weekly\_wage) AS fulltime\_ave\_wage

FROM (

SELECT o.occupation\_id, o.occupation, w.worktype

FROM occupations o

INNER JOIN worktypes w

ON o.worktype\_id = w.worktype\_id

WHERE w.worktype = 'Full-time'

) AS ot

INNER JOIN wages w

ON ot.occupation\_id = w.occupation\_id

GROUP BY ot.occupation

ORDER BY fulltime\_ave\_wage DESC;

|  |  |
| --- | --- |
| **occupation** | **fulltime\_ave\_wage** |
| **Management occupations** | 1748.5278846153800000 |
| **Natural and applied sciences and related occupations** | 1370.8922268907600000 |
| **Occupations in education, law and social, community and government services** | 1254.0339694656500000 |
| **Health occupations** | 1214.1645909090900000 |
| **Occupations in art, culture, recreation and sport** | 1043.6472602739700000 |
| **Natural resources, agriculture and related production occupations** | 1026.7790853658500000 |
| **Trades, transport and equipment operators and related occupations** | 1025.5827522935800000 |
| **Business, finance and administration occupations** | 1022.3161224489800000 |
| **Occupations in manufacturing and utilities** | 921.9230373831780000 |
| **Sales and service occupations** | 725.8768333333330000 |

|  |
| --- |
| Insight: Regarding occupations, we first focus on the results of full-time employment. We can find that the wage level of management occupations is very high, even more than twice that of sales and service occupations. Health occupations rank fourth, which may reflect the importance attached to health in advanced countries. |

-- 8. Comparison of work type wage levels by occupation

WITH wage\_worktype AS(

SELECT ot.worktype, ot.occupation, AVG(w.ave\_weekly\_wage) AS ave\_wage

FROM (

SELECT o.occupation\_id, o.occupation, w.worktype

FROM occupations o

INNER JOIN worktypes w

ON o.worktype\_id = w.worktype\_id

) AS ot

INNER JOIN wages w

ON ot.occupation\_id = w.occupation\_id

GROUP BY ot.worktype, ot.occupation

)

SELECT wp.occupation, (wp.ave\_wage / wf.ave\_wage) AS worktype\_wage\_ratio

FROM (

SELECT \*

FROM wage\_worktype

WHERE worktype = 'Part-time'

) AS wp

INNER JOIN wage\_worktype wf

ON wf.occupation = wp.occupation

WHERE wf.worktype = 'Full-time'

ORDER BY worktype\_wage\_ratio DESC;

|  |  |
| --- | --- |
| **occupation** | **worktype\_wage\_ratio** |
| **Health occupations** | 0.46036869817996100000 |
| **Natural and applied sciences and related occupations** | 0.44457983619104300000 |
| **Management occupations** | 0.41813277592804200000 |
| **Trades, transport and equipment operators and related occupations** | 0.38891522180705200000 |
| **Occupations in education, law and social, community and government services** | 0.37806314964504700000 |
| **Sales and service occupations** | 0.37298804142169000000 |
| **Business, finance and administration occupations** | 0.36466041198466000000 |
| **Occupations in manufacturing and utilities** | 0.34630331063883000000 |
| **Occupations in art, culture, recreation and sport** | 0.25488326597282600000 |
| **Natural resources, agriculture and related production occupations** | 0.25133503324486200000 |

|  |
| --- |
| Insight: Comparing the wage levels of full-time and part-time workers, part-time workers only account for about 20% to 40% of full-time workers. Even including the factor of working hours, this gap is still very high, which shows that full-time work obviously has better wages. |

-- 9. Average wage levels by gender in various occupations

SELECT o.occupation, p.sex,

SUM(CASE WHEN w.ave\_weekly\_wage > 1217 THEN 1 ELSE 0 END) AS high\_wage,

SUM(CASE WHEN w.ave\_weekly\_wage BETWEEN 516 AND 1217 THEN 1 ELSE 0 END) AS medium\_wage,

SUM(CASE WHEN w.ave\_weekly\_wage < 516 THEN 1 ELSE 0 END) AS low\_wage

FROM wages w

INNER JOIN profiles p

ON w.profile\_id = p.profile\_id

INNER JOIN occupations o

ON w.occupation\_id = o.occupation\_id

GROUP BY o.occupation, p.sex

ORDER BY 1, 2 DESC;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **occupation** | **sex** | **high\_wage** | **medium\_wage** | **low\_wage** |
| **Business, finance and administration occupations** | Males | 55 | 107 | 72 |
| **Business, finance and administration occupations** | Females | 5 | 146 | 83 |
| **Health occupations** | Males | 70 | 68 | 15 |
| **Health occupations** | Females | 38 | 104 | 11 |
| **Management occupations** | Males | 100 | 13 | 2 |
| **Management occupations** | Females | 96 | 19 | 0 |
| **Natural and applied sciences and related occupations** | Males | 89 | 47 | 7 |
| **Natural and applied sciences and related occupations** | Females | 77 | 59 | 7 |
| **Natural resources, agriculture and related production occupations** | Males | 28 | 54 | 9 |
| **Natural resources, agriculture and related production occupations** | Females | 7 | 75 | 9 |
| **Occupations in art, culture, recreation and sport** | Males | 23 | 51 | 44 |
| **Occupations in art, culture, recreation and sport** | Females | 12 | 64 | 42 |
| **Occupations in education, law and social, community and government services** | Males | 99 | 80 | 45 |
| **Occupations in education, law and social, community and government services** | Females | 54 | 111 | 59 |
| **Occupations in manufacturing and utilities** | Males | 24 | 83 | 10 |
| **Occupations in manufacturing and utilities** | Females | 0 | 107 | 10 |
| **Sales and service occupations** | Males | 0 | 144 | 154 |
| **Sales and service occupations** | Females | 0 | 134 | 164 |
| **Trades, transport and equipment operators and related occupations** | Males | 41 | 68 | 39 |
| **Trades, transport and equipment operators and related occupations** | Females | 4 | 106 | 38 |

|  |
| --- |
| Insight: Observe the wage levels of each occupation by gender. Divide the wage range into three intervals, based on the 25th and 75th percentile data points from the first analysis. It can be found that gender has little impact on the Management occupations, Sales and service occupations industry, while there is a relatively large gap in other occupations. |

-- 10. Observe the wage distribution by occupation in some provinces

WITH pvso AS(

SELECT o.occupation, p.province,

SUM(CASE WHEN w.ave\_weekly\_wage > 1217 THEN 1 ELSE 0 END) AS high\_wage,

SUM(CASE WHEN w.ave\_weekly\_wage BETWEEN 516 AND 1217 THEN 1 ELSE 0 END) AS medium\_wage,

SUM(CASE WHEN w.ave\_weekly\_wage < 516 THEN 1 ELSE 0 END) AS low\_wage

FROM wages w

INNER JOIN provinces p

ON w.province\_id = p.province\_id

INNER JOIN occupations o

ON w.occupation\_id = o.occupation\_id

WHERE province IN ('Alberta', 'Ontario')

GROUP BY o.occupation, p.province

)

SELECT occupation, province,

round(high\_wage / (high\_wage + medium\_wage + low\_wage)::numeric, 2) AS high\_wage\_per,

round(medium\_wage / (high\_wage + medium\_wage + low\_wage)::numeric, 2) AS medium\_wage\_per,

round(low\_wage / (high\_wage + medium\_wage + low\_wage)::numeric, 2) AS low\_wage\_per

FROM pvso

ORDER BY occupation, province;

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **occupation** | **province** | **high\_wage\_per** | **medium\_wage\_per** | **low\_wage\_per** |
| **Business, finance and administration occupations** | Alberta | 0.26 | 0.41 | 0.33 |
| **Business, finance and administration occupations** | Ontario | 0.18 | 0.33 | 0.48 |
| **Health occupations** | Alberta | 0.69 | 0.31 | 0.00 |
| **Health occupations** | Ontario | 0.30 | 0.50 | 0.20 |
| **Management occupations** | Alberta | 1.00 | 0.00 | 0.00 |
| **Management occupations** | Ontario | 0.48 | 0.50 | 0.02 |
| **Natural and applied sciences and related occupations** | Alberta | 0.59 | 0.41 | 0.00 |
| **Natural and applied sciences and related occupations** | Ontario | 0.40 | 0.48 | 0.12 |
| **Natural resources, agriculture and related production occupations** | Alberta | 0.50 | 0.50 | 0.00 |
| **Natural resources, agriculture and related production occupations** | Ontario | 0.10 | 0.57 | 0.33 |
| **Occupations in art, culture, recreation and sport** | Alberta | 0.22 | 0.33 | 0.44 |
| **Occupations in art, culture, recreation and sport** | Ontario | 0.18 | 0.36 | 0.46 |
| **Occupations in education, law and social, community and government services** | Alberta | 0.43 | 0.35 | 0.22 |
| **Occupations in education, law and social, community and government services** | Ontario | 0.33 | 0.33 | 0.33 |
| **Occupations in manufacturing and utilities** | Alberta | 0.50 | 0.50 | 0.00 |
| **Occupations in manufacturing and utilities** | Ontario | 0.00 | 0.63 | 0.38 |
| **Sales and service occupations** | Alberta | 0.00 | 0.50 | 0.50 |
| **Sales and service occupations** | Ontario | 0.00 | 0.50 | 0.50 |
| **Trades, transport and equipment operators and related occupations** | Alberta | 0.32 | 0.37 | 0.32 |
| **Trades, transport and equipment operators and related occupations** | Ontario | 0.11 | 0.43 | 0.46 |

|  |
| --- |
| Insight: Comparing the two most representative provinces based on occupation,  Alberta has the highest wage and Ontario has the highest population and GDP. In Alberta, Health occupations, Management occupations, Natural resources, agriculture and related production occupations and Occupations in manufacturing and utilities have relatively high salaries. Ontario is only close to Alberta with Occupations in art, culture, recreation and sport and Sales and service occupations. |

-- View 1. For marketing department

CREATE VIEW marketing\_target AS

SELECT pf.sex, pf.age, pv.province, AVG(w.ave\_weekly\_wage)

FROM wages w

LEFT JOIN profiles pf

ON w.profile\_id = pf.profile\_id

LEFT JOIN provinces pv

ON w.province\_id = pv.province\_id

GROUP BY pf.sex, pf.age, pv.province

ORDER BY pf.sex, pf.age, pv.province;

|  |
| --- |
| Insight: When a company's marketing department sets the target audience for digital advertising (like Facebook platform), they can generally improve the effectiveness of ad delivery by filtering gender, age, and location. Therefore, if the marketing department can know which audiences are more likely to be able to afford the corresponding products, and only deliver ads to this group of audiences, it can improve marketing performance. |

-- View 2. For Human Resource department

CREATE VIEW HR\_recruitment AS

SELECT y.year, o.occupation, AVG(w.ave\_weekly\_wage)

FROM wages w

LEFT JOIN years y

ON w.year\_id = y.year\_id

LEFT JOIN occupations o

ON w.occupation\_id = o.occupation\_id

GROUP BY y.year, o.occupation

ORDER BY y.year, o.occupation;

|  |
| --- |
| Insight: When the company's human resources department is recruiting talents, it can know in advance the occupation of the interviewer's last job, and then use the query to find out the approximate range of the average wage of the occupation in the past few years, so as to adjust the suitable employment wage. This will help companies bring in talent at a more accurate cost. |

**● Conclusion**

In Canada, the average weekly wage of people is about $900. Through the median value, we can find that the overall wage demographic structure does not tend to be seriously skewed.

In terms of year-on-year performance, most periods show positive growth and fall within a growth rate of 1%-5%.

In terms of geography, Alberta ranks first, and surprisingly, Ontario, the province with the largest population and highest GDP, ranks second to last, we also found that the province lags behind the average in wage performance every year. After comparing the two provinces in various occupations, it was found that salaries in the health, management, and natural resource industries in Alberta are much higher than those in Ontario.

In terms of gender and age, we found that women’s average wage accounts for about 87% of men. This is an issue that can be considered in terms of gender equality. We also took a closer look at occupations and found that the gap between different genders is most obvious in the management and sales service industries.

In terms of occupations, in addition to management occupations, health, education and natural sciences also have high wage levels. These occupations have a positive impact on the development of the country. In addition, the average wage of part-time workers lags significantly behind that of full-time workers. For many people who must work part-time (such as housewives), this may be a problem that needs to be improved.

After comprehensive data analysis, we can observe the average wage level from multiple dimensions, including profile (sex and age), year, province and occupation, which will help us better understand the wage level of the Canadian people.