

Effects of education on income in Mexico, 2022

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Abstract

The research aims to estimate the education returns of heads of household in Mexico using data from the 2022 National Household Income and Expenditure Survey (ENIGH). Methodology: This study applies the Mincerian income equation and dichotomous variables. Results: Education, experience, and income from overtime work have a positive impact on the household heads' income, on the other hand, income rises with additional schooling, and higher levels of education contribute more significantly to income. Recommendations: it is suggested that decision-makers implement strategies to promote schooling to increase individual's income. Limitations: The research is restricted to information on heads of household in Mexico in 2022. Originality: The study uses microdata from ENIGH 2022 with 90102 records, one of the most comprehensive datasets available in recent years. Conclusions: Income increase with levels of schooling.

JEL Classification: C13, I23, I26

Keywords: education returns, dichotomous variables, Mincer income equation.

Efectos de la educación sobre el ingreso en México, 2022

Resumen

El objetivo de la investigación es estimar los retornos de la educación de jefes de familia en México mediante la Encuesta Nacional Ingreso Gasto de los Hogares (ENIGH) 2022. Metodología: se utilizan variables dicotómicas y ecuación de ingresos de Mincer. Resultados: la educación, la experiencia y los ingresos por horas extras trabajadas presentan un impacto positivo en las percepciones de los jefes de familia, por otro lado, con un incremento en la escolaridad aumentan los ingresos, asimismo, los niveles de mayor educación concentran mayor parte del ingreso. Recomendaciones: se sugiere a los tomadores de decisiones implementar estrategias para promover la escolaridad y así incrementar los ingresos de los individuos. Limitaciones: la investigación se restringe a la información de jefes de familia en México 2022. Originalidad: el estudio utiliza microdatos de la ENIGH 2022, cuenta 90102 datos, gran cantidad de información disponible respecto al pasado. Conclusiones: las percepciones aumentan con los niveles de escolaridad.

Clasificación JEL: C13, I23, I26.

Palabras clave: retornos de la educación, variables dicotómicas, ecuación de ingresos de Mincer.

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1. Introduction

This article studies the effects of education on income in Mexico in 2022. The objective is to estimate the impact of schooling on individuals' income, using data from the National Household Income Expenditure Survey provided by the National Institute of Statistics, Geography and Informatics (INEGI). The relationship between education and income has been widely studied in both theoretical and empirical literature. Empirical analysis gained momentum with Mincer's (1974) seminal work, which introduced the income function that underlies most subsequent studies. Research in this area continues to expand across micro- and macroeconomic perspectives, employing diverse methods and international datasets to explore determinants, causalities, and the role of education in productivity and well-being. In Mexico, significant disparities persist between individuals with higher and lower levels of schooling. This study hypothesizes that education plays a crucial role in raising income levels, and that schooling contributes significantly to improving economic well-being. It also considers the impact of recent minimum wage increases—over 22% in 2022 alone—on household income.

This research differs from the current state of the subject in the following ways: 1) it is based on the 2022 National Household Income and Expenditure Survey in Mexico, 2) it incorporates a larger sample than previous surveys, 3) it uses recent data, 4) cross-sectional data are estimated, and 4) it employs dichotomous variables to estimate income by education level. The second section of the research deals with the state of the art of the subject, which is divided into two parts: a section on international literature on the subject and another on literature about Mexico; the third section shows the data and statistical description of variables; the fourth section presents the methodology; the fifth section reveals the main empirical findings of the research; subsequently, the conclusions and recommendations based on the research are presented.

2. Literature Review

2.1. International Literature

There is a vast international literature on the subject of returns to education, such as Woodhall (1987), Jamison et al. (1987), Psacharopoulos et al. (1994), Wei et al. (1999), Hartog (2000), Moock et al. (2003), Brunello and Comi (2004), Kuepie (2009), Beffy et al. (2012), Mann and Percy (2014), Herrington (2015), and others. Woodhall (1987) analyzes the relationship between education and workers' income in the United States, finding that education is a form of investment that increases workers' productivity, and that higher incomes of more educated workers reflect the value of their product.

Additionally, he recommends investment in education for governments committed to long-term income redistribution. At the same time, Jamison et al. (1987) study the impact of education on income in China, based on the Household Survey. They find positive returns to schooling, but higher returns for women than for men. The effects of experience on income are very low or insignificant. Children of parents with low levels of education perform worse than children of parents with higher levels of education, and rural residents perform worse than those living in urban areas.

Psacharopoulos et al. (1994) examine the links between education and income in Paraguay based on the 1990 Household Survey. They estimate that each additional year of schooling produces a private rate of return of 11.5%. Women experience higher rates of return than men. Private sector employees earn 3.6% more than public sector workers. They recommend that Paraguayan decision-makers expand and improve primary and secondary education as the most efficient and cost-effective investment in education. Subsequently, Wei et al. (1999) analyze the effects of education on income in China, based on data from residents of 23 counties. They find a significant positive relationship between education and income.

Returns are higher in economically more advanced provinces and regions. The private rate of return on primary education was 9% and 11.2% for secondary education. They conclude that investment in education is profitable for individuals and society. On the other hand, Hartog (2000) studies the effects of over-education and under-education on individual income in five countries over two decades, based on three theoretical models (search, human capital, and allocation). He concludes that none of the models adequately explain income function specifications. Later, Moock et al. (2003) analyze the effects of education on earnings in Vietnam after labor market liberalization. They estimate private rates of return to primary education of 13%, secondary education of 4%, vocational education of 5%, and university education of 11%. They also estimate that the returns to higher education are higher for women (12%) than for men (10%). Brunello and Comi (2004) subsequently assess whether experience-earnings profiles differ by educational level. They use data from eleven European countries and find that employees with tertiary education have steeper experience-earnings profiles than employees with secondary education. The authors conclude that education not only provides an initial advantage in the labor market, but also a permanent advantage that increases over time. Likewise, Kuepie et al. (2009) examine the effects of education on labor market outcomes in urban West Africa using a series of comparable surveys. They find that in most West African cities in their sample, the public sector places the highest value on education, followed by the formal private sector and finally the informal private sector.

On the other hand, Beffy et al. (2012) analyze the effects of post-secondary education on future earnings in France. They find earnings elasticity with respect to education and conclude that non-monetary factors are a major determinant of schooling choices in the French university context. Moreover, Mann and Percy (2014) assess the effects of different levels of schooling on earnings in Great Britain by estimating a dynamic model. They find that the estimated causal effects vary with the level of cognitive and non-cognitive endowments. Subsequently, Herrington (2015) studies public education financing, income inequality and intergenerational mobility in Norway and the United States of America, finding that taxes and public spending on education explain a third of the differences in income inequality. Sparse public sources.

2.2. Literature about Mexico

Numerous studies address the contribution of education to income in Mexico, such as Psacharopoulos et al. (1996), Binder (1999), Levison et al. (2001), Cortez (2001), Weiling (2003), Quinn and Rubb (2006), Popli (2011), Hazarika and Otero (2011), Attanasio et al. (2012), Ortiz-Zarco et al. (2013), Binelli and Rubio-Codina (2013), Kaufmann (2014), Estrada and Gignoux (2017), Aali-Bujari et al. (2019), Levy and López-Calva (2020), Toro (2021), Hausmann et al. (2021), Valero-Gil and Valero (2022), Escamilla-Mejía et al. (2023), Székely et al. (2024), and others. Initially,

Psacharopoulos et al. (1996) analyzed the returns to education in Mexico to study the relationship between education and income using data from various household surveys. They found that the returns to education declined during recessions and rose again with economic recovery. They also indicated that the returns to education remained high even after significant expansion of the education system. Furthermore, they found that secondary education had the highest profitability.

On the other hand, Binder (1999) studied the returns to education in Mexico in 1980. He used panel data for different states and found that rates of return responded strongly to the economic conditions of the poorest states. State schooling indicators were sensitive to urbanization, sectoral structure, and school spending patterns across states. Subsequently, Levison et al. (2001) used data from Mexico based on the National Urban Employment Survey and analyze the determinants of whether young people between 12 and 17 years old in urban areas of Mexico choose to study or work. They found that girls are 13.8% more likely than boys to specialize in school. On the other hand, Cortez (2001) evaluated the effects of educational expansion on wage inequality using a simulation technique proposed by Knight and Sabot. They concluded that increases in the rate of return to higher education would have led to an increase in wage inequality, and that changes in the composition of educational distribution would have led to a sharper decline in income inequality.

Likewise, Weiling (2003) studied the returns on educational investment in children in Oaxaca, Mexico. The study identified the main issues that families consider when making educational decisions: the role of personal sacrifice for the benefit of the entire family, the collective nature of educational achievement, the association between education and upward social mobility for the family, feelings of pride in the family and higher social status in the community; and the hope of a better life for future generations. In this regard, Quinn and Rubb (2006) analyzed the relevance of education to productivity, income, and employment in the Mexican labor market. The authors demonstrated the positive links between educational attainment and wages in Mexico and suggest that raising employment levels is essential to maximize the returns from higher educational attainment. On the other hand, Popli (2011) examined the effects of changes in human capital on wage inequality in Mexico. She found that human capital is associated with and explains inequality, and that changes in human capital and the returns to education explain changes in inequality. At the same time, Hazarika and Otero (2011) analyzed the effect of the North American Free Trade Agreement (NAFTA) on returns to skilled labor in Mexico. They used Mexican labor microdata and find evidence that NAFTA is slowing the increase in returns to skilled labor. They suggested that trade with developed nations may reduce returns to skilled labor in developing nations. Subsequently, Attanasio et al. (2012) examined the impact of social programs on school participation and find that subsidizing social programs has a strong impact on children's school enrollment, especially after primary school. Similarly, Ortiz-Zarco et al. (2013) estimated the returns to education in Mexico using the ENIGH 2010 and find positive rates of return. On the other hand, Binelli and Rubio-Codina (2013) studied the returns to private high schools in Mexico, using labor market data and historical census data, they found that attending a private high school does not affect college progression or high school wages, but it does positively affect wages upon completion of college.

In this sense, Kaufmann (2014) examined the differences in university enrollment between rich and poor in Mexico, used data on individuals' subjective expected returns, found that poor individuals require higher expected returns to be induced to attend university than individuals from

wealthy families, moreover, poor individuals were sensitive to school costs and credit restrictions. On the other hand, Estrada and Gignoux (2017) examined the benefits of admission to an elite public secondary school system in Mexico City, estimated that admission to elite schools increases future earnings and the returns that students have to a university education, also improved academic achievement and university graduation outcomes. Likewise, Aali-Bujari et al. (2019) analyzed the contributions of schooling on wage earnings in Mexico, used the ENIGH 2016, estimating a Mincerian income function, find that as the level of formal education increases, income levels increase.

In addition to the above, Levy and López-Calva (2020) studied the returns to education in Mexico. They found that average workers' earnings have stagnated, and the incomes of workers with higher levels of education have declined, compressing the income distribution and reducing the returns to education. They explained that this is due to large and persistent distortions in the misallocation of resources to less productive firms, which are less intensive in educated workers compared to more productive firms, which has generated a growing mismatch between the supply of and demand for educated workers. Likewise, Toro (2021) evaluated the relationship between income inequality, social origin, and educational attainment in Mexico. He used data from the 2006 Mobility Survey and finds that social origin worsens inequality by inducing an income bonus. The author emphasized the importance of universal educational opportunities in reducing the effect of social origin on labor market outcomes.

On the other hand, Hausmann et al. (2021) studied the wage gaps between Chiapas and the rest of Mexico, finding that the education gap has narrowed, while the wage gap has widened. The authors explained that persistent income gaps were due to location-specific characteristics, which affect the behavior of individuals living in Chiapas, thereby limiting firm-level investments, complex economic conditions account most of the income gap, rather than other factors, concluding that the problem is Chiapas and not the Chiapanecos. Subsequently, Valero-Gil and Valero (2022) analyzed the relationship between differences in human capital and state per capita product in Mexico, considering the quantity and quality of education in human capital formation. They found that changes in human capital explain more than 40% of the variation in state Gross Domestic Product per hour worked. They concluded that Mexican states should place greater emphasis on the quality and coverage of education to contribute to state economic development.

Likewise, Escamilla-Mejía et al. (2023) examined the effects of higher education on economic growth in countries of the Organization for Economic Cooperation and Development (OECD) over the period 2000–2019. They used panel data models based on information from the OECD and the World Bank. The authors found that higher education in general has a positive impact on economic growth, while when disaggregated by age they found empirical evidence that individuals with higher education between the ages of 25 and 34 have a positive impact on their EQ, while individuals between the ages of 55 and 64 have a negative effect due to the obsolescence of acquired knowledge, outpaced by recent scientific and technological progress. They recommended continuous training, knowledge updating, and postgraduate studies to mitigate the obsolescence of knowledge in the older age group. Recently, Székely et al. (2024) study the effects of the delay in the return to face-to-face school activities after the peak of the COVID-19 pandemic in different States in Mexico, they used data corresponding to children aged 10 to 15 between April and December 2021, based on learning outcomes in mathematics and reading comprehension, they found that children who returned to school earlier achieved higher scores, the authors concluded that there are possible learning losses

associated with distance education; see also, Moreno-García et al. (2024) and García-Santillán (2023) regarding financial education. In summary, the consensus of most of the literature on the subject is that education is associated with increases in income.

3. Descriptive Analysis

Since 1984, the ENIGH has been conducted in Mexico with the aim of better understanding the living conditions of the population. It also contributes to improving the performance of economic agents such as individuals, families, businesses, and government agencies by providing insight into the country's economic reality.

Furthermore, databases such as the ENIGH are extremely important for many studies like this one, which contribute to understanding the country's environment and progress. This research uses the 2022 ENIGH conducted by INEGI to estimate the returns to education in the country. The ENIGH provides information on households, population, income, expenses, and hundreds of variables that address a wide range of topics. The 2022 ENIGH surveyed 90,102 heads of household, of whom 61,905 (68.71%) were men and 28,197 (31.29%) were women. The mean age of heads of household was 51 years, with a maximum of 109 years and a minimum of 13 years, with a standard deviation of 16 years.

The ENIGH defines income as the total earnings from salary, rent, subsidies, and other sources of each household member as reported quarterly in the survey. Sex to the self-reported classification of household heads as male or female; 68.71% were men and 31.29% were women. Age refers to the number of years between the individual's birth and the survey date. Literacy is defined as the ability to read and write simple texts. Schooling refers to the highest level of education successfully completed by the individual, recorded in the survey as *nivaprob*.

Overtime is the additional compensation received for hours worked beyond regular schedules. Information on heads of households was obtained from 90,102 individuals based on a nationally representative survey sample. Descriptive statistics for the study variables are presented below. Table 1 indicates that the average annual income of household's heads is 245,959.8 Mexican pesos in constant 2022 terms, with a standard deviation of 313,299.4 pesos. Reported incomes ranged from 0 to a maximum of 28,615,082 pesos per year, equivalent to approximately 1,423,635.91 US dollars at the 2022 exchange rate.

The average years of schooling completed is 5.80 (SD = 2.5). This level corresponds approximately to the completion of primary education. The minimum recorded level was 1, representing no formal instruction, while the maximum was 11, corresponding to postgraduate studies. The average income for overtime worked was 15,208.44 pesos per year (SD=103,739.9), the minimum was 0, while the maximum was 5,748,260 pesos per year. The average age of household heads is 51 years (SD=16), with ages ranging from 13 to 97 years.

Table 1. Descriptive statistics

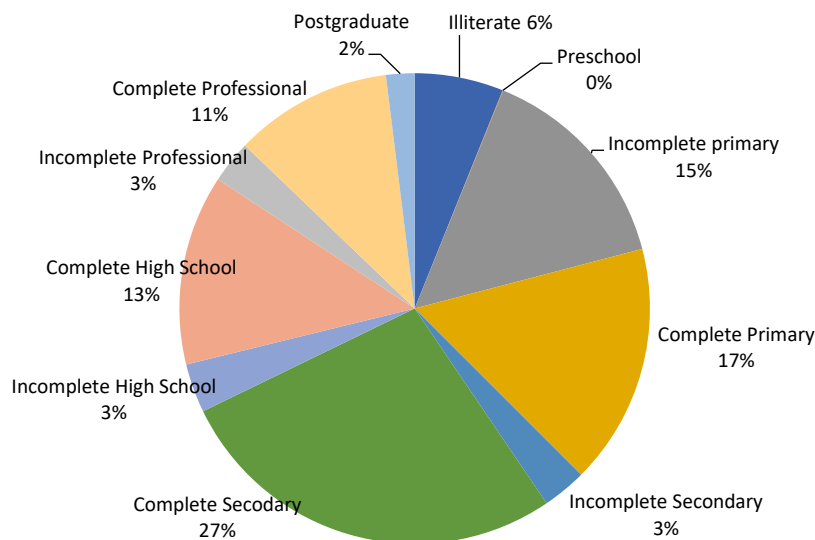
Variable	Mean	Standard deviation	Minimum	Maximum
Income	245959.8	313299.4	0	28615082.0
Schooling	5.80	2.56	1	11
Experience	36.73	18.56	0	97
Entry of hours worked	15208.44	103739.9	0	5748260
Number of observations	90102			

Source: Authors' estimate based on INEGI data.

Graph 1 shows the education of heads of households in Mexico 2022, 6% of heads of households are illiterate or uneducated, 15% did not complete primary studies, 17% completed primary studies, 3% did not complete secondary studies, a total of 27% completed secondary studies, 3% had some high school education without completion. In addition, 13% completed high school, 3% had some higher education without completing a degree, 11% completed a higher education degree, and 2 percent attained postgraduate studies.

Figure 1. School Level in Mexico 2022

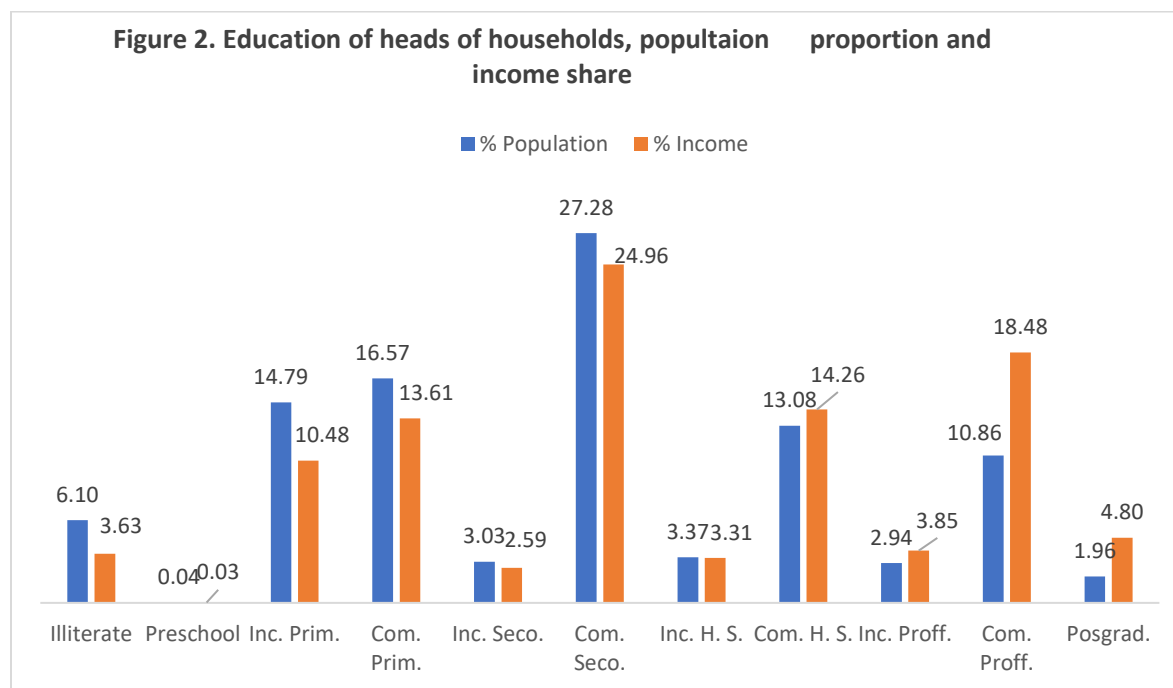
Source: Authors with data from INEGI



Source: Authors' estimate based on INEGI data.

On the other hand, 38% of household heads have less than primary education, 68% have completed secondary school, and 84% have completed high school or less, while only 13% hold a professional or postgraduate degree.

Chart 2 shows the distribution of educational attainment among respondents and their corresponding share of income. Household heads with no formal education represent 6.10% of the sample and account for 3.63% of total income. Those with preschool education represent 0.04% and account for 0.03% of income. Individuals with incomplete primary education represent 14.79% and earn 10.48% of income, while 3.03% of household heads have incomplete secondary education and receive 2.59% of income.



Source: Authors with information from INEGI

Likewise, 27.28% of household heads have completed secondary education and accounted for 24.96% of total income.

An additional 3.37% of had incomplete high school and earned 3.31% of income, while 13.08% of completed high school studies and received 14.26% of income, 2.94% of had some higher education without completion and earn 3.85% of income, 10.86% completed higher education and accounted for 18.48% of income, and 1.96% attained postgraduate studies and earned 4.80% of income. In summary, Figure 2 shows that income share rises with higher levels of educational attainment among household heads.

4. Methodology

The returns to education are a relevant topic of interest to economic agents such as individuals, families, businesses, government agencies, as well as too many researchers, which has generated a large number of studies, both empirical and theoretical, on the subject at the national and international levels.

The Mincerian earnings function is used in many empirical research studying the returns to education to calculate the effects of schooling on people's income. The classic Mincer equation², is equation (1), it consists of estimating a model with explained variable in logarithms and the explanatory variables in levels, as explained variable, the logarithm of income and as explanatory variables, schooling, work experience, the square of work experience [Shows diminishing effects of experience on income], the logarithm of hours worked.

$$\ln(Y) = \beta_0 + \beta_1 S + \beta_2 E + \beta_3 E^2 + \ln Hrs + \varepsilon \quad (1)$$

where:

- Y are the income of the respondents
- S is schooling
- E it is the work experience
- E^2 the square of work experience
- $\ln Hrs$ is the logarithm of the hours worked and
- ε it is a random disturbance that is normally distributed.

Equation (1) is constructed under the assumptions of the neoclassical model of labor market functioning: wages depend on productivity, and firms know the marginal productivity of each worker. Furthermore, the partially logarithmic wage equation can be estimated using dichotomous education variables, each equivalent to different levels of schooling, which is expressed by the following equation:

$$\ln(Y) = \beta_0 + \beta_1 S_1 + \beta_2 S_2 + \beta_3 S_3 + \dots + \beta_9 S_9 + \beta_2 E + \beta_3 E^2 + \ln Hrs + \varepsilon \quad (2)$$

where S_i it is equivalent to different levels of schooling in the present study: illiterate, pre-primary, completed primary, completed primary, incomplete secondary, completed secondary, incomplete preparatory, completed preparatory, incomplete professional, completed professional and postgraduate.

² Mincer (1974) gives rise to numerous empirical works and a wide literature on the subject of returns to education.

5. Results

5.1. Discussion of empirical results

This section reveals the main results obtained from the ENIGH 2022, which are relevant for policymakers, educational institutions, families, and individuals. To assess the returns to education among household heads in Mexico in 2022, equation (1) is estimated, where the dependent variable is the logarithm of income and the explanatory variables include schooling, work experience, its square (to capture diminishing effects), and income from overtime hours worked instead of the logarithm of hours worked. The main findings from the Mincerian income function estimates are revealed below:

Table 2. Estimates of the revenue function

Explanatory variables	Coefficient
Constant	10.86227*
Schooling	0.140281*
Experience	0.019429*
Square of experience	−0.000166*
Log. earnings for overtime hours worked	0.0000007*
Explained variable: logarithm of income	

Source: authors with data from INEGI.

*[$P(t)$ significant at 1%]

Total observations: 90102.

The coefficients estimated from the Mincerian earnings equation show the expected signs and are statistically significant at 1%. Education, work experience, and overtime income all have positive effects, while the squared term of experience has the expected negative sign. The estimated returns to schooling are 14.0281% per additional year of education completed by of the household head. The positive sign of the schooling coefficient indicates that an increase in educational level is associated with an increase in individuals' income. Work experience is associated with a 1.9 percent increase in income, although the coefficient on the squared term confirms diminishing returns to experience. The coefficient for overtime income is positive (0.000007) but not statistically significant in explaining income variation.

The results of this research are consistent with previous studies. Psacharopoulos (1989) reported 9.6% for Argentina, while Bracho and Zamudio (1994) estimated returns of 11.8% for Mexico, Austria-Carlos and Venegas-Martínez (2011) found a return of 8.83% per additional year of higher education, and Ortiz-Zarco et al. (2013) estimated returns of 9.43% for Mexico. More recently, Aali-Bujari et al. (2019) reported a return of 15.65% by education level of household heads in Mexico in 2016. These findings are in line with Austria et al. (2018). Subsequently, the returns to education in Mexico are estimated using dichotomous variables, and the main results are presented in Table 3:

Table 3. Average monthly income level in MXP and USD

Schooling	Average income in MXP	Average income in USD
Illiterate	12212.16	607.57
Preschool	14649.73	728.84
Incomplete Primary	14525.56	722.66
Complete Primary	16834.04	837.51
Incomplete Secondary	17516.85	871.49
Complete Secondary	18753.84	933.03
Incomplete High School	20149.15	1002.44
Complete High School	22355.87	1112.23
Incomplete Professional	26900.87	1338.35
Complete Professional	34865.10	1734.58
Postgraduate	50280.19	2501.50

Source: Prepared by the authors using data from ENIGH 2022 and the Bank of Mexico.
The average exchange rate for 2022 was 20.10 PMX per 1 USD.

Number of observations: 90102

Table 3 indicates that the average monthly income of an illiterate head of household is USD 607.57. Those with preschool education earn 728.84 USD, with those with incomplete primary education the average income is 722.66 USD. Heads of households who completed primary education earn USD 837.51, and those with incomplete secondary education earn USD 871.49. With incomplete high school, the average income is 1002.44 USD, and with completed high school it increases to 1112.23 USD. while those who completed professional studies earn USD 1,734.58.

Finally, heads of households with postgraduate studies earn more than USD 2,501.50 per month. In addition, incomes among individuals with lower levels of education have risen significantly in recent years, possibly reflecting the substantial increases in minimum wages. As a result, the earnings of less-educated groups have grown at a faster pace, contributing to a more equitable income distribution. Overall, higher levels of formal education have a positive impact on household earnings in Mexico, while minimum wage increases have further improved the incomes of those with lower educational attainment.

5.2. Comparative Analysis

In this section, the behavior of individual incomes over time is evaluated and the evolution of the income of different groups classified according to their level of formal education is analyzed. Table 4 uses results from Ortiz-Zarco et al. (2013) under the monthly income column in 2010 and compares them with the results of this work for 2022. The third column presents the percentage change in household heads' income by education level between 2010 and 2022.

Table 4. Average monthly income level in MXP, in 2010 and 2022.

Level of studies approved	Monthly income 2010	Monthly income 2022	Percentage variation
Illiterate	2078.17	12212.16	487.64
Primary	2705.92	16834.04	522.12
Secondary	3295.75	18753.84	469.03
High School	4138.49	22355.87	440.19
Professional	8714.02	34865.10	300.10
Posgraduate	16483.74	50280.19	205.03
Observations	29654	90102	203.84

Source: Prepared by the authors based on ENIGH 2010 and ENIGH 2022.

Table 4 shows the evolution of the income of illiterate individuals, from an average of 2,078.17 Mexican pesos per month in 2010 to 12,212.16 Mexican pesos per month in 2022, an increase of 487.64%. Likewise, the incomes of individuals with completed primary education increased from 2,705.92 Mexican pesos per month in 2010 to 16,834.04 Mexican pesos per month in 2022, an increase of 522.12%. People with completed secondary school increased their income from 3,295.75 Mexican pesos per month in 2010 to 18,753.84 Mexican pesos per month in 2022, an increase of 469.03%. On the other hand, individuals with completed high school went from earning 4,138.49 Mexican pesos per month in 2010 to 22,355.87 Mexican pesos per month in 2022, a 440.19% increase. Likewise, individuals with a professional degree, income rose from 8,714.02 Mexican pesos per month in 2010 to 34,865.10 Mexican pesos per month in 2022. On the other hand, individuals with a postgraduate degree went from earning 16,483.74 Mexican pesos per month in 2010 to 50,280.19 Mexican pesos per month in 2022.

On the other hand, the number of individuals surveyed increased from 29,654 in the 2010 ENIGH to 90,102 in 2022, representing an increase of 203.84% in the number of respondents. This indicates that the sample size is significantly larger and more representative of the population, which reinforces the possibility of obtaining more reliable estimates, as well as the urgent need for new estimates based on larger and updated databases. Table 4 indicates that the highest percentage increase in income corresponds to individuals with completed primary education (522.12%), followed by illiterate individuals (487.64%), those with completed secondary education (469.03%), and followed by individuals with completed high school (440.19%), then professionals (300.10%), finally, individuals with postgraduate studies (205.03%). These variations indicate that individuals with lower levels of education experienced larger relative income increases compared to those with higher levels of education. This may be related to significant and successive increases in the minimum wage in Mexico in recent years. For example, in 2017 the minimum wage increased by 9.58%, in 2018 by 10.39%, in 2019 by 16.21%, in 2020 by 20%, in 2021 by 15%, and in 2022 by 22%. Another possible explanation is that the incomes of individuals with lower levels of education had lagged significantly behind those with higher levels of education.

Table 5 compares the results of Aali-Bujari et al. (2019), based on the 2016 ENIGH, with the results of the present work using ENIGH 2022, in order to analyze the income dynamics of heads of households, expressed in United States dollars (USD). Illiterate individuals increased their monthly

income from USD 213.82 in 2016 to USD 607.57 in 2022, an increase of 184.15%. Individuals who completed pre-primary education went from earning USD 253.19 per month in 2016 to USD 728.84 per month in 2022, an increase of 187.86%. Likewise, individuals with incomplete primary education increased their income from USD 400.43 in 2016 to USD 722.66 in 2022, an increase of 80.47%. Individuals with completed primary education went from USD 535.55 in 2016 to USD 837.51 in 2022, an increase of 56.38%. Individuals with incomplete secondary education increased their income from USD 565.49 in 2016 to USD 871.49 in 2022, an increase of 54.11%. Finally, individuals with completed secondary education went from USD 618.76 in 2016 to USD 933.03 in 2022, an increase of 50.79%.

Table 5. Average monthly income level in USD, in 2016 and 2022

Scholling	Monthly income in U SD 2016	Monthly income in USD 2022	Percentage variation
Illiterate	213.82	607.57	184.15
Preschool	253.19	728.84	187.86
Incomplete Primary	400.43	722.66	80.47
Complete Primary	535.55	837.51	56.38
Incomplete Secondary	565.49	871.49	54.11
Complete Secondary	618.76	933.03	50.79
Incomplete High School	697.48	1002.44	43.72
Complete High School	782.75	1112.23	42.09
Incomplete Professional	906.48	1338.35	47.64
Complete Professional	1130.23	1734.58	53.47
Postgraduate	1441.56	2501.50	73.53
Observations	65535	90102	37.49

Source: Prepared by the authors using data from ENIGH 2016 and ENIGH 2022, and exchange rates obtained from the Bank of Mexico.

Similarly, individuals with incomplete high school education increased their monthly income from USD 697.48 in 2016 to \$1,002.44 in 2022, an increase of 43.72%. Those with completed high school went from \$782.75 in 2016 to \$1,112.23 in 2022, an increase of 42.09%. Individuals with incomplete university studies increased their monthly income from USD 906.48 in 2016 to USD 1,338.35 in 2022, an increase of 47.64%. University graduates went from USD 1,130.23 in 2016 to USD 1,734.58 in 2022, an increase of 53.47%. Finally, Individuals with postgraduate degrees increased their income from USD 1,441.56 to USD 2,501.50 in 2022, an increase of 73.53%. The number of respondents in the 2016 ENIGH was 65,535 individuals, while in the 2022 ENIGH it was 90,102.

This represents a 37.49% increase in sample size, implying greater representativeness, more up-to-date data, and improved information compared to previous surveys. Comparing ENIGH 2016 and ENIGH 2022, the largest increase in monthly income (in USD) corresponded to individuals with pre-primary education (187.86%), followed by illiterate individuals (184.15%), then incomplete primary education (80.47%), postgraduate degree holders (73.53%), completed primary education (56.38%), incomplete secondary education (54.11%), university graduates (53.47%), completed

secondary education (50.79%), incomplete university degree (47.64%), incomplete high school education (43.72%) and finally, individuals with completed high school (42.09%). Increases in income expressed in USD can be associated with multiple internal and external factors, such as the appreciation of the Mexican peso, the depreciation of the USD, wage policies in Mexico, wars, global inflation, geopolitical changes, the shifts in the international economic and financial order, etc. In summary, comparing the 2022 ENIGH with 2010 ENIGH shows a generalized increase in income in Mexican pesos of at all education levels, while comparing 2022 ENIGH with 2016 ENIGH indicates an increase in income in US dollars across all education levels in Mexico.

6. Conclusions

This research estimates the educational attainment of heads of households in Mexico in 2022, based on information provided by the INEGI. The research begins with a theoretical framework and a review of the literature, which shows a consensus that higher levels of formal education have positive effects on individuals' income. A descriptive analysis, along with data, and information sources is then presented. This section reaffirms that individuals' income increases with formal education. The descriptive analysis reveals that 38% of heads of households have primary education or less, 68% have completed secondary school, 84% have completed high school or less, and only 13% have professional or postgraduate studies.

On the other hand, income distribution favors those with higher education levels. Illiterate heads of households represent 6.10% of the sample and account for 3.63% of total income, while heads of households with postgraduate studies represent 1.96% of the population and contribute 4.80% of total income. Likewise, the main findings of the research in Mexico (2022) are as follows: education has an annual return of 14%, work experience contributes approximately 2% to income growth, and earnings from overtime hours worked are almost irrelevant to the increase in income increases. Furthermore, the square term of work experience has a negative sign and is not statistically significant in explaining changes in individuals' income.

The Mincerian income equation estimation method is also presented. Finally, the returns to education by educational level are estimated using dichotomous variables. The empirical evidence suggests that income levels increase as schooling increases. These findings are consistent with previous research, which highlights the positive effects of formal education on individuals' income.

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