

Effect of Education on Workers' Financial Success in Career and Life

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## **Introduction**

It can be difficult for teenagers to decide what level of education they want to attain because of the many factors that influence their decision, including tuition costs and the delay of full-time employment. Making the right decision can be especially difficult when they do not have a comprehensive understanding of the actual effect of education on their future life and career. To assist teenagers with their decision, this statistical research study aims to reveal and prove the significant effect of education on workers' career and life circumstances in the United States by gathering and analyzing U.S. civilian labor statistics of different education levels from the past ten years, including salary, unemployment rate, personal net worth, and primary residence cost of workers. This data is then compared with the workers' corresponding educational investment, including tuition fees and years of education. By demonstrating the relationship between educational attainment and career circumstances through statistical calculations and analysis, the study hopes to provide teenagers with a complete picture of how education will impact their future life and career and enable them to make the best decision.

Education levels in the United States start with elementary school (eight years, free to U.S. citizens), followed by high school (four years, free to U.S. citizens, resulting in a high school diploma). If students choose to continue their education, they can choose between associate programs (two years, resulting in an associate degree) and college programs (four years, resulting in a bachelor degree). After college, students can proceed to graduate programs (two years, resulting in a master degree). After masters, doctorate or PhD programs are the highest education that can be reached (around six years, resulting in a doctorate degree).

Because of the lack of primary data sources regarding the career circumstance and educational attainment of individual workers in the United States, the research uses secondary data that summarize the circumstances of workers at each education level. Although it may not lead to an accurate calculation, the trend predicted still represents the majority of workers in the U.S.

All currency units are in U.S. dollars throughout the report.

## U.S. Workers Employment Circumstances Versus Educational Attainment

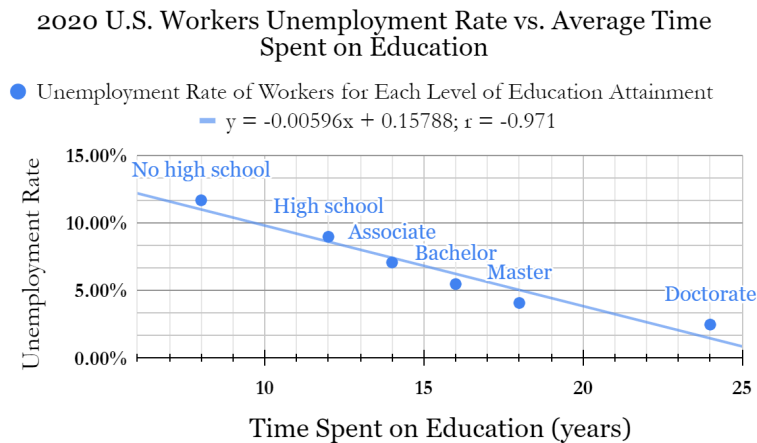


Figure 1-1

Figure 1-1 shows the relationship of U.S. workers' unemployment rate in 2020 and their time spent on education with a coefficient of correlation of -0.971, which indicates a strong negative linear correlation between workers' unemployment rate and the number of years they spent on education. This correlation shows that the decrease of workers' unemployment rate is in direct proportion to the increase of their time spent on education. By calculation, every additional year of a worker's education decreases his/her unemployment rate by approximately 0.6%.

By calculating the residual (difference between actual unemployment rate and the rate estimated by the trend line) of the six data points, no high school (+0.68%) and high school diploma (+0.36%) have positive residuals above the trend line, while associate (-0.34%), bachelor (-0.75%), and master (-0.96%) degrees have negative residuals below the trend line. The first five points have a decreasing trend of residuals. However, the doctorate has a +1.02% residual, which slightly disrupts the trend. Calculating the rate of change of unemployment rate from master to doctorate, the unemployment rate decreases on an average of 0.27% for each year, which is significantly lower than the general 0.6% decrease for each year. If ignoring doctorate, the coefficient of correlation reaches -0.998, which indicates a strengthening of the negative linear correlation. These analyses indicate that each additional investment in education up until the master degree brings a significant decrease in unemployment rate, but the investment in the doctorate degree, while decreasing the unemployment rate, has a less significant impact on a worker.

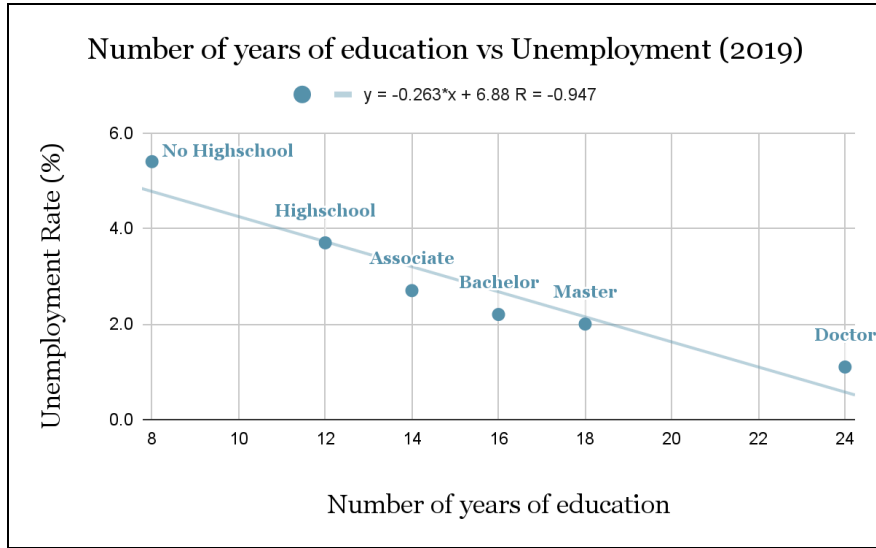


Figure 1-2

By evaluating the graph of the Number of Years of Education versus the Unemployment Rate in the United States in 2019 (Figure 1-2), the chart displays a strong negative linear correlation between the number of years of education and the unemployment rate. The (r-value) correlation coefficient is -0.947, which falls under the category of strong negative linear correlation indicating a solid connection between the two variables. Based on the graph, it can be analyzed that individuals who have not completed highschool have the highest unemployment rate, while those who have completed more years of education have a significantly lower unemployment rate. For example, graduates who have completed around 14-18 years have an unemployment rate of 2%, whereas individuals who only obtained only a highschool diploma have a 4% unemployment rate. Through a deeper analysis of comparing the residuals of all levels of education to determine which is above or below the line of best fit, it can evaluate which degree has the best ratio of “number of years of education” and “unemployment rate.” Of the 6 levels of education, only master’s, bachelor’s, and associate’s degree have a negative residual (master -0.1, bachelor -0.5, and associate -0.5). This means that those degrees have a lower unemployment rate compared to the average of all degrees.

Although there are many extraneous variables affecting your unemployment rate such as the type of university being attended to and the degree being completed. It can be conclusively evaluated that a higher level of education ensures job security and a higher level of employment.

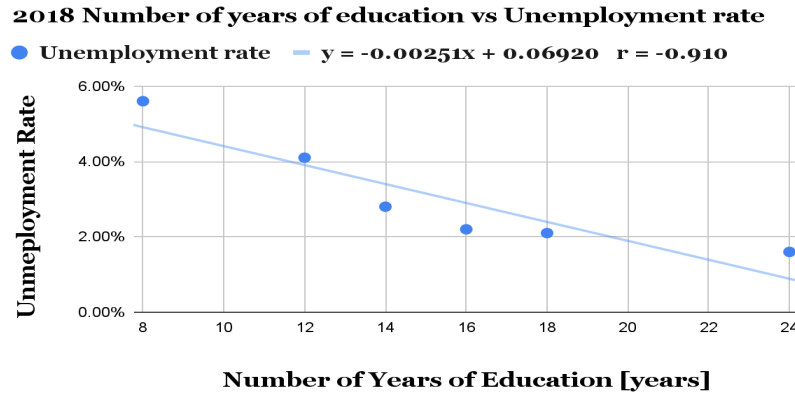


Figure 1-3

Figure 1-3 shows the unemployment rate in 2018 with respect to the number of years of education taken by US workers. From left to right, each data point represents an education level of no high school, high school graduates, associate degree, bachelor, master, and doctorate.

Through calculation, the coefficient of correlation is  $-0.910$ , indicating a strong negative linear correlation. This shows that when a US worker gets longer education, it is almost certain that their unemployment rate would decrease. On average, every year of education a worker takes would decrease his or her unemployment rate by about  $0.25\%$ . No outliers are in this figure, but differences among different levels of education can still be seen through the residuals. No high school ( $+0.68\%$ ), high school graduates ( $+0.18\%$ ), and doctorate degrees ( $+0.68\%$ ) have positive residuals, meaning they have higher unemployment rates than expected. This can be explained by how workers who never get into college only get limited or zero professional knowledge and skills and can only do jobs that are easily replaceable. For Ph.D. students, what they gain through their extended education is mainly experience in doing research in certain fields, which is not the core quality most companies are looking for. Also, usually, companies need to pay Ph.D. students a higher salary, which is another concern for companies to hire them. The rest of the college degrees, associate's ( $-0.62\%$ ), bachelor's ( $-0.72\%$ ), and master's ( $-0.32\%$ ), all have lower-than-expected unemployment rates, implying that it makes the most sense and is most cost-effective for workers to invest 14 to 18 years of their time in education from the standpoint of reducing unemployment rate. Nevertheless, the relationship between unemployment and years of education still follows a strong negative linear correlation despite some fluctuations in residuals.

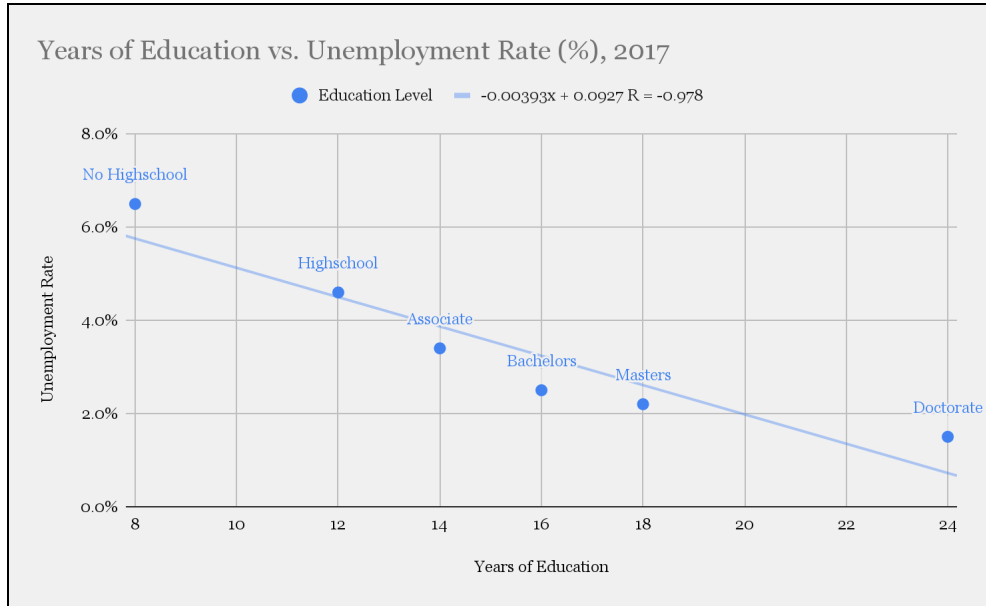


Figure 1-4

Looking at unemployment rate vs years of education displayed in Figure 1-4, the correlation coefficient is calculated to be -0.978, the absolute value of which is very close to 1.00. This shows a **strong negative linear correlation**, meaning that the more time one puts into education, the less likely they are to be unemployed. This is likely due to the fact that those who study for longer and obtain higher education achieve more prestigious degrees and are therefore hired into “higher skill” jobs. Such jobs have much better benefits for their workers, one of those benefits being higher job security. It’s intuitive to think that the unemployment rate for a surgeon who has 21 years of education would be much lower than a high school dropout who works in a “lower skill” occupation such as a fast food worker. Generally, companies put more trust and value into those who spent longer getting their degree, meaning they have much better job security. Looking at each individual point, the highest residual values (absolute value) can be found from doctorate degrees (+0.483%) and bachelor’s degrees (-0.482%), and the lowest residual values can be found from master’s degrees (+0.004%) and highschool graduates (+0.046%). In general, the residuals are all very low. This fact along with the high correlation coefficient further indicates that the relationship between achieving higher education and having higher job security is extremely strong.

## U.S. Workers Income Situation vs. Spending on Education

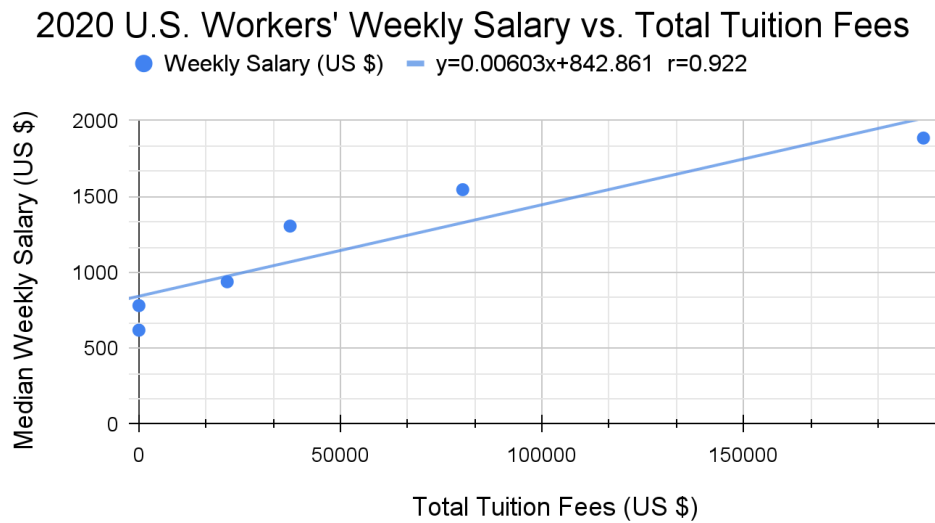


Figure 2-1

Figure 2-1 reveals the relationship between weekly salary and tuition fees in America in 2020. By comparing the dots in the scatter plot, it is clear that people who spend \$0 on tuition have the lowest weekly salary after graduation (around \$700). These are the people who did not attend high school or graduate from high school. People with an associate's degree or a bachelor's degree, which costs between 20 to 40 thousand dollars to earn, can get a weekly salary ranging from just below \$1000 to just over \$1300. The average total tuition fee for a master's degree is about \$80,000, but its graduates can earn over \$1500 per week. For the highest-paying degree shown in the graph, a Ph.D. can cost a person almost \$200,000 to earn, which is about nine times as much as an associate's, and six times as much as a bachelor's.

By evaluating the scatter plot, the coefficient correlation ( $r$ ) between weekly salary and total tuition fees in 2020 is approximately 0.922, indicating that there is a strong positive correlation between the two variables. So, in general, as the independent variable increases, the dependent variable increases as well. The coefficient correlation does not reach "1", meaning the relationship is not perfect. There should be a few extraneous variables affecting the correlation, such as the worker's age and experience.

No high school, high school, and Ph.D. degrees are under the line of best fit, meaning these data points have a negative residual. The data point representing the associate's degree almost lies on the line



of best fit, showing that its residual is almost equal to "0". The data points for bachelor's and master's degrees are above the line of best fit, indicating that their residuals are positive. By evaluating the residuals of different degrees, it is clear that Ph.D. is not the most cost-effective degree even though its salary is the highest (because its data point is below the line of best fit). Bachelor's and master's degrees are cost-effective. People with these two degrees can spend relatively low tuition fees and earn relatively high salaries. To summarize, in America in 2020, the more tuition a person spends, the higher their salary will be.

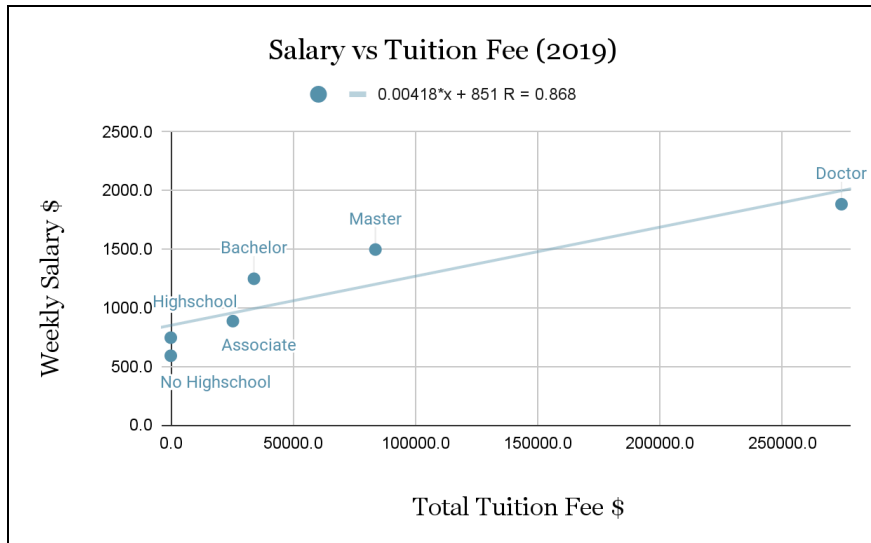


Figure 2-2

Figure 2-2 displays the importance of a bachelor's degree by comparing the salary and tuition fees of a bachelor's degree and an associate degree. By evaluating Salary vs Tuition in 2019 (Figure 2-2), there is a strong positive linear correlation (0.868) between Salary and Tuition Fee vs Education levels. So as the total tuition fee increases (independent variable), the median weekly salary of the individual (dependent) increases as well. While comparing the median of both bachelor's degrees and associate degrees tuition fees, (\$34,000 Bachelor vs \$25,380 Associate) it can be seen that a bachelor's degree is significantly more expensive to obtain. However, the median bachelor's degree graduate earns about \$361 more every week than an associate's degree, where the weekly salary of a bachelor's degree is \$1,248 whereas an associate earns \$887 a week. By analyzing the tuition fee and salary of a master's degree (master \$83,640 tuition, \$1,497 salary) and doctorate degree (\$274,147 tuition, \$1,883 salary). The high tuition fee may seem unappealing and unreasonable, however, with the high median salary of those degrees, it is possible to pay off student debt within 3 years with good financing and budgeting. Although the relationship between the two variables may not be perfect due to extraneous variables such as household income and the university they go to. This chart provides strong evidence that higher levels of education guarantee a higher salary and that paying high tuition fees is a worthy trade-off.

### Salary vs Tuition fee (2018)

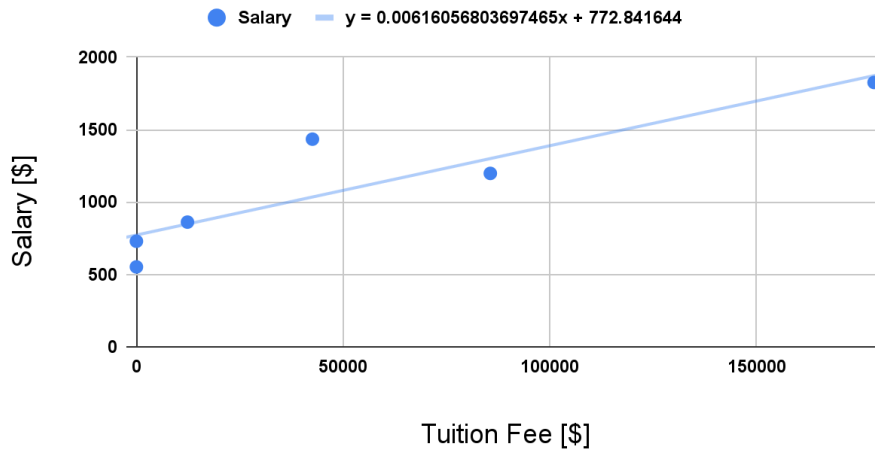


Figure 2-3

From Figure 2-3, a positive significant correlation at 0.805 represents that between the salary and tuition fees vs. education levels shown in the first graph while examining salary vs. tuition in 2018 [Salary vs Tuition fee graph]. Each dot represents an educational level, high school dropout, high school diploma, associate degree, bachelor's degree, master's degree, and doctorate degree. This graph demonstrates the importance of a bachelor's degree by evaluating the tuition costs and incomes for a bachelor's and associate's degree. Therefore, comparing bachelor's degrees is significantly more costly once compared to the median prices of bachelor's degrees and associate degrees [85,600\$ for a Bachelor's degree vs 12,350\$ for an Associate's degree]. Nevertheless, the median bachelor's degree graduate makes 336\$ more per week, which is about 4032\$ more per year, than those with an associate's degree. Additionally, the steep tuition charge may appear undesirable when compared to the level of education required for a master's and doctorate degree, but given the high average wages for both degrees, this might be repaid in just three years. Overall this graph provides definitive evidence that obtaining greater education guarantees a better salary and that making the effort of paying high tuition costs is profitable.

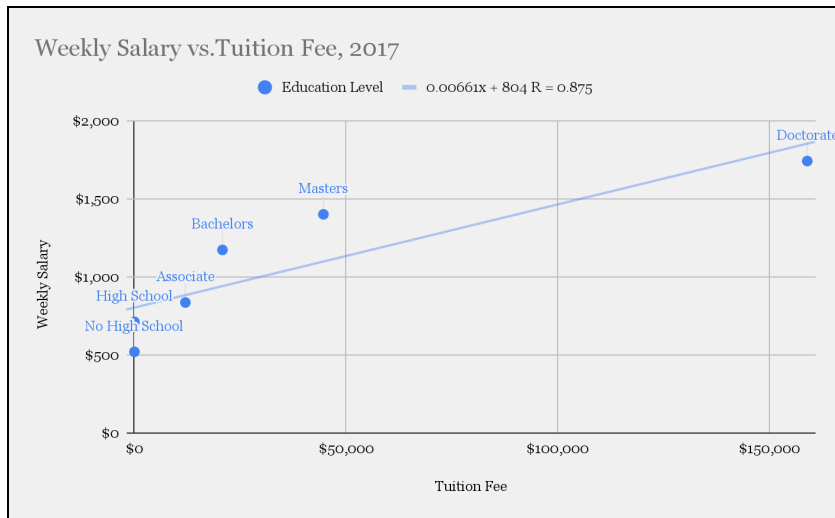


Figure 2-4

Looking at Figure 2-4, it should be understood first that each point represents a different education level. It can be seen that the higher the tuition fee (higher level of education) results in a higher weekly salary. This can be further proven by calculating the correlation coefficient, which is 0.875. This indicates a relatively **strong positive linear correlation**. This information is useful for individuals who are considering which level of education to pursue. If master's degree to a bachelor's degree are compared, master's degree recipients make \$11,856 more each year, but pay \$23,858 more in tuition. This means that master's degree recipients will pay back their extra tuition in about 2 years. This shows that achieving the highest possible education is the correct approach, as the differences in weekly salary are enormous and the extra tuition can be paid back in a few years. Looking at each individual point, it can be seen that no high school, high school, and associate degrees all fall under the trendline (residual values of -284.00, -92.00, -47.58 respectively). Meaning that the tuition paid will not give as much return compared to bachelors and masters degrees, which fall above the trendline (residual values of +231.58, +304.88 respectively). For the first five points (from the left), the residual values going from very low (-284) to very high (+304.88) is a large indicator that paying more for tuition, and therefore achieving higher education, will have a great impact on salary. The rightmost point, doctorate degree, is a bit of an exceptional case as it doesn't follow the trend. Removing the doctorate degree from the graph increases the correlation coefficient to 0.953. It also falls under the line of best fit with a residual value of -111.65

even though it should follow the trend of increasing residual values.. Although this is the case, getting a doctorate degree would still be beneficial. The low residual value just means that the increase in pay from a doctorate degree isn't as high as it should be, but it is still high enough (~300 more than masters) to justify getting the degree.

## U.S. Workers Financial Statistics vs. Educational Attainment

2019 U.S. Workers Average Net Worth & Percentage Composition vs. Educational Attainment

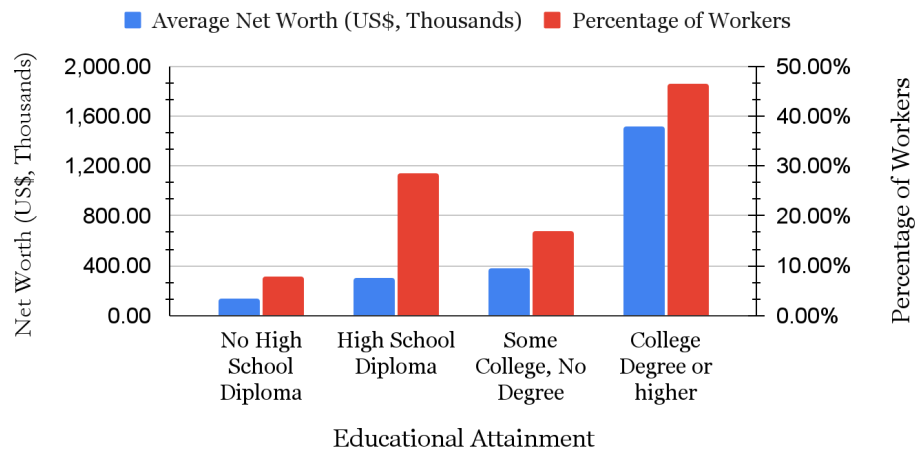


Figure 3-1

According to Figure 3-1, about half (47%) of the workers in the U.S. in 2019 had a college degree or higher, while the other half of the workforce (53%) did not have a college degree. By calculation, the average net worth of all U.S. workers in 2019 is approximately 867.105 thousand dollars. By comparing the average net worth of all workers with the average net worth of workers at each education level, it is clear that having a college degree or higher will likely result in a worker having a net worth higher than the general average. On the other hand, if a worker has not earned a college degree, his/her net worth is likely going to be lower than the average.

The standard deviation (the measure of the amount of dispersion of a set of values) of the net worth of workers is 608.396 thousand dollars. College or higher degree holders' average net worth has a Z-score of +1.068, while in comparison, those without college degrees all have negative Z-scores (no high school -1.199, high school -0.925, college drop out -0.810). This means that workers with college degrees or higher have an average net worth that is more than 1 standard deviation higher from the overall average, while workers without college degrees have an average net worth about 1 standard deviation lower than the overall average. The huge standard deviation demonstrates the significance of earning a college degree because workers who do so are able to boost their expected net worth by 2 standard deviations. Earning a college degree seems to be the watershed of a person's net worth.

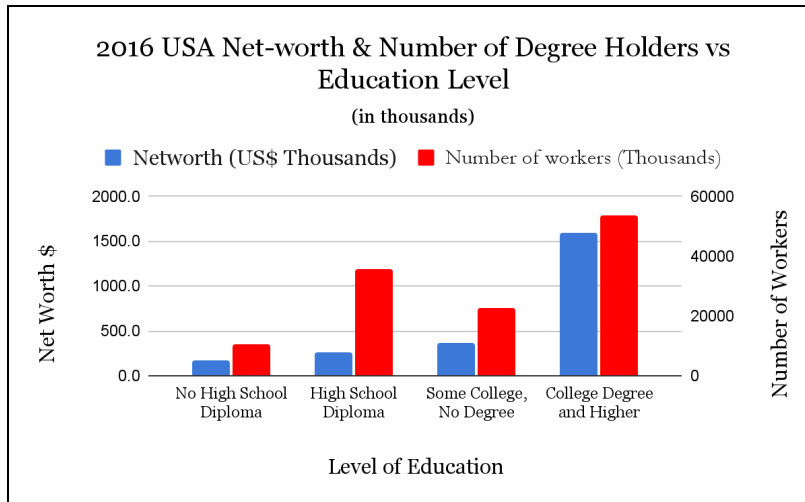


Figure 3-2

The bar graph above (Figure 3-2) displays the 2016 US data for the degree of education compared to the number of workers(with that degree) and average net worth. Those who had the lowest level of education (without a high school diploma) had the least net worth at an average of \$167 300 USD, while those with the highest level of education (college degree or higher) had the most net worth at \$1 600 000 USD. Throughout the graph, as the education level increases, the net worth increases as well. This proves that the data evidently displays a positive correlation in net worth based on (increasing) education level.

However, the data also portrays that obtaining a college degree(or higher) drastically increases a worker's net worth, which can be evaluated through looking at the values of the median net worth at each education level. The mean net worth of workers without high school diplomas, having a high school diploma, or attending some college(without achieving a degree) are \$167 300, \$265 300 and \$361 700 USD respectively. Comparatively, those with a college degree or higher have an average net worth of \$1 600 000 USD. The standard deviation of the net worth of workers is 757 138, meaning that the Z-score (number of standard deviations from the weighted mean) for the networth of workers with at least a college degree is 0.979. This largely contrasts with the Z-scores of the other net worths which are, -0.91 for those without a high school diploma, -0.78 for those with a high school diploma, and -0.66 for those with some college degree. Therefore, not only does net worth increase with education level, but a college degree(or higher) drastically increases one's net worth (on average) by roughly 1.9 standard deviations (\$1 432 500).

**2013 Number of recipients and net worth Vs Education level**

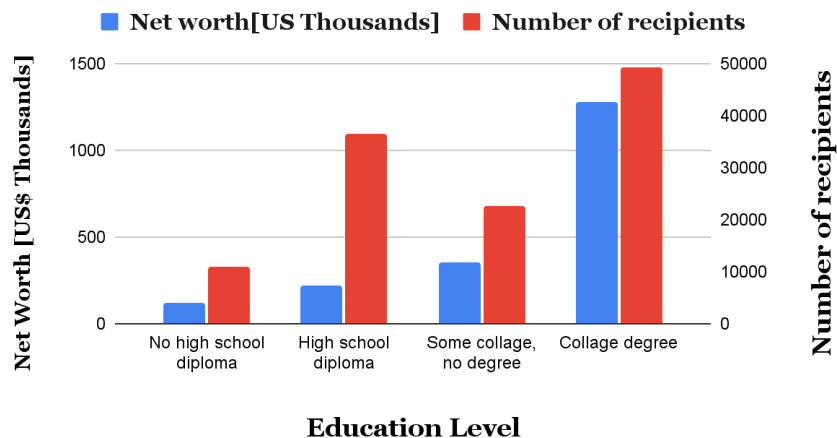


Figure 3-3

According to calculations, the weighted average net worth of US workers from different educational backgrounds in 2013 is \$672.86 thousand. It is easy to see from the graph above that only workers with some kind of college degree have an average net worth higher than the overall average.

The weighted standard deviation of this figure is \$591.28 thousand, indicating that 68% of the workers have a net worth that falls in the range of about \$295.64 thousand ( $\$591.28/2$ ) higher or lower than the weighted average, that is, from \$377.22 thousand to \$968.5 thousand. By calculation, only the college graduates' average net worth has a positive Z-score of +1.023, and all the other education levels, including high school dropouts, high school graduates, and college dropouts, have a negative Z-score, being -0.937, -0.767, and -0.546 respectively. This implies that workers with a college degree are likely to have a net worth that is about one standard deviation above the weighted mean, and those without one have an average net worth that is within one standard deviation lower than the mean but gradually close to the gap as their education level increases.

According to Figure 3-3, 41.20% of the workers have a university degree, the most. In addition, they also have an average net worth that is significantly higher than all the others. With these, college graduates make up a dominant 78.62% of the total net worth. Overall, whether a worker obtains a college degree or not is a key factor separating the net worth of US workers.



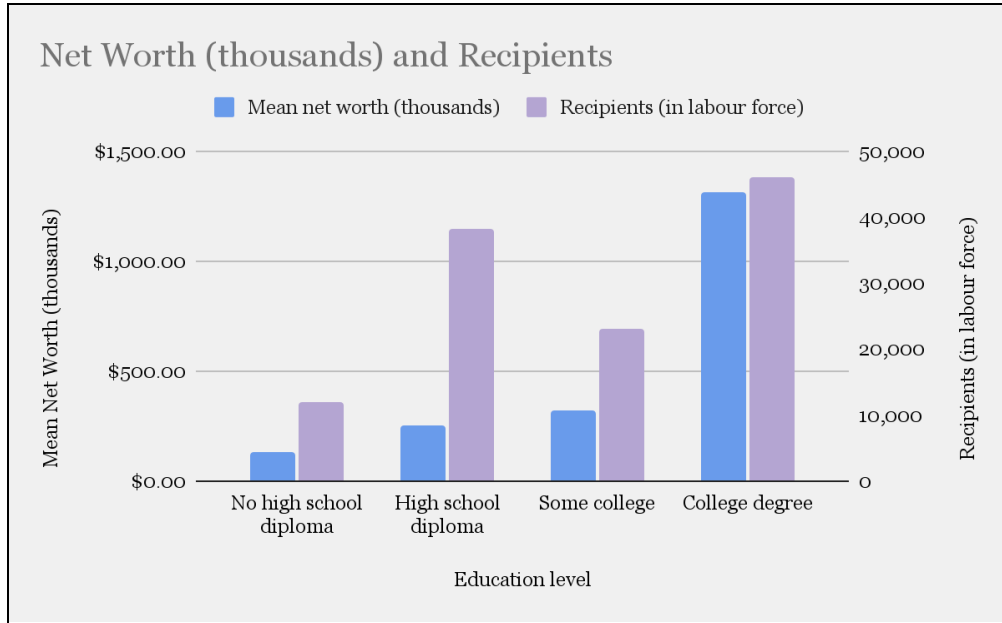


Figure 3-4

Based on evidence from Figure 3-4, it can be seen that one's education level has a major impact on their net worth, as the progression from no high school to college aligns with increasing net worth. The median net worth for 2010 is \$288,400, and the weighted mean is \$665,030. Using the outlier formula, ( $Q1 - \text{Standard deviation}$  or  $Q3 + \text{standard deviation}$ ) it can be determined that there are no outliers. Looking at the graph though, there is still a value that stands out, being the difference in net worth between individuals who partially completed college and those who fully did. Those who complete college make over 4 times more than those who dropped out early. To further prove this difference, college degree is the only value that falls above the weighted mean, also having the largest deviation of +\$650,270 above average. Looking at the other data points, dropping out of college vs getting a high school diploma seems to make practically no difference, and not having a high school diploma seems to have a fairly large negative impact on your net worth, having a deviation of -\$534,740 below the mean. The biggest takeaway from this graph is the extremely large difference going to college makes in one's net worth, and how dropping out of college is practically equivalent to only getting a high school diploma.

## U.S. Workers Residence Circumstance vs. Educational Attainment

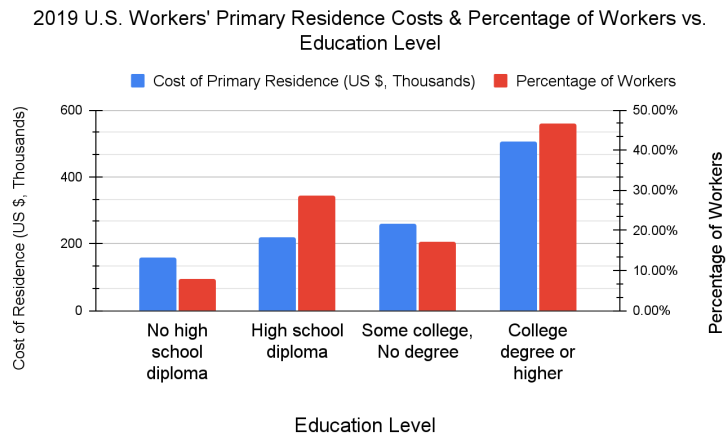


Figure 4-1

The bar graph above (Figure 4-1) shows the proportion of workers with different education levels and the average primary residence cost for people with different education levels. As education level increases, the average cost of people's primary residence also increases. The cost of primary residence for people with no high school diploma is the lowest (\$159,780). For people with a high school diploma or some college diploma but no degree, the price of their primary residence ranges from 210 to 260 thousand dollars. People with a college degree or higher have the highest residential values. Their primary residence costs an average of over \$500,000, more than three times as much as those without a high school diploma, and twice as much as people with high school and some college degrees. This shows the vast price gap of primary residence between people with different degrees.

By calculating the weighted average, the average cost of primary residence for Americans in 2019 is 353.5 thousand dollars. Only people with a college or higher degree diploma have an average cost of primary residence above this average line. Using the formula to calculate weighted standard deviation,  $SD_w$  is equal to 164.2, which is very large. This means most data are very far from the weighted average. As a result, the price of a primary residence varies significantly among people with different degrees. By comparing the percentage of workers with different degrees, the highest proportion is "college degree or higher". This proportion of people has the most expensive primary residence. This shows that a large proportion of people choose to study hard to get higher degrees in order to get a higher standard of living.

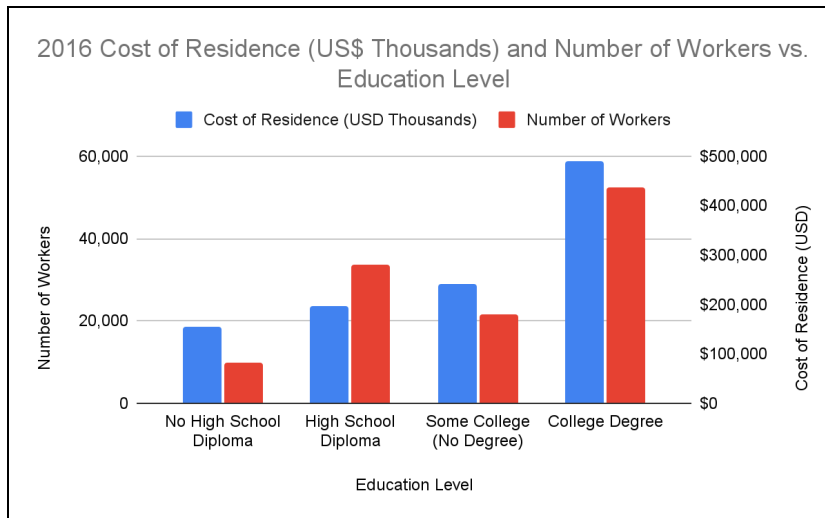


Figure 4-2

Figure 4-2 displays the cost of primary residence and the number of workers for each education level. Similar to the *Net Worth and Number of Degree Holders vs. Education Level*, holding a college degree is much more beneficial to achieving a more valuable primary residence and asset. The weighted mean of the primary residence (of workers) in the US is 331 954 USD, while having a college degree or higher provides a primary residence costing approximately 490 700 USD (increases of 158 746 USD). On the other hand, without a college degree or higher education, the average cost of primary residence is below the mean. In addition, the standard deviation in the cost of primary residence is 166 058 USD, a significant amount. This means that there is a significant disparity in data between different education levels. The value for the highest level of education(college or higher education) has a Z-score of 0.956 while the lowest level of education(no high school diploma) has a Z-score of -1.068. This emphasizes the positive impact that a higher education level has on the cost of primary residence.

Within all education levels, the price of primary residence is in ascending order, increasing from the lowest education level to the highest. Having no high school degree provides a primary residence cost of 154 600 USD on average, while having a high school diploma or some college (no degree) provides a primary residence cost of 195 700 USD and 241 700 USD. Since the graph shows a positive correlation between primary residence cost and education level, it can be assumed that having a higher level of education benefits the cost of a worker's primary residence.

### Cost of primary residence & Number of recipients vs. Education level 2013

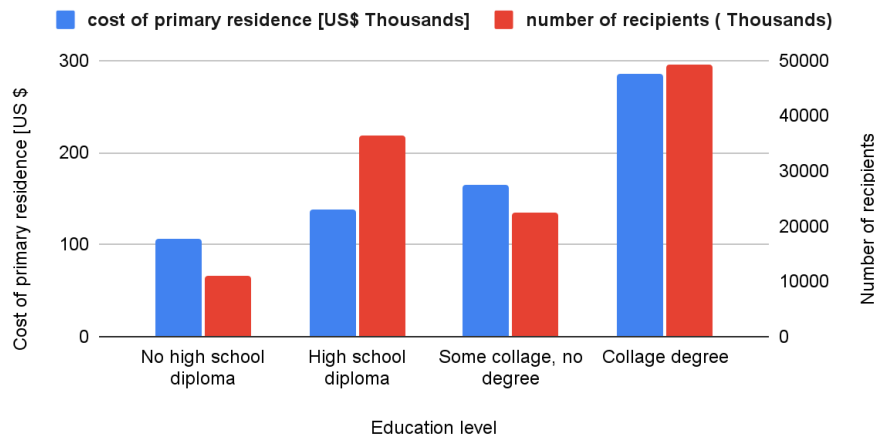


Figure 4-3

Figure 4-3 represents the numbers of workers having different education levels, and their average primary residence cost with the education level they had. Therefore as the education level goes up, the cost of the primary residence will also increase, and the gap of the cost between different education is big. For the people has no high school diploma, they have the lowest cost for primary residence, at 106,520\$, and as the education level increases, for the cost for the high school diploma and had some college but didn't get the degree, the cost are ( 137,270\$ high school diploma, 164,730\$ college dropouts.), and that is about 300-600 thousand more. However, the cost of primary residence for a college degree is the highest, which is 285,520\$, Compared to people who have no high school diploma, the cost of primary residence are almost tripled, therefore it shows that the gap of the primary residence cost between people of different degrees.

However, after calculating the weighted average, the average weight in US for around 200.1\$, for people has a highschool diploma, they barely passed the average line, and for the college dropouts, they passed the average by 100\$, and for the college degree people, their average is way above the average, however, people has no high school diploma are the only one didn't reach the average line. Therefore it has further representation, most of the people will choose to work hard and have a degree above high school, in order to have a better standard of living.

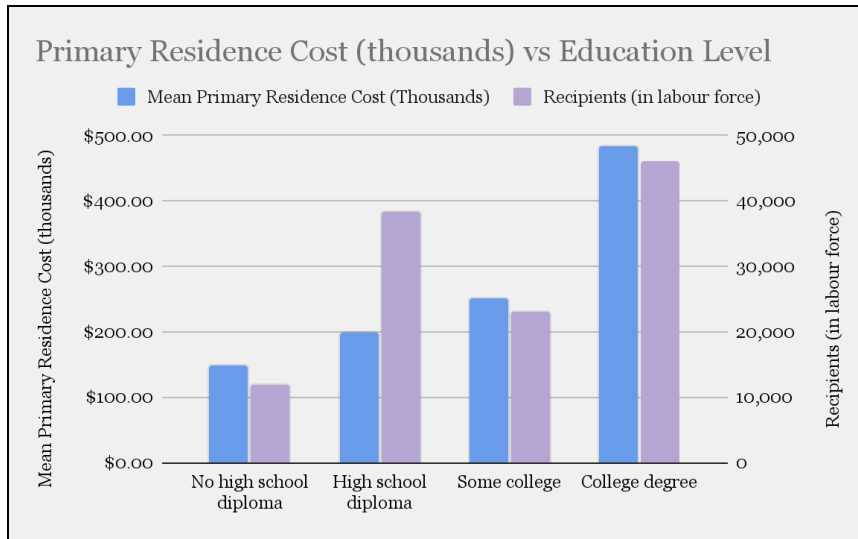


Figure 4-4Based on

evidence from Figure 4-4, it can be seen that the higher one's education level, the higher the cost of their primary residence. The progression from high school to college aligns with a progression of lower to higher residence cost. The median value for this graph is \$225,160, and the weighted average is \$313,870. The main difference between this graph and the *Net Worth by Education Level* graph is that this one has a lower difference between the dependent variables. This can be further proven by comparing the standard deviations, 148.138 for this graph and 545.608 for the previous. The smaller difference is also evident when looking at residuals. This graph also only has one value above the weighted average: college degree. In this case, the residual for this value (+\$169,600 above the mean) is less than our previous double bar graph. This is likely due to the fact that although residence can be reflective of wealthiness, it does not completely reflect it. The cost of living increases with net worth to a certain extent, but there comes a point where houses cannot get any more expensive, for example, two people with net worths 10 million and 50 million likely have the same cost of residence. Another way of expressing this is by stating that the wealthier one gets, the less percentage of their money they spend on residence, meaning that those who have a higher net worth who graduated from college will spend a lower proportion of their money on their residence, lowering the difference between their cost of living and those who did not complete college.

## **Conclusion**

Analysis of each year's data demonstrates similar trends, in which the more education workers receive, the higher their salary and employment rates will be, representing relatively better career circumstances. Likewise, the analysis also shows conclusively that the higher the education level that workers reach, the higher their average net worth and the higher the cost of their primary residence will be, representing relatively better financial circumstances. Therefore, the study can conclude that the more advanced the worker's educational attainment is, the more likely the worker will achieve greater financial success in their life and career. In particular, investing in a bachelor degree or a master degree is remarkably significant to achieving this success. In comparison, multiple analyses indicate that a doctorate degree is somewhat less effective in producing further financial benefits after a master degree.

Although deriving from clear patterns, the conclusion of the study is limited due to the usage of secondary data in analysis. All education-related data is used in a simplistic way. Time spent on education as well as tuition fees of each education level are based on the average of all workers instead of the values of individual workers. In fact, different programs of a certain education level may have different length and tuition fees, and graduates' career circumstances vary widely as well. For example, an engineering undergrad potentially earns much more than a graduate with a bachelor degree in history. This may cause deviations in graphing and data analysis. Similarly, the analysis used the average net worth and residence cost of workers and number of workers of each educational attainment to represent all workers at each education level instead of using data from individual workers. The calculation of the standard deviation of net worth and primary residence may therefore be impacted.

Although the analysis may not have the most accurate calculations that are derived from exact information of each worker individually, the trends and patterns discovered still reflect the circumstances of the majority workers. Therefore, the conclusion that education leads to greater financial success in their life and career is still cogent and persuasive.

## **Reflection**

Currently, many young people have decided not to pursue higher education or have dropped out of college. The results from this research can hopefully inspire more teenagers to pursue a bachelor or master degree in order for them to have a better career and future. In the foreseeable future, more employers will require higher education and skills, including communication skills and other soft skills. Employers tend to prefer candidates with bachelor degrees or higher because their skill sets better match their job openings. In the future, having a bachelor degree may become even more crucial for future employment opportunities.

However, this study raises some questions on the effectiveness of a doctorate degree in terms of financial success. Further research on doctorate degree could possibly explain the anomaly observed from this research. By then, we can conclude whether the doctorate is indeed effective or not from the perspective of financial success.

Additionally, all data used in the study is secondary data mostly from the U.S. Bureau of Labor Statistics. Further studies with access to the primary data of individual workers could potentially substantiate our conclusions in a more precise manner.

Lastly, this analysis is only based on the data of workers from the United States, a country with a unique economic and social structure. Further research with data from other countries, such as Canada, China, and even developing countries, would be useful in either substantiating the conclusions of this study or demonstrating the limitations of the conclusions with respect to other countries.

## Appendix

### 2020 US Workers Unemployment Rate vs. Time Spent on Education

Education Level	Time Spent on Education (years)	Unemployment Rate	Residuals
No High School Degree	8	11.70%	+0.68%
High School Degree	12	9.00%	+0.36%
Associate Degree	14	7.10%	-0.34%
Bachelor Degree	16	5.50%	-0.75%
Master Degree	18	4.10%	-0.96%
Doctorate Degree	24	2.50%	+1.02%

Other Calculation:

Coefficient of Correlation	Coefficient of Correlation without doctorate	Linear Regression	Average Rate of Change from master to doctorate
$r = -0.971$	$r = -0.998$	$y = -0.00596 + 0.15788x$ $x \in [8, 24]$	$AROC = -0.00267$

### 2020 US Workers Total Tuition of Education Attainment vs. Weekly Salary

Education Level	Total Tuition to Reach the Education (US\$)	Weekly Salary (US\$)
No High School Degree	0	619
High School Degree	0	781
Associate Degree	21,900	938
Bachelor Degree	37,508	1,345
Master Degree	80,883	1,545
Doctorate Degree	195,183	1,885



Other Calculations:

Coefficient Correlation (r)	Line of Best Fit (Linear Regression)
R = 0.922	$y = 0.00603 x + 842.861$ ; $x \in [0, 194632]$

#### 2019 US Workers Net Worth & Percentage Composition vs. Educational Attainment

Education Level	Average Net Worth (US\$, Thousands)	Number of Workers (Thousands)	Percentage of Workers	Z-Score of Net Worth
No High School Diploma	137.58	9,976	7.88%	-1.199
High School Diploma	304.59	36,162	28.56%	-0.925
Some College, No Degree	374.01	21,592	17.05%	-0.810
College Degree or higher	1,516.91	58,889	46.51%	+1.068

Other Calculations:

(Weighted) Average Net Worth for All Workers (Thousands, USD)	(Weighted) Standard Deviation of Net Worth (Thousands, USD)
867.105	608.396

#### 2019 US Worker Primary Residence Cost & Number Recipient vs. Education Attainment

Education Level	Primary Residence Cost (US\$, Thousands)	Number of Workers (Thousands)	Percentage of workers
No High School Diploma	159.78	9,976	7.88%
High School Diploma	218.53	36,162	28.56%
Some College, No Degree	258.67	21,592	17.05%
College Degree and higher	503.98	58,889	46.51%

Other Calculations:

Weighted Average (Thousands, USD) (Average cost of primary residence for all workers)	Weighted Standard Deviation (Thousands, USD)
353.507	164.215

2019 USA Salary median salary vs Total Tuition fee by education level

	Salary	Total Tuition fee (Cumulative)	Residual
Doctor	\$1883	\$274147	-113.9
Master	\$1497	\$83640	296.4
Bachelor Degree	\$1248	\$34000	254.9
Associate	\$887	\$25380	-70.1
High School	\$746	0	-105
No High School	\$592	0	-259

Coefficient Correlation (r)	Line of Best Fit (Linear Regression)
$r = 0.868$	$y = 0.00418x + 851$

2019 USA worker unemployment rate & length of education

	Number of education	Unemployment rate	Residual
Doctor	24 years	1.1%	0.5%
Master	18 years	2%	-0.1%
Bachelor Degree	16 years	2.2%	-0.5%
Associate	14 years	2.7%	-0.5%
High School	12 years	3.7%	0
No High School	8 years	5.4%	0.6

Coefficient Correlation (r)	Line of Best Fit (Linear Regression)
R = 0.947	$y = -0.263x + 6.88$

#### 2016 US Workers Net Worth & Number Recipient vs Education Attainment

	Average Net Worth (US\$, Thousands)	Number of Workers (Thousands)
No High School Diploma	167.3	10679
Highschool Diploma	265.3	35649
Some college, no degree	361.7	22667
College degree and higher	1599.8	53723

Weighted Mean	Median	Mode	Weighted Standard Deviation
858.789	313.510	N/A	757.138

#### 2016 US Worker Primary Residence Cost & Number Recipient vs. Education Attainment

	Average Net Worth (US\$, Thousands)	Number of Workers (Thousands)	Z-Score
No High School Diploma	154.6	9,884	-1.068
Highschool Diploma	195.7	33,801	-0.821
Some college, no degree	241.7	21,668	-0.543
College degree and higher	490.7	52,374	0.956

Weighted Mean	Median	Mode	Weighted Standard Deviation

331.954	218.700	N/A	166.058
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### 2018 US Workers Unemployment Rate vs. Length of Education Received

Education Level	Length of Education (years)	Unemployment Rate	Residual
No High School Degree	8	5.60%	+0.68%
High School Degree	12	4.10%	+0.18%
Associate Degree	14	2.80%	-0.62%
Bachelor Degree	16	2.20%	-0.72%
Master Degree	18	2.10%	-0.32%
Doctorate Degree	24	1.60%	+0.68%

Other Calculations:

Coefficient of Correlation	Linear Regression
-0.910	$y = -0.00251x + 0.06920$

### 2018 US Workers Total Tuition of Education Attainment vs. Weekly Salary

Education Level	Total Tuition to Reach the Education (US\$)	Weekly Salary (US\$)
No High School Degree	0	553
High School Degree	0	730
Associate Degree	12350	862
Bachelor Degree	85600	1198
Master Degree	42578	1434
Doctorate Degree	178428	1825

Other Calculations:

Coefficient of Correlation	Linear Regression
0.897	$y = 0.00616x + 772.84164$

2013 US Workers Net Worth & Number Recipient vs. Education Attainment

Education Level	Average Net Worth (US\$, Thousands)	Number of Workers (Thousands)	Z-score
No High School Diploma	19.05	11,005	-0.937
High School Diploma	57.54	36,359	-0.767
Some College, No Degree	55.35	22,488	-0.546
College Degree and higher	304.19	49,351	+1.023

Other Calculations:

Weighted Average	Weighted Standard Deviation
672.859	591.277

2013 US Worker Primary Residence Cost & Number Recipient vs. Education Attainment

Education Level	Primary Residence Cost (US\$, Thousands)	Number of Workers (Thousands)
No High School Diploma	106.52	11,005
High School Diploma	137.27	36,359
Some College, No Degree	164.73	22,488
College Degree and higher	285.52	49,351

Other Calculations:

Weighted Average	Weighted Standard Deviation
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200.98822	83.81434
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#### 2017 US Workers Unemployment Rate vs. Length of Education Received

Education Level	Length of Education (years)	Unemployment Rate	Residual
No High School Degree	8	6.5%	+0.037%
High School Degree	12	4.6%	+0.046%
Associate Degree	14	3.4%	-0.368%
Bachelor Degree	16	2.5%	-0.482%
Master Degree	18	2.2%	+0.004%
Doctorate Degree	24	1.5%	+0.483

Other Calculations:

Correlation Coefficient: -0.978

Line of Best Fit:  $y = -0.00393x + 0.0927$

	Mean	Standard Deviation
Years of Education	15.33	5.465
Unemployment Rate	3.5%	1.838%

#### 2017 US Workers Total Tuition of Education Attainment vs. Weekly Salary

Education Level	Total Tuition to Reach the Education (US\$)	Weekly Salary (US\$)	Residual
No High School Degree	0	\$520	-284.00
High School Degree	0	\$712	-92.00
Associate Degree	\$12,040	\$836	-47.58
Bachelor Degree	\$20,790	\$1173	+231.58
Master Degree	\$44,648	\$1401	+304.88

Doctorate Degree	\$158,948	\$1743	-111.65
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Other Calculations:

Correlation Coefficient: 0.875

Correlation Coefficient (excluding doctorate degree): 0.953

Line of Best Fit:  $y = 0.00661x + 804$

	Mean	Standard Deviation
Tuition Fee	\$39,404	60858.668
Weekly Salary	\$1,064	460.068

2010 US Workers Net Worth & Number Recipient vs. Education Attainment

Education Level	Average Net Worth (US\$, Thousands)	Number of Workers (Thousands)	Percentage of Labour Force
No High School Diploma	\$130.29	11,880	9.977%
High School Diploma	\$254.95	38,236	32.112%
Some College, No Degree	\$321.84	22,956	19.279%
College Degree and higher	\$1,315.30	45,998	38.631%

Other Calculations:

	Mean	Weighted Mean	Standard Deviation	Q1	Q3
Net Worth	\$505.60	\$665.03	545.608	\$192.62	\$818.57

2010 US Worker Primary Residence Cost & Number Recipient vs. Educational Attainment

Education Level	Mean Primary Residence Cost (US\$, Thousands)	Number of Workers (Thousands)	Percentage of Labour Force
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No High School Diploma	\$148.15	11,880	9.977%
High School Diploma	\$198.73	38,236	32.112%
Some College, No Degree	\$251.58	22,956	19.279%
College Degree and higher	\$483.47	45,998	38.631%

Other Calculations:

	Mean	Weighted Mean	Standard Deviation
Primary Residence	\$270.48	\$313.87	148.138



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