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The effect of ethnicity on the mexican labor market; An analysis of wage discrimination in the indigenous population

El efecto del origen étnico en el mercado laboral mexicano; un análisis de la discriminación salarial en la población indígena

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Abstract

Considering the hypothesis that observable wage differences against the indigenous population in Mexico are explained by discrimination and the underestimation of their work skills, the present study aims to analyze the wage gap between the workers who recognize themselves as indigenous and those who do not. Using the data from the 2018 National Household Expenditure Revenue Survey (ENIGH), the Oaxaca-Blinder decomposition was calculated and it was found that the wage gap against the indigenous workers is about 36%. The explained component by the observable characteristics of the workers is 61%, while the remaining 39% is attributed to other unobserved elements, such as ethnic discrimination. Both the socio-demographic variables considered in the analysis of the two groups of workers, as well as the unexplained part of the gap, suggest discriminatory behavior in the Mexican labor market.

JEL Code: J15, J24, J31, J71
Keywords: labor market discrimination; ethnicity wage gap; indigenous population; Mexico; Oaxaca-Blinder decomposition

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Resumen

Bajo la hipótesis de que en México las diferencias salariales en contra de la población indígena se explican por la discriminación y subestimación de sus capacidades laborales, el presente estudio analiza la brecha salarial entre los trabajadores que se identifican como indígenas y aquellos que no. Con los datos de la Encuesta Nacional de Ingresos y Gastos de los Hogares de 2018 (ENIGH), se realizó la descomposición de Oxaca-Blinder y se encontró que la diferencia salarial en contra de los indígenas es del 36%. De ella, el 61% se explica por las características observables en los trabajadores, mientras que el 39% restante, se atribuye a otros elementos no observados, como la discriminación. Tanto las características sociodemográficas consideradas en el análisis estadístico de los dos grupos de trabajadores, como la parte no explicada de la brecha, sugieren un comportamiento discriminatorio en el mercado laboral mexicano.

Código JEL: J15, J24, J31, J71
Palabras clave: discriminación laboral; brecha salarial étnica; población indígena; México; descomposición de Oaxaca-Blinder

Introduction

According to the National Council for the Prevention of Discrimination (CONAPRED), a discriminatory act occurs when, in some circumstance of daily life, a person or group of the population receives unfavorable treatment that is undeserved and unjustifiable. In general, the discriminatory act has to do with one or several attributes of the victim, such as ethnic origin, physical appearance, gender, age, health condition or disability, and social status, among other characteristics.[1]

In all cases, discrimination has wide-ranging negative effects on individuals and society, ranging from psychological damage to problems of social exclusion and marginalization. These problems are reflected in the lack of rights as well as in the lack of equitable access to development resources and opportunities. Because of the nature of the problem and the multiplicity of its causes and consequences, discrimination is a subject of interest to different disciplines and can be approached from different perspectives. This research will limit itself to analyzing the problem from an economic perspective. Particularly, its incidence in the labor market is examined through the analysis of wage discrimination toward indigenous groups because this constitutes one of the main causes of income inequality among the population (Cain, 1984; Horbath, 2008; Borjas, 2015; & Ordoñez, 2018).

Under the standard approach to economics, discrimination commonly occurs in the labor market. When employers of labor reduce costs and increase profits, they resort to differentiated or

[1]CONAPRED is a Mexican State body created by the Federal Law to anticipate and eliminate discrimination. It develops programs to protect citizens from any distinction or exclusion based on ethnic origin, gender, age, disability, social status, or religion, among others. For a detailed description of its functions and action programs see: http://www.conapred.org.mx

discriminatory labor measures that affect the welfare of their workers, putting them at a disadvantage in the labor market for reasons unrelated to their labor productivity, experience, or ability to perform a productive activity. In this context, four types of labor discrimination are identified (ILO, 2003; Borjas, 2015; McConell et al., 2007): i) wage discrimination; ii) employment discrimination; iii) discrimination in the distribution of occupations; iv) discrimination in the acquisition of job skills.

Among the four forms of discrimination, wage differentials have received the greatest interest from specialists. Empirical studies show that, in general, wage discrimination represents a form of lasting inequality that harms the economic well-being of society (Cain, 1984). In the case of Mexico, research is focused on the study of wage gaps with an emphasis on gender. Nevertheless, the problem is broader and affects different segments of the population. Currently, there are minority groups that work under unequal conditions and receive lower salaries because they belong to a segregated group. Specifically, this refers to indigenous people. This group of the Mexican population represents 21.5% of the total population (INEGI, 2020) (Spanish: Instituto Nacional de Estadística y Geografía) and, according to data on labor income and access to employment, people who identify themselves as indigenous experience broad disadvantages due to their ethnic condition.

For example, Horbath (2008) found that in the labor markets of Mexico's major urban areas, indigenous people often suffer from income discrimination. According to the author's calculations, indigenous workers in these areas earn up to 21% less than non-indigenous workers. Likewise, data from the 2018 National Household Income and Spending Survey (ENIGH) (Spanish: Encuesta Nacional de Ingresos y Gastos de los Hogares) show that, on average, the labor income of people who define themselves as indigenous represents up to 78% of those who do not (the difference is highly significant). On the other hand, calculations by the National Council for the Evaluation of Social Development Policy (CONEVAL, 2019; 2020) (Spanish: Consejo Nacional de Evaluación de la Política de Desarrollo Social) show that the difference in labor income by ethnic condition not only occurs in urban areas but also between municipalities. Quarterly data for 2005-2020 expose that, on average, the real labor income of the employed population residing in non-indigenous municipalities is more than double that of those living in municipalities considered indigenous.[2]

In addition to wage discrimination, people of indigenous origin suffer other prejudicial acts in one or more areas of their lives, which negatively influences their economic opportunities (Solís &

[2]According to the CONEVAL, an indigenous municipality is considered to be one where the indigenous population is greater or equal to 40%. To consult the data in more detail, it is recommended to consult the following link: https://www.coneval.org.mx/Medicion/Paginas/Pobreza_laboral_3erTrim2021.aspx#:~:text=en%20municipios%20ind%C3%ADgenas.-,Entre%20el%20segundo%20trimestre%202021%20y%20el%20ter%20tercer%20trimestre%202021,ind%C3%ADgenas%20el%20cual%20aument%20aument%C3%B3%200.3%25.

Güémez, 2020). Data from the 2017 National Survey on Discrimination (ENADIS) (Spanish: Encuesta Nacional sobre Discriminación) indicate that of the total number of indigenous people aged 12 years and older interviewed, 24% reported having experienced at least one discriminatory situation in the five years prior to the survey.[3] When asked if the cause of the discrimination was attributed to their status as an indigenous person, the percentage increased to 40.3%. When asked about the specific problems faced by this population group, 20.9% stated lack of employment, 16.1% lack of economic resources, and 15.8% lack of government support. Finally, 75.6% of the total population interviewed in the survey—which includes indigenous people, the disabled, the elderly, and people of sexual and religious diversity—stated that most people do not highly value indigenous people.

Statistical information makes it evident that in 21st-century Mexico, the indigenous population faces a problem of economic discrimination in the labor market that requires the attention of specialists and public policymakers. The simple fact of having an ethnic origin means that the labor skills of this population group are less valued, and they are penalized with lower salaries than other groups. Nevertheless, it should be emphasized that the problem of wage gaps against the indigenous population does not originate solely from ethnic discrimination; there are other factors, such as schooling and experience (human capital), that could explain these wage differences.

Therefore, the objective of this article is to estimate with data from the 2018 National Household Income and Expenditure Survey (ENIGH) (Spanish: Encuesta Nacional de Ingresos y Gastos de los Hogares), the wage gap of the indigenous population in Mexico to analyze through the Oaxaca-Blinder decomposition (Blinder, 1973; Oaxaca, 1973) whether its existence is the result of a problem of ethnic discrimination or differences in human capital. The relevance of the research lies in the need to contribute more empirical evidence to the discussion of wage discrimination in indigenous groups in Mexico since the ethnic issue as a cause of the wage gap has been little explored. In order to fulfill this purpose, the paper is divided into five sections. After this introduction, the second section presents a review of the literature. The third section presents the estimation methodology, and the next section presents the main results. Finally, final reflections are presented.

[3]The forms of discrimination mentioned in the survey are 1) Rejection or exclusion from social activities; 2) Making them feel or look uncomfortable; 3) Insults, taunts, or things that bother them; 4) Threats, pushing, or shoving; 5) Forcing them to leave a community.

Review of the literature on wage discrimination in the indigenous population

In the case of Mexico, the analysis of wage gaps associated with the ethnic origin of workers is meager, especially when compared to the amount of research that addresses the issue from a gender perspective. Despite this, the few studies that have focused on analyzing and explaining wage gaps in this minority group have done so from different strategies and sources of information.

Horbath (2008), using information from the 2000 Population and Housing Census and the calculation of indices to measure inequality, conducted a nationwide investigation on the discrimination suffered by indigenous people in urban spaces. This sample included people 12 years of age and older of indigenous and non-indigenous origin. The elements considered to analyze ethnic inequality in metropolitan areas were occupational segregation, educational discrimination, and wage discrimination. The Duncan and Karmel-MacLachlan indices indicated that occupational segregation mainly affects the indigenous population in all the urban areas analyzed. Likewise, they revealed that the metropolitan area of the Valley of Mexico presents the greatest occupational segregation.

Regarding educational and wage discrimination in metropolitan areas, the author found that indigenous groups are more vulnerable to experiencing these conditions. In the case of wage discrimination, it was observed that indigenous youth suffer frequently from this problem, mainly in urban areas. With this scenario, the author concluded that the precarious conditions faced by the indigenous population are due, on the one hand, to the economic and social backwardness of their communities and, on the other, to the clear and systematic discrimination and segregation, which limits their capacity as a social group.

Aguilar-Rodríguez et al. (2018), using a sample from the 2000 and 2010 population and housing census and the Oaxaca-Choe decomposition, analyzed the linguistic wage gap among ethnic minorities in Mexico. The analysis group was people of productive age (20 to 40) who self-identify as indigenous and are monolingual—of an indigenous language- or bilingual—who also speak Spanish-. In all econometric estimations, the control group was the monolinguals. The wage estimation and subsequent decomposition of the language gap were conducted for men using a panel data model and a municipal fixed effects model. In estimating the wage and gap for women, the selection bias due to labor participation was considered; therefore, a random effects model and Heckman correction were estimated in addition to the panel. The results indicate a positive return in the labor income of indigenous people for being bilingual: 17% for men and 42% for women. Regarding the linguistic wage gap, they found that most of this gap is explained by observable differences in individuals: 61% for men and 62% for women.

Canedo (2019) used the ENIGH 2016 (Spanish: Encuesta Nacional de Ingresos y Gastos de los Hogares) and an Oaxaca-Blinder decomposition by quantiles to estimate the wage gap between the

indigenous and non-indigenous population along the wage distribution. The sample included the employed and salaried population with an age range of 15 to 65 years. Given the probability that the indigenous population self-selects into activities without pay and in the informal sector, the estimates considered the Heckman correction. The results confirm the existence of a wage gap toward the indigenous population of 77.9%. According to the author's calculations, 62.8% of the total gap is attributed to the unexplained component, while the remaining 37.2% is explained by the characteristics of the workers (indigenous and non-indigenous) that are observable and measurable in the model. Within the explained component, it is noteworthy that most of the ethnic wage gap is explained by human capital endowments. The results of the decomposition of the ethnic gap by quantiles indicate that wage inequality against indigenous people is more pronounced at lower levels of the wage distribution. It also finds that indigenous women face a double penalty in the labor market. The first is due to their gender status since wage inequality is more pronounced for indigenous women than for men. The second is due to their ethnic condition and the existence of greater discrimination toward women.

Arceo-Gómez and Torres (2020), using the ENIGH 2018 (Spanish: Encuesta Nacional de Ingresos y Gastos de los Hogares), estimated the wage gap and its decomposition by indigenous self-identification and linguistic traits in Mexico. Their analysis group was individuals aged 25 to 65 who recognize themselves as indigenous—either by culture or because they speak an indigenous language—and those who do not. Assuming that indigenous self-identification changes throughout life for different purposes, including discrimination avoidance, they proposed the existence of a self-identification bias in estimating the wage gap. In order to correct it, they used a regime-switching model and, in a second stage, estimated the wage equations by worker's ethnic self-identification. Finally, they conducted the Oaxaca decomposition. Their results indicate the existence of a wage gap by ethnic self-identification. The population that considers itself indigenous earns 23% less than those that do not. The decomposition of the gap between indigenous and non-indigenous people showed that 70% of the gap is due to differences in observable characteristics, while the residual, which represents the unexplained gap, could be attributed to factors such as discrimination. Regarding linguistic traits, they found that payments for being bilingual are nil for indigenous people: speaking an indigenous language in addition to Spanish does not bring a return in the labor market.

Descriptive statistics of the sample

The ENIGH 2018 (new edition) (Spanish: Encuesta Nacional de Ingresos y Gastos de los Hogares) was used to estimate the ethnic wage gap. The use of this survey as a primary source of information is because this instrument reports the ethnic self-designation of household members, enabling the identification of

people who are part of the indigenous population. With this information, a sample base of indigenous and non-indigenous subordinate workers between the ages of 15 and 65 who reported income was constructed. The number of observations was 78 347 individuals, of which 22 846 (29.16%) belonged to the indigenous population and 55 501 (70.84%) to the non-indigenous population. By applying the sample expansion factor, an estimated population of 37 639 318 individuals was obtained.

First, a comparison was conducted between individuals in the two sample groups. Table 1 presents the statistical description and the significance test applied to the differences between the individuals of the indigenous group (A) and the non-indigenous group (B). The probability value P indicates that all the variables between the two groups exhibit a significant difference. The Indigenous are at a disadvantage in salary, years of schooling, and hours worked per week, but they are older and have more work experience. The average monthly salary data indicate that an individual from Group A earns up to 78% of what an individual from Group B earns.[4]

Table 1
Characteristics of the individuals in the sample

Variables	Total		Indigenous (A)		Non-Indigenous (B)		Difference	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	A-B	P-value
Salary (monthly)	$ 6 604	6455.30	$ 5 499	4499.07	$ 7 046	7039.75	-$1 546.61	0.000
log salary	9	0.79	8	0.79	9	0.77	-0.23	0.000
age	36	13.90	36	13.97	36	13.87	0.26	0.016
years_education	10	4.16	9	4.20	10	4.10	-1.16	0.000
experience	20	15.40	21	15.70	20	15.26	1.43	0.000
hours_week	45	17.92	44	19.14	45	17.39	-0.84	0.000

Note: the gender of the individuals was not included because the percentage distribution of men and women is similar between both groups, and their differences were not statistically significant.
Source: created by the authors with data from ENIGH (2018).

Having indications of wage differences by ethnic self-designation, income behavior was analyzed based on sociodemographic characteristics. First, a quadratic adjustment was conducted with the wage and age data trend to observe the relation between these two variables during the working life of the two groups of workers. Figure 1 shows this relation, and three issues stand out: i) the wage difference between the two groups of workers remains throughout their working life; ii) the concavity of the curve of the indigenous group has a lower slope, indicating that their wages grow at a slower rate than those of the other group; iii) the wages of the indigenous group at retirement age (65 years) are, on average, similar to those at the beginning of their working life (15 years). In the non-indigenous group, the opposite is true; wages at retirement age are higher than when they enter the labor force.

[4]Since the wage distribution is not normally distributed, the median was obtained. In the indigenous group it was $4 800 and in the other group $5 600. Both the mean and the median indicate that the indigenous group has a lower income.

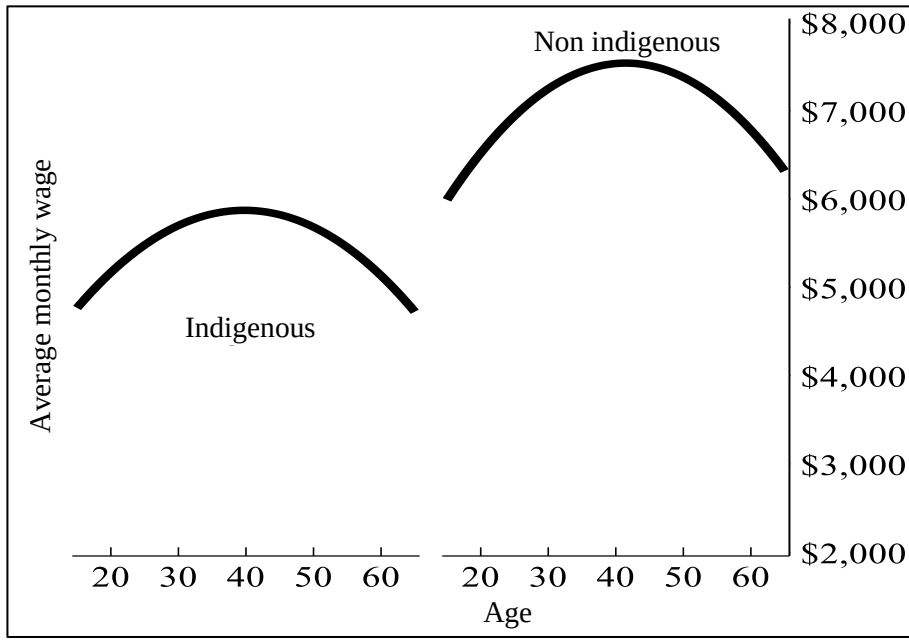

Figure 1. Wage curves adjusted for age and ethnic affiliation
Source: created by the authors with data from ENIGH (2018).

Next, in Figure 2, an analysis is made of the income by educational level and ethnic affiliation of the two groups of workers. It was observed that regardless of the level of education, individuals who recognize themselves as Indigenous have, on average, a lower monthly income than those who are not. The exception is the case of indigenous workers with a teaching qualification, where there is a wage advantage over non-indigenous workers. This analysis suggests that the labor market may be undervaluing the knowledge that indigenous people acquire through the educational system.

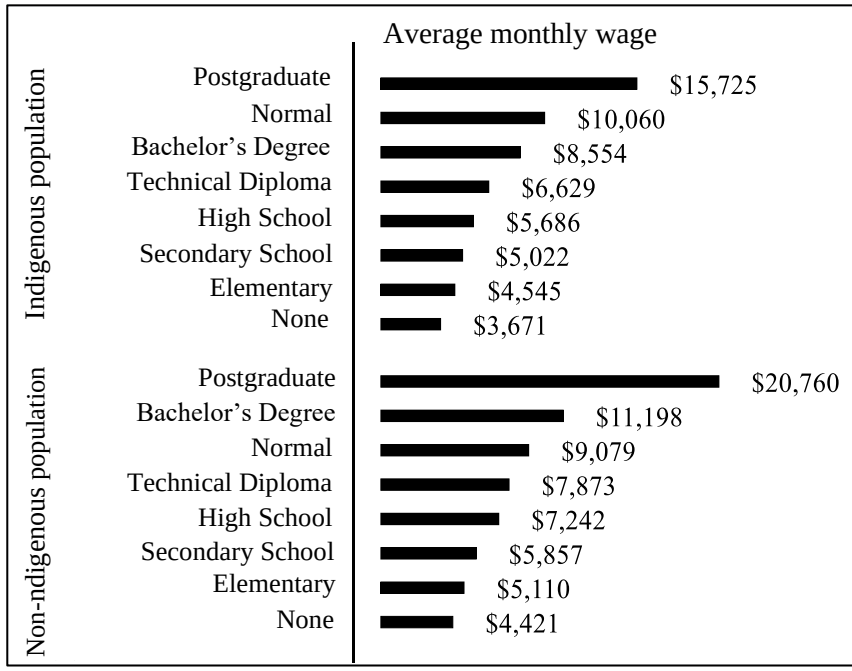

Figure 2. Wages by educational level according to ethnic affiliation.
Note: the graph is ordered by income level and not by educational level.
Source: created by the authors with data from ENIGH (2018).

Table 2 presents information on the salary and geographic region of the individuals in the sample. Note that in all regions of the country, indigenous people experience a wage differential against them. Likewise, the indigenous population is mostly concentrated in central and southeastern Mexico, while in the western and northern regions, the percentage of the indigenous population is lower. One of the regions that stands out most for its concentration of indigenous population and its greater wage disadvantage is the South-Central region, where this group in the sample earns up to 73% of the salary of the individual in group B. In contrast, the percentage of indigenous workers in the northern states is lower. On the other hand, in the northern states of the republic, where there is less concentration of indigenous people, relative wages are higher.

Table 2
Average monthly wage by region and ethnic affiliation

Region	States	% indigenous population	Average Indigenous monthly wage (A)	Average non-indigenous monthly wage (B)	Relative wage: (A/B)*100
Center South	CDMX, MEX, MOR	23.5%	$ 6 134	$ 8 427	73%
Center East	PUE, VER, TLAX, HGO	22.5%	$ 4 614	$ 5 656	82%
Southwest	QROO, YUC, TAB, CAMP	12.0%	$ 5 749	$ 7 439	77%
West	COL, JAL, MICH, NAY	10.1%	$ 5 768	$ 7 134	81%
Northeast	BC, BCS, CHIH, DGO, SIN, SON	8.3%	$ 6 913	$ 8 608	80%
Center North	AGS, GTO, QRO, SLP, ZAC	5.3%	$ 6 066	$ 6 752	90%
North	COAH, NL, TAMS	4.8%	$ 6 962	$ 8 332	84%
National		100%	$ 5 613	$ 7 594	74%

Note: Regionalization taken from INEGI
Source: created by the authors with data from ENIGH (2018).

When examining in Table 3 the wages of the two groups by sector of economic activity, it was observed—in addition to the ethnic wage disadvantage—that the sectors with the lowest relative wages for indigenous people are the primary sector and the government sector. On the other hand, the primary and secondary sectors show a higher relative wage. It should also be noted that workers in group A are concentrated mainly in the tertiary sector and, to a lesser extent, in the government sector.

Table 3
Average monthly salary by sector of economic activity and ethnic affiliation

Economic activity sector	% indigenous population	Average Indigenous monthly wage (A)	Average non-indigenous monthly wage (B)	Relative wage: (A/B)*100
Tertiary Sector	49%	$ 5 534	$ 7 469	74%
Secondary Sector	27%	$ 6 095	$ 7 480	81%
Primary Sector	20%	$ 3 635	$ 4 494	80%
Government Sector	4%	$ 9 537	$ 13 511	70%

Source: created by the authors with data from ENIGH (2018).

Table 4 explores income by type of occupation. In general, it is observed that when workers (indigenous and non-indigenous) are employed as officers, directors, and chiefs, salaries are higher than any other occupation. Nevertheless, although this type of occupation has the highest salary for indigenous people, inequality, measured through relative salary, is high. In addition, the indigenous concentration in this type of occupation is 2%. In occupations related to agricultural activities and others, 7% of the indigenous population is concentrated, and the relative salary is 81%. The lowest-paid occupations are elementary and support activities, where the largest proportion of the indigenous population is concentrated (39%) and where there is a very large wage disadvantage.

Table 4
Average monthly wage by type of occupation and ethnic affiliation

Occupation type	Indigenous concentration	Average Indigenous monthly wage (A)	Average non-indigenous monthly wage (B)	Relative wage: (A/B)*100
Civil servants, directors, and managers	2.3%	$ 14 325	$ 19 648	73%
Professionals and technicians	10.5%	$ 8 943	$ 11 177	80%
Auxiliary workers in administrative activities	5.1%	$ 6 307	$ 7 146	88%
Retailers, sales force employees, and sales agents	9.5%	$ 4 581	$5 583	82%
Workers in personal and security services	8.4%	$ 5 109	$ 5 693	90%
Workers in agriculture, livestock, forestry, hunting, and fishing	6.5%	$ 4 235	$ 5 256	81%
Craft, construction, and other trades workers	8.6%	$ 6 271	$ 6 765	93%
Industrial machinery operators, assemblers, chauffeurs, and transport drivers	9.5%	$ 6 492	$ 7 157	91%
Workers in elementary and support activities	39.5%	$ 3 928	$ 4 420	89%

Source: created by the authors with data from ENIGH (2018).

Table 5 presents the distribution of households by locality and socioeconomic stratum. According to the data, more than half of the households with indigenous inhabitants reside in urban areas. This fact is probably related to rural-urban migration. The highest percentage of households with group B inhabitants are in urban areas. Regarding socioeconomic level—an indicator of the household's capacity to access a set of goods and lifestyle—it is observed that more than a quarter of the indigenous individuals live in households classified as low stratum. In the opposite group, the percentage is lower. In the case of lower middle-stratum households, the percentage is similar in the two groups. When considering the cumulative sum of the first two strata, it is observed that 82% of indigenous households are grouped in the low strata (in group B, the percentage is 62). This fact could be associated with the wage disadvantages they experience.

Table 5
Classification of households by size and socioeconomic stratum

Sample group	Size of locality		Socioeconomic stratum			
	Urban	Rural	Low (1)	Medium-low (2)	Medium-high (3)	High (4)
Indigenous (A)	53%	47%	27%	55%	12%	5%
Non-indigenous (B)	73%	27%	10%	52%	16%	12%
Total sample	67%	33%	15%	53%	22%	10%

Source: created by the authors with data from ENIGH (2018).

Table 6 presents some characteristics of the jobs performed by the individuals in the sample. In the case of the employment contract—a hallmark of security and protection in a job—it is observed that compared with individuals in group B (49%), 36% of the indigenous people work under a contract. In other words, the absence of a contract affects group A workers the most. Regarding access to social security at work, the data show that only 41% of indigenous people have this right. In the opposite group, the percentage is 53%.

Table 6
Job Characteristics

Sample group	Employment contract		Access to Social Security		Access to benefits	
	Under contract	Without contract	With social security	Without social security	At least one benefit	Without benefits
Indigenous (A)	36%	64%	41%	59%	52%	48%
Non-indigenous (B)	49%	51%	53%	47%	60%	40%
Total sample	46%	54%	50%	50%	57%	43%

Source: created by the authors with data from ENIGH (2018).

The data analyzed in the study sample on the characteristics of individuals, the classification of their households, and the distinctiveness of the jobs they perform provide evidence not only of an ethnic wage gap but also of significant disadvantages for individuals who self-identify as indigenous. These data suggest that the wage differentials affecting the indigenous population could be rooted in a problem of ethnic discrimination.

Empirical methodology

The estimation of the ethnic wage gap was conducted using the Oaxaca-Blinder method (Oaxaca, 1973; Blinder, 1973), which consists in decomposing the observed wage gap between two population groups to separate it into the proportion explained by the characteristics of the individuals, such as human capital and work environment, and the proportion not explained by these characteristics and therefore attributable to unobservable factors such as discrimination. This decomposition is based on the Mincerian earnings equation, which, in its simplest form, establishes that labor earnings depend positively on schooling and experience, but the latter at a decreasing rate (Mincer, 1974). The general form of this equation is as follows:

$$\mathrm{Ln}(\mathrm{Y_i}) = \beta_0 + \beta_1 \mathrm{S_i} + \beta_2 \mathrm{X_i} + \beta_3 \mathrm{X_i^2} + \mathrm{U_i} \quad (1)$$

Where the subscript i represents each individual. LnY_i is the natural logarithm of the wage per worker in a specific period, S_i their years of schooling, X_i their potential[5] experience and X_i^2 their (potential) experience squared, which captures the diminishing return of human capital on income as the individual's age advances. Ui is the random error term iid and represents all unobservable variables that although not explicitly incorporated in the equation, affect the wage of individuals. In order to estimate the decomposition between the group of workers who self-define as indigenous (A) and those who do not (B), it is necessary to estimate separately a Mincer equation for each group, in this case, Equations 2 and 3.

$$\mathrm{Ln}\left(W_i^A\right) = \beta_0^A + \sum_{j=1}^{n} \beta_j^A X_{ji}^A + U_i^A \tag{2}$$

$$\mathrm{Ln}\left(W_i^B\right) = \beta_0^B + \sum_{j=1}^{n} \beta_j^B X_{ji}^B + U_i^B \tag{3}$$

Where the subscripts "i" and "j" represent workers and coefficients, respectively. LnW_i is the natural logarithm of labor income, and X is a vector of variables representing the human capital components of workers and other control variables. The estimated coefficients β express the returns to the worker's wage for each of the observable characteristics. U_i is the error term. The Oaxaca-Blinder decomposition is obtained by subtracting Equation (3) from Equation (2) to obtain the following expression.

$$\sum_j \beta_j^B \overline{X}_j^B - \sum_j \beta_j^A \overline{X}_j^A = \underbrace{\sum_j \beta_j^B \left(\overline{X}_j^B - \overline{X}_j^A\right)}_{\text{Explained}} + \underbrace{\sum_j \overline{X}_j^A \left(\overline{X}_j^B - \overline{X}_j^A\right)}_{\text{Unexplained}} \tag{4}$$

Where the first term represents the explained part of the wage gap attributable to the observed characteristics between the two groups of workers (A and B). The second term is the unexplained part of the gap not explained by the observable characteristics of individuals. When the explained proportion of

[5]Due to the difficulty of obtaining direct information on the actual years of work experience of individuals, in the literature on human capital it is common to use as an alternative approximation, the concept of potential experience, which is defined as age minus years of schooling minus years of initiation (6 by consensus). It is important to mention that from here on, when using the term experience, reference will be made to potential experience.

the gap is larger, the market does not reward the two groups of workers with the same wage because they do not have the same characteristics. On the other hand, when the unexplained part is larger, it means that indigenous and non-indigenous workers are rewarded at different rates.

A drawback of this statistical technique is that it does not consider the sample selection problem (Heckman, 1979), which arises because the statistical sample only collects information from the economically active population that was working at the time of being surveyed but excludes the part of the population that was seeking employment or was unemployed. To correct this problem of sample selection bias, it is common in the literature to resort to the methodology proposed by Heckman, which is developed in two stages (Austria & Venegas-Martínez, 2011; Celeste, 2018; Raudales & Sánchez, 2018).

In the first stage, considering the possible selection bias in workers of the indigenous group, a probit model was estimated to obtain the probability that, given certain characteristics, an indigenous individual would be part of the employed population. The inverse Mills ratio (λ), used in the literature to capture the magnitude of selection bias, was obtained from this estimation. In the second stage, Mincerian income functions were estimated with the Mills ratio incorporated, and finally, the wage gap decomposition was conducted. Specifically, the probit model proposed was as follows:

$$\text{Prob}(Y = 1|X_i) = \Phi(\beta X_i) \tag{5}$$

Where Y is the dichotomous dependent variable that takes the value of 1 when the indigenous individual is part of the economically active population (EAP) and 0 otherwise. The term Φ represents the normal logistic probability function that contains the vector of independent variables or observable characteristics (βx_i) and that, in this case, included the following:

$$\beta x_i: \left[\beta_0 + \beta_1 \text{age} + \beta_2 \text{age}_i^2 + \beta_3 \text{female}_i + \beta_4 \text{married} + \beta_5 \text{offspring}_i + \beta_6 \text{higher\_ed} \right] \tag{6}$$

The model estimates the probability that the i-th indigenous person is employed if he/she is of a certain age, is female, is married, has offspring, and has higher education. The squared-age variable was included to capture the non-linear effects in the probabilistic model. On the other hand, the wage equation estimated for each group of workers in the second stage was as follows:

$$\begin{aligned} \ln W_i = {} & \beta_0 + \beta_1 \text{education}_i + \beta_2 \text{experience}_i + \beta_3 \text{experience}_i^2 + \beta_4 \text{hours\_work}_i + \beta_5 \text{sex}_i \\ & + \beta_6 \text{size\_comp}_i + \beta_7 \text{type\_comp}_i + \beta_8 \text{emp\_contract}_i + \beta_9 \text{size\_loc}_i \\ & + \beta_{10} \text{type\_emp}_i + \beta_{11} \text{region}_i + U_i \end{aligned} \tag{7}$$

The dependent variable is the natural logarithm of monthly labor income (LnW_i), which is a function of a set of independent variables such as years of schooling; potential experience and its square; the number of hours worked per week; the individual's biological sex; the size of the company; the type of company (private or public); the existence of an employment contract; the size of the individual's place of residence; the type of occupation; the geographic region to which the individuals belong; and the error term. The selection of these variables was conducted based on the review of the literature on wage discrimination.

Finally, it should be noted that STATA version 16 was the statistical software used to conduct all the econometric estimations. Likewise, the sample expansion factor was used in all the calculations presented, mainly to obtain more representative results at the national level.

Results

Table 7 presents the results of the probabilistic model of labor participation of the indigenous population aged 15 to 65. Because the coefficients estimated by the probit are not directly interpretable, the marginal effects of the model were calculated, which constitute the set of probabilities (expressed in proportions) that the variable Y is equal to 1 when X changes by one unit. Nevertheless, the marginal effects are presented in Figure 3 instead of the classical probability table for a more intuitive interpretation.[6]

Table 7
Probit estimate of labor participation of the indigenous EAP

Variable	Coefficient	Standard error	Statistic Z	P-value
Age	0.1919*	0.000	892.77	0.000
Age^2	-0.0022*	0.000	-819.65	0.000
Female	-0.7088*	0.001	-501.34	0.000
Married	-0.2487*	0.001	-225.77	0.000
Offspring	-0.4787*	0.002	-313.99	0.000
Higher education	0.1548*	0.001	105.22	0.000
Constant	-2.1669*	0.004	-604.46	0.000
	Prob > chi2 = 0.0000		Pseudo R2 = 0.1776	

*Statistically relevant coefficients at 99% confidence level. Wald statistics and Likelihood Ratio indicated a well-specified model.
Source: created by the authors with data from ENIGH (2018).

[6]Marginal effects can be calculated by considering specific values for the independent variables or simply the value of their mean. In this case, the marginal effects were calculated from the average value of each explanatory variable and then plotted.

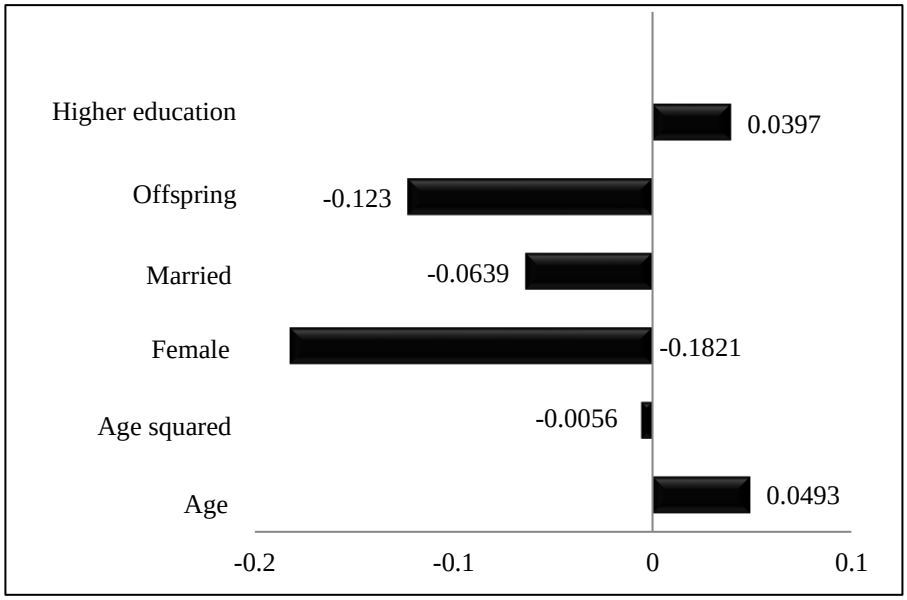

Figure 3. Marginal effects of the labor participation probit of the indigenous population
Source: created by the authors with data from ENIGH (2018).

According to Figure 3, each additional year of age increases the probability of an indigenous person's employment by 0.049. Nevertheless, because of the diminishing returns to labor productivity associated with greater age, age squared indicates that each year completed simultaneously reduces the probability of employment by 0.005. Being a woman and having offspring have a very significant negative effect; these traits most decrease the modeled probability. This implies not only that indigenous women are less likely to be employed but also that the effect of gender may overshadow the positive effect that age and possession of a higher education degree have on the labor market. This result is consistent with the finding of Canedo (2019) on the double discrimination faced by indigenous women in the Mexican labor market that is associated with gender and their status as an indigenous person.[7] Finally, the condition of being married reduces the probability of indigenous people's employment.

After this, the income functions by ethnic affiliation were estimated by the ordinary least squares method. The results are summarized in Table 8.

[7]Báez (2015) also points out this double discrimination toward indigenous women in the Ecuadorian labor market.

Table 8
Summary of OLS estimates by ethnic affiliation.

Variable	Indigenous group (A)		Non-indigenous group (B)	
	Coefficient	Interpretation	Coefficient	Interpretation
-CONSTANT	7.8947*	$2 683	8.2169*	$3 703
-Schooling	0.0275*	2.75 %	0.0329*	3.29 %
-Experience	0.0113*	1.14 %	0.0051*	0.51 %
-Experience squared	-0.0001*	-0.02 %	-0.0001*	-0.01 %
-Hours worked per week	0.0157*	1.58 %	0.0140*	1.40 %
-Gender: (male)				
female	-0.0862*	-8.62 %	-0.0288*	-2.88 %
-Company size: (large)				
SME	-0.0700*	-7.00 %	-0.1109*	-11.09 %
-Company type: (public)				
Private	-0.305*	-30.51 %	-0.2438*	-24.38 %
-Employment contract: (without contract)				
Under contract	0.2897*	28.97 %	0.2389*	23.89 %
-Size of locality: (rural)				
Urban	0.0668*	6.68 %	0.0711*	7.11 %
-Type of occupation: (civil servants, directors, and managers)				
Professionals and technicians	-0.2640*	-26.40 %	-0.3367*	-33.67 %
Auxiliary workers in administrative activities	-0.5701*	-57.01 %	-0.6745*	-67.45 %
Merchants, sales force employees, and sales agents	-0.8003*	-80.03 %	-0.8633*	-86.33 %
Workers in personal and security services	-0.8059*	-80.59 %	-0.8692*	-86.92 %
Workers in agriculture, livestock, forestry, hunting, and fishing	-0.6353*	-63.53 %	-0.6745*	-67.45 %
Craft, construction, and other trades workers	-0.3760*	-37.60 %	-0.5356*	-53.56 %
Industrial machinery operators, assemblers, and drivers	-0.5438*	-54.38 %	-0.6670*	-66.70 %
Workers in elementary and support activities	-0.7076*	-70.76 %	-0.8309*	-83.09 %
-Region: (Northeast)				
Northwest	-0.0450*	-4.50 %	-0.0417*	-4.17 %
Center East	-0.0183*	-1.83 %	-0.0557*	-5.57 %
West	-0.3068*	-30.68 %	-0.2602*	-26.02 %
Center North	-0.0369*	-3.69 %	-0.0866*	-8.66 %
Center South	-0.1369*	-13.69 %	-0.0861*	-8.61 %
Southwest	-0.3735*	-37.35 %	-0.3543*	-35.43 %
Southeast	-0.2148*	-21.48 %	-0.1767*	-17.67 %
Prob >F	0.0000		0.0000	
R-squared	0.4266		0.4266	
Adj R-squared	0.4258		0.4263	
Root MSE	0.5798		0.5696	

*coefficients statistically meaningful at a 99% confidence level. Note: In the case of categorical variables or dummies, the category in parentheses represents the comparison value regarding the rest of the categories.
Source: created by the authors with data from ENIGH (2018).

The “coefficient” columns in Table 8 show the value estimated by the regression, while the “interpretation” columns show the transformation made to the coefficient for its explanation. The constant indicating the estimated average wage, without considering any other characteristic than the ethnic affiliation of the individuals, shows that indigenous people have a wage disadvantage that could be

attributed to discrimination ($2 683 versus $3 703 in the opposite group). This greater vulnerability of indigenous workers to experience a priori wage disadvantages has been pointed out by authors such as Horbath (2008) and Canedo (2019).

Schooling provides lower returns for the indigenous (2.75% vs. 3.29%), but work experience is higher for them (1.14% vs. 0.51%), probably because they enter the labor market earlier. The quadratic term of experience shows that the salary of indigenous people decreases at a slightly higher rate, possibly because of the outdatedness of their knowledge, the types of work they perform, or the underestimation of their skills; (-) 0.02% vs. (-) 0.01%. The hours coefficient shows that wage income per hour worked is higher in the indigenous population (1.58% vs. 1.40%). The gender coefficient shows that, although an average woman earns less than a man, indigenous women have a greater disadvantage: (-) 8.62% vs. (-) 2.88%.

The next group of variables is categorical, and the coefficients are interpreted for the condition in parentheses. Thus, the negative coefficient, SME, indicates that, on average, workers who work in small and medium-sized companies earn less than those who work in large companies. Nevertheless, in a non-indigenous worker, the difference is greater (-11%). The Private coefficient indicates that workers in this type of company earn (on average) less than those in public companies. Nevertheless, in an indigenous worker the difference is greater (-30.5%). In the case of the employment contract, it is observed that workers who have this agreement earn, on average, more than those who do not—nonetheless, a contract benefits indigenous workers more.

The Urban coefficient indicates that workers in cities obtain a higher average wage than those in rural localities. Nevertheless, the effect of working in an urban locality is smaller for indigenous workers, consistent with Horbath (2008). The coefficients of the type of occupation have a negative sign in both groups of workers, suggesting that all occupations other than civil servants, directors, and managers receive a lower average wage. In the case of indigenous workers, the disadvantage is greater.

The Region, which takes the Northeast as a reference because it has the lowest percentage of indigenous population, shows a negative sign in both groups. This implies that, in general and independently of the ethnic group, wages in the Northeast are higher on average. Nevertheless, this lower wage in the rest of the regions behaves differently between the two groups of workers. For example, the Center South region, which has a higher concentration of indigenous people, reports a difference regarding the Northeast of -37% in individuals in group A and -35% in group B.

Oaxaca-blinder decomposition results

Table 9 presents the results of the Oaxaca-Blinder (1973) decomposition.[8] The first section shows the wage gap without the correction for selection bias in the indigenous population, while the next section presents the correction for selection bias.

Table 9
Wage gap decomposition results

Variables	Estimates
Section I	
Without sample bias correction	
Non-indigenous group (B)	$5 832
Indigenous group (A)	$4 547
Salary gap	28.27 %
Section II	
With sample bias correction	
Non-indigenous group (B)	$5 832.52
Indigenous group (A)	$4 279.32
Salary gap	36.29 %
Explained	22.29**
Inexplicable	14.0**

**Percentage points of the salary gap
Source: created by the authors with data from ENIGH (2018).

Note that the Heckman correction showed that the ethnic wage gap was being underestimated. Thus, in section two of Table 9, a decrease in the average wage of the indigenous group is observed and, therefore, an increase in the wage gap of about eight percentage points (going from 28% to 36%). This situation indicates the existence of a wage gap toward indigenous workers of 36%. When decomposing this adjusted gap, it was found that the observable characteristics of the workers explain 61.4%, and the remaining 38.6% is attributed to other elements not explained by the model.[9]

It is important to highlight that despite the different strategies regarding the calculation and decomposition of Oaxaca-Blinder, the results presented here are consistent with the empirical literature. For example, Arceo-Gomez and Torres (2020) report an unadjusted wage differential against indigenous people of 23%, and when decomposing it, they stress that 70% is attributed to observable characteristics and the rest to unexplained factors. Aguilar-Rodriguez et al. (2018) found that most of the indigenous

[8]The estimation and decomposition of the wage gap was conducted based on the methodology proposed by Jann Ben (2008).
[9]The explained and unexplained percentage of the gap (61.40% and 38.60%) was obtained by dividing the points of the explained and unexplained part by the percentage of the wage gap, and the resulting quotient was multiplied by 100.

wage gap is explained by the characteristics of individuals (61% in men and 62% in women), while the residual is attributed to other unobservable factors.

Below is a breakdown of the two components of the ethnic wage gap to examine these results in more detail.

Breakdown of the explained and unexplained part of the ethnic wage gap

Figure 4 presents the breakdown of the explained portion: 61.4%. Positive values indicate characteristics in which indigenous workers are disadvantaged and, therefore, contribute to the ethnic wage gap (and vice versa with negative values). Theoretically, if these disadvantages disappeared, there would be no wage gap between the two groups of workers.

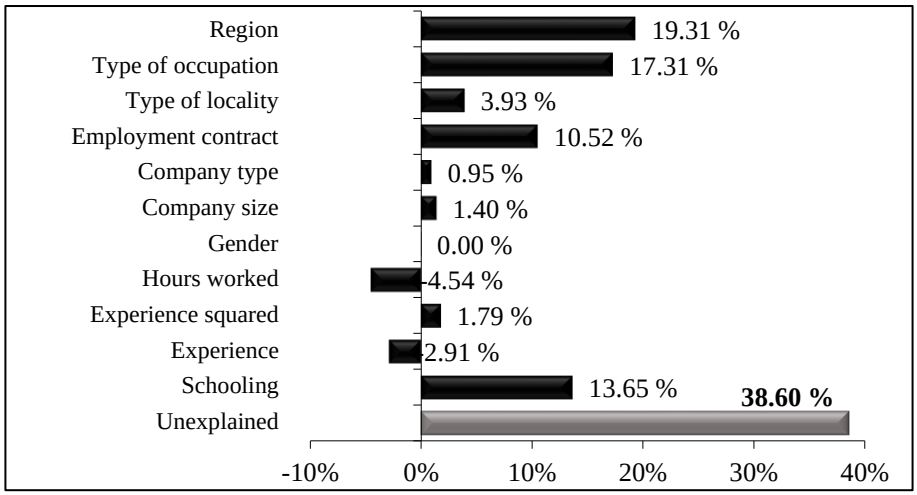

Figure 4. Breakdown of the explained portion of the ethnic wage gap
Source: created by the authors with data from ENIGH (2018).

By this logic, Figure 4 shows that region is the most important element in explaining the ethnic wage gap (19.3%).[10] Nevertheless, it is important to note that it is not the concentration of the indigenous population by region that determines stricto sensu the wage inequality against this population, but rather, that in the regions with greater ethnic diversity (central and southeastern Mexico), lower quality jobs and lower wages predominate. Hence, if there were a structural change in the demand for jobs in the regions

[10]Unlike the Mincer functions where the effects of each category of the region and type of occupation variables are estimated, in the decomposition only the total effects of the variables are considered.

and localities considered indigenous, the differences in the ethnic wage gap would decrease. This result is consistent with the observation that Mexico's trade liberalization exacerbated wage inequality in the country (Castro & Lugo, 2007).

The type of occupation also has a significant relevance (17.3%); the fact that indigenous workers are more concentrated in certain occupations, such as elementary and support activities (Table 4), contributes to the gap.[11] Occupational segregation in the indigenous population as one of the causes of the ethnic wage gap has also been pointed out by Horbath (2008). The size of the locality contributes 3.9%, suggesting that if indigenous people living in rural areas had access to the same type of jobs as in urban areas, the wage gap would decrease by that percentage. The employment contract has a relevance of 10.5%. Since most indigenous people work without an employment contract, this element contributes positively to widening the wage gap.

The type and size of the company contribute to the existence of the gap. If indigenous people worked in public and large companies in the same proportion as workers in the opposite group, the wage gap would close to 1.0% and 1.4%, respectively. Gender is not as relevant in explaining the wage gap. This is because the proportion of men and women in both groups of workers is similar, but above all, because in these two groups, discrimination based on indigenous self-designation is superimposed on gender. Hours worked per week, which has a negative sign, contributes to closing the wage gap by 4.5% because indigenous people work on average more hours per week. Experience squared influences the gap with 1.8%, suggesting that wage depreciation is faster in the indigenous population and contributes to widening the wage gap over time. Experience contributes to closing the wage gap by 2.9%, essentially because of the greater work experience of indigenous people.

Schooling is the third most relevant element in explaining the ethnic wage gap because, on average, the indigenous population has fewer years of education. If both groups of workers had the same level of education, the gap would decrease by 13.7%. Nevertheless, in this statistical experiment, the disadvantages in education as a cause of the gap are of little relevance to the influence that the regional distribution of the population and the non-existence of an employment contract may exert. They suggest that the indigenous population's acquisition of skills and abilities in the Mexican labor market is insufficient to close the existing gap. Rather, the focus should be on the conditions under which this population group works, which could be affected by a phenomenon of discrimination.

Figure 5 shows the breakdown of the unexplained part of the gap, which constitutes the set of unobservable factors commonly associated with discrimination.

[11]According to the ENOE classification of activities, elementary and support activities include: Support work in agriculture, forestry, fishing and hunting; Support work in mining, construction and industry; Assistants to transport drivers; Assistants in food preparation; Street vendors; Domestic workers and other cleaning work; Parcel workers and delivery workers; among others not classified.

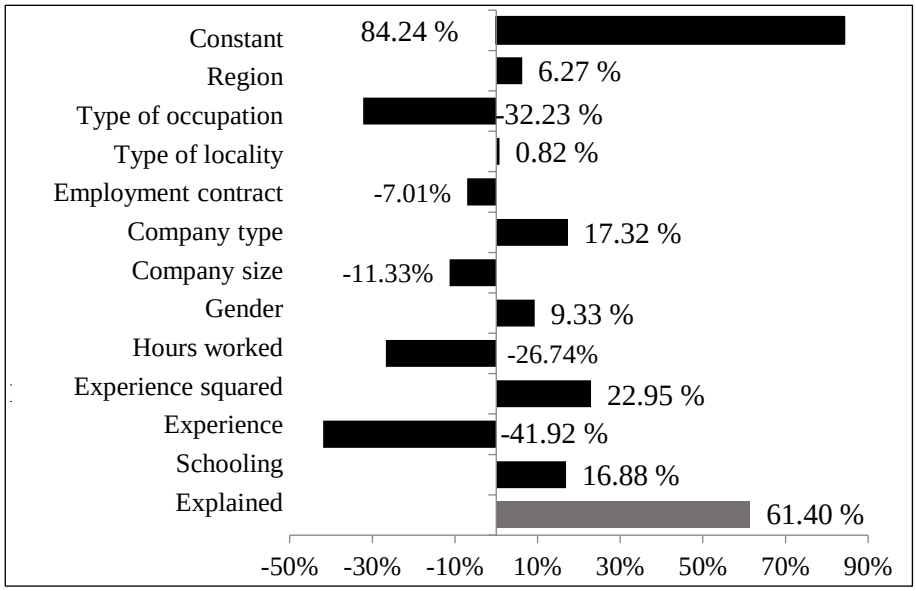

Figure 5. Breakdown of the unexplained part of the ethnic wage gap
Source: created by the authors with data from ENIGH (2018).

In general, it is observed that the productive capacities of indigenous people are underestimated, which favors the existence of the wage gap. Particularly, the contribution of schooling as an unobservable factor in the wage gap is 16.8%, suggesting that the labor market underestimates the knowledge indigenous people have acquired in educational institutions, but can this underestimation necessarily be attributed to discrimination? Probably not. Perhaps one element that could be considered as an explanation is that the quality of education tends to be undervalued in indigenous communities. Nevertheless, this is no more than a simple assumption since this topic is beyond the scope of this research.

Something similar occurs with experience squared and its contribution to the unobservable part of the gap (22.9%), which indicates a faster depreciation of wages in the indigenous population, perhaps because it is assumed a priori that their experience tends to depreciate faster than the rest of the workers due to the type of companies in which they are employed (17.3%). The contribution of the gender of indigenous workers to the unexplained part of the gap is also relevant (9.33%), indicating an element of discrimination against indigenous women.

Hypothesis testing

Is discrimination the main cause of indigenous workers obtaining lower wages than non-indigenous workers, or is there a difference in human capital endowments? As the decomposition of the ethnic wage gap showed, 61.4% is explained by observable differences between the two groups of workers, and the remaining 38.6% by factors not explained by the model, such as discrimination. One could hastily conclude that the existing gap results from indigenous people's inability to adapt to the conditions and demands of the labor market.

Nevertheless, considering that the percentage not explained by observable attributes in indigenous workers is very high (almost 40%), it can be answered that there is evidence that discrimination plays a very meaningful role in the current ethnic wage gap. This last statement is consistent with the empirical literature, where the existence of a significant ethnic discrimination phenomenon is also highlighted (Horbath, 2008; Aguilar-Rodríguez et al., 2018; Canedo, 2019; Arceo-Gómez & Torres, 2020).

Furthermore, the sociodemographic and work environment characteristics that were considered in the analysis of the explained gap show discriminatory behaviors in the labor market toward the indigenous population, such as lower returns to schooling and experience, occupational segregation, barriers to access to employment, and unfavorable working conditions. For example, when analyzing the type of occupation by group, it was observed that even though indigenous people earn, on average, a lower salary in any occupation, the best-paid activities for them employ a very small percentage of indigenous workers.

In the case of occupations with a defined employment contract and access to social benefits, it was observed that indigenous people are more frequently hired without these rights, which is a discriminatory act. This, in addition to reflecting negatively on their wages, has serious repercussions on their quality of life, suggesting that the discrimination faced by this population group influences the level of poverty and marginalization in which they live. The analysis of discrimination based on indigenous status among workers is not limited to the unexplained percentage of the gap but also to statistical analysis and econometric estimations, which showed that discrimination may be the main cause of wage differences in the indigenous population.

Conclusions

Although the existence of significant wage gaps between different groups of the Mexican population has been documented, public attention is mainly focused on gender gaps. Nevertheless, there are wage gaps

associated with the ethnic origin of workers, which are wider and present very worrying features of discrimination. The indigenous population, far from being the pride and symbol of Mexico's cultural identity, is a population group that currently suffers discrimination and social exclusion. The data presented in this research show that indigenous workers earn much lower salaries than the rest of the population, which in part contributes to their living in conditions of poverty.

The statistical sample analysis enabled the observation that indigenous people have, on average, fewer years of schooling and more years of work experience because they enter the labor market at a younger age. The precarious work situation faced by workers who identify themselves as indigenous was also observed. The data show that 64% of indigenous people in paid work do not have a contract to formalize their employment (in the opposite group, the percentage is 51%). As a consequence of this situation, 59% of indigenous workers do not have access to social security, and in general, 48% of them do not have access to any benefits in their work (the corresponding data for the opposite group are 47% and 40%).

When comparing the average monthly wage by type of occupation and ethnic affiliation, it was found that indigenous workers receive a lower average wage in all the occupations analyzed. When analyzing the average monthly income by region, it was observed that the center south region is the most unequal for indigenous workers. A very important element in the data is that indigenous workers earn less even with the same level of schooling. This disadvantage is repeated in almost all educational levels considered. When estimating the ethnic wage gap, its adjustment for bias, and its decomposition, it was observed that there is a wage difference of 36.3% toward indigenous workers between both groups. Of this difference, 61.4% is explained by human capital and other sociodemographic characteristics, while 38.6% is attributed to other elements not observed in the model, such as discrimination.

When analyzing the individual contributions of each sociodemographic and labor characteristic to the explained part of the ethnic wage gap, it was observed that the distribution of the population by region (19.3%), type of occupation (17.3%), years of schooling (13.7%), and employment contract (10.5%) together explain 60% of the difference against the indigenous population. When discounting the contribution of education and experience, the explained gap decreases by 10.8 percentage points to 44.8%. This statistic suggests that the effect of human capital on the reduction of the explained wage gap is minuscule because the underlying problem lies in the types of jobs and the conditions in which indigenous workers work.

In addition to the above, it was found that the part not explained by the observable characteristics of the indigenous population and therefore attributed to discrimination is quite high (38.6%). Hence, it is concluded that economic discrimination against the indigenous population is the main factor causing their low wages. The solution to this problem should consider not only policies that affect the labor supply of

this group but also the demand for labor since, as noted, a large part of the inequality suffered by indigenous people is found in the unequal conditions in which they work.

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