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# Gender wage gap in the formal and informal sector in the COVID-19 crisis period, of the national labor market and the state of Coahuila

# Brecha salarial por género en el sector formal e informal en el periodo de crisis COVID-19, del mercado laboral nacional y del estado de Coahuila

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**Abstract**

One of the Sustainable Development Goals of the 2015-2030 agenda establishes guaranteeing equal remuneration between women and men for work of equal value. This objective is taken up in the 2018-2024 nation project for Mexico. In the project, the Federal Government aims to eliminate inequality gaps between women and men, as well as the obstacles that women face in all areas. The objective of this research is to estimate the Gender Wage Gap in the formal and informal sector of the labor market of the country and the state of Coahuila in the period of the COVID-19 crisis, to observe the trend of wage differences in the period 2019 – 2022. Mincerian wage equations (1974) were estimated for each gender with data from the National Occupation and Employment Survey (ENOE), for subordinate workers. The variables considered the sector in which the employee works and the condition of the working day. The Gender Wage Gap was estimated using the Blinder and Oaxaca (1973) methodology, with selection bias correction (Heckman, 1979). It was observed that the Gender Wage Gap in the context of crisis generally tended to close, this was because in the formal and informal sector the salary difference for women tended to decrease in 2020, while in 2022, during the economic recovery the Gender Wage Gap returned to the parameters of 2019 both nationally and in the state of Coahuila.

**Wage Gap, Formal and Informal Sector, Crisis Periods**

**Resumen**

Uno de los Objetivos de Desarrollo Sostenible de la agenda 2015-2030 establece garantizar la igualdad de remuneraciones entre mujeres y hombres por un trabajo de igual valor, dicho objetivo se retoma en el proyecto de nación 2018-2024 para México. En el proyecto el Gobierno Federal se propone eliminar las brechas de desigualdad entre mujeres y hombres, así como los obstáculos que enfrentan las mujeres en todos los ámbitos. El objetivo de esta investigación es estimar la Brecha Salarial por Género en el sector formal e informal del mercado laboral del país y del estado de Coahuila en el periodo de crisis COVID-19, para observar la tendencia de las diferencias salariales del periodo 2019 – 2022. Se estimaron ecuaciones salariales mincerianas (1974) para cada género con datos de la Encuesta Nacional de Ocupación y Empleo (ENOE), para trabajadores subordinados. En las variables se consideró el sector en el que labora el empleado y la condición de la jornada laboral. Se observó que la Brecha Salarial por Género en contexto de crisis en general tendió a cerrarse, esto se debió a que en el sector formal e informal la diferencia salarial para las mujeres tendió a disminuir en el año 2020, mientras que en el año 2022, durante la recuperación económica la BSG regresó a los parametros del año 2019 tanto a nivel nacional y en el estado de Coahuila.

**Brecha Salarial por Género, Sector Formal e Informal, Periodos de Crisis**

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## 1. Introduction

The Sustainable Development Goals (SDGs) of the 2015-2030 agenda, also called Global Goals, set out goals covering the economic, social and environmental spheres, where the fifth goal proposes to achieve gender equality and empower all women and girls, The fifth goal proposes to achieve gender equality and empower all women and girls through sound policies that support women's effective participation and equal opportunities for leadership, improve the use of information and communications technology to promote women's empowerment, promote shared responsibility in the home and family, and end all discriminatory practices, among others.

The eighth goal aims to promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all, to be achieved by ensuring equal pay for women and men for work of equal value, through equal opportunities for women and girls in employment, leadership and decision-making at all levels, and to eliminate discrimination and violence against women and girls (United Nations, 2018).

These objectives are taken up in the 2018-2024 project of nationhood for Mexico, where the federal government's inclusive project proposes to eliminate the inequality gaps between men and women, as well as the obstacles faced by women in all areas to advance their physical, economic and political autonomy (López Obrador 2018).

Empirical evidence exposes the existence of GPGs and helps to explain their increase or decrease based on structural or conjunctural changes; in this study it will be approached from the conjunctural approach by carrying out an analysis of economic crises.

Economic cycles have different impacts depending on their phase, which affect men and women unequally in terms of unemployment rates, allocation of temporary or part-time contracts and wage setting, in the face of changes in the economic situation.

In the crisis stage, there is a loss of household purchasing power and this is a reason that encourages the participation of more women in the labour market; and according to the characteristics of the economy under analysis, pro-cyclical and counter-cyclical impacts are observed in the GPG (Murillo and Simón, 2014; Peña-Boquete, 2014; Rodríguez, Ramos and Castro, 2017; and Castro, Rodríguez and Brown, 2018).

Throughout the 20th century, a decline in gender disparity in employment, earnings and occupations was observed, with a particularly notable reduction in the 1980s. However, it is questionable whether this gap will continue to narrow until it disappears completely; this uncertain trend is likely to be related to the gender gap in the amount of time spent on childcare and household responsibilities (Goldin, 2008).

In that sense, the objective of this research is to estimate the Gender Wage Gap in the formal and informal sector of the labour market in the country and the state of Coahuila in the COVID-19 crisis period, in order to observe the trend in wage differentials for the period 2019 - 2022.

Mincerian wage equations (1974) were estimated for each gender with data from the National Occupation and Employment Survey (ENOE), for subordinate workers. The variables considered the sector in which the employee works (formal or informal) and the condition of the working day (full or part-time).

The Gender Wage Gap was estimated using the methodology of Blinder and Oaxaca (1973), with selection bias correction (Heckman, 1979).

It was observed that the Gender Wage Gap in the context of crisis in general tended to close, this was due to the fact that in the formal and informal sector the wage gap for women tended to decrease in the year 2020, while in the year 2022, during the economic recovery the GPG returned to the parameters of the year 2019 both at the national level and in the state of Coahuila.

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This underlines the importance of generating reliable information that allows policy makers to regulate the labour market to provide jobs in conditions of gender equity International organisations have established their commitment to gender equality at global and local levels; therefore, the study of gender pay inequality has become relevant in academic, political and social work.

In the following, the background to the research problem is presented, followed by the methodology used for the estimations, results and conclusion.

## 2. Background

The gender pay gap has been studied in Mexico for more than 30 years, with different databases and methodologies, and it has been found that the behaviour of the phenomenon is temporally dynamic, as it manifests itself by reducing or widening according to the economic events that occur.

The neoliberal structure of the reforms caused the economic changes in developed countries to have globalised effects that impacted other countries to varying degrees, depending on their degree of integration. During periods of crisis, countries are exposed to adverse conditions in relative magnitudes in labour markets, such as increased unemployment rates, growth of temporary and part-time jobs, and declining real wages which in turn lead to a loss of purchasing power of household income. Consequently, crises are a reason for the incorporation of women into the labour market in the face of economic instability.

Therefore, it is of interest to know what is the behaviour of the GPG in times of economic crisis and what is the impact of recessions on the GPG? For this purpose, the decomposition of wages by gender contributes to understanding the movements in the GPG in the face of changes in the economic cycle, with a focus on recessions. In this respect, there is no theoretical basis to support the behaviour of the GPG in this area, or, alternatively, sufficient empirical evidence to support the results of the studies presented (Murillo and Simón, 2014; Peña-Boquete, 2014; Rodríguez, Ramos and Castro, 2017; and Castro, Rodríguez and Brown, 2018).

In order to study the effect of recessions on the GPG, research compared estimates from a period of crisis versus a period of economic boom (Aláez and Ullíbarri, 2001; Domínguez and Brown, 2013; Murillo and Simón, 2014; Rodríguez, Ramos and Castro, 2017; and Castro, Rodríguez and Brown, 2018); and agreed that in periods of crisis real wages tend to decrease and there is a loss in the purchasing power of households (Aláez and Ullíbarri, 2001; Domínguez and Brown, 2013; Murillo and Simón, 2014; Rodríguez, Ramos and Castro, 2017; and Castro, Rodríguez and Brown, 2018); Finio, 2010; Domínguez and Brown, 2013; Murillo and Simón, 2014; Peña-Boquete, 2014; Rodríguez, Ramos and Castro, 2017; and Castro, Rodríguez and Brown, 2018), a situation that causes women to decide to join the labour market to compensate for the reduction in household income, and this possibly leads to the closure of the BSG.

Moreover, if women are employed in greater proportion in economic sectors that are more exposed to the impacts of the crisis, it would be expected that women's wages would be affected in greater proportion and the gap would tend to increase; but if men are concentrated in activities with greater sensitivity, then men's average wages would be reduced and consequently the GPG as well (Finio, 2010; Peña-Boquete, 2014; and Rodríguez, Ramos and Castro, 2017; and Castro, 2017).

With reference to the increase in temporary or part-time work, it is argued that women are more likely to engage in flexible working time activities and in times of crisis they would be expected to be less affected in terms of wages and unemployment, but the effect is not entirely clear; On the one hand, the GPG is likely to decrease at a time when unemployment affects men's working hours and wages significantly; and on the other hand, if the increase in the share of women's part-time jobs puts significant downward pressure on average wages, the GPG would widen.

To conclude the study of the GPG under the more fundamental crisis approach, it is recommended to investigate the business cycle in order to have a wider scope of results.

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The economic cycle has different impacts on the availability of jobs and the wages set, which affect men and women differently in terms of an unequal position in employment in the face of changes in the economic climate (Finio, 2010; Murillo and Simón, 2014; Peña-Boquete, 2014; and Castro, Rodríguez and Brown, 2018).

It is established that when measuring the impact of the economic cycle, a long period of time should be taken into account in order to contrast the effects of the stages of the cycle and compare the behaviour of the GPG when there are periods of growth or crisis (Finio, 2010).

Two possible effects of the crisis on the GPG were proposed, for which there is no consensus in the empirical evidence, as the GPG changed according to the characteristics of the labour market in question, resulting in pro-cyclical and counter-cyclical impacts. According to the counter-cyclical impact, it is argued that in periods of crisis women are more affected than men because unemployment is positively related to the creation of temporary or part-time jobs, which are occupied in greater proportion by women, and consequently the GPG widens. In this case, women have a higher inelastic supply curve in downturns, as their relative share of temporary or part-time jobs increases, putting downward pressure on their average wages (Domínguez and Brown, 2013; and Murillo and Simón, 2014).

On the contrary, in line with pro-cyclical behaviour in the downturn stage of the cycle there is a tendency for the GPG to fall, at a time when the share of part-time and temporary jobs held by men increases at a faster pace than that of women, given that the average wages of temporary workers are lower. The fact that men possess a more inelastic labour supply curve with respect to women is posited, as in this situation men would prefer to keep their jobs, even if the crisis affects their pay (Finio, 2010; Peña-Boquete, 2014; Rodríguez, Ramos and Castro, 2017; and Castro, Rodríguez and Brown, 2018).

The empirical evidence showed three positions, counter-cyclical, pro-cyclical and neutral BSG behaviour, without having an argument that generalises the effects.

On the other hand, in the context of crisis it should be taken into consideration that in the formal and informal sector the GPG has differentiated behaviour.

In the process of globalisation, governments are deregulating labour markets, promoting labour reforms with new contracts that incorporate more flexibility and facilitate subcontracting, informal jobs or working from home (Domínguez and Brown, 2013). In this regard, in a period of crisis, the question arises: In which segment of the labour market is there more GPG, formal or informal?

According to the literature, one way to identify formal jobs is to classify workers who enjoy social benefits provided by the state, through quotas contributed by the workers, while informality consists of workers who do not have an employment contract, benefits, social security, unemployment insurance or pension plan (Domínguez y Brown, 2013; Popli, 2013; y Rodríguez, Ramos y Castro, 2017). Few studies have analysed the GPG in terms of market segmentation (Domínguez and Brown, 2013; Popli, 2013; and Rodríguez, Ramos and Castro, 2017), although other studies have estimated the effect of formality on the earnings function (Pagán and Ullíbarri, 2000; and Ñopo, Daza, and Ramos, 2012).

Subcontracting jobs generate flexible employment opportunities, so women have the opportunity to enter paid employment at a higher rate or can work from home without neglecting household responsibilities (Domínguez and Brown, 2013; Popli, 2013; and Meza, 2018). Thus, compared to men, women tend to be more concentrated in firms in the informal segment of the economy (Pagán and Ullíbarri, 2000), and are characterised by lower human capital, lower wages and higher GPG (Pagán and Ullíbarri, 2000; and Rodríguez, Ramos and Castro, 2017), with the unexplained part of the wage differential affecting their remuneration to a greater extent (Pagán and Ullíbarri, 2000).

In summary, we highlight the absence of studies that address the GPG based on labour market segmentation, with the aim of enriching the empirical evidence to support the development of public policy to protect workers in the informal segment.

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The empirical evidence shows that crisis periods, and public and private sector approaches, have mechanisms that affect the GPG differently, in some cases tending to increase it and in others encouraging closure. Therefore, it is of interest to investigate the percentages of GPG prior to the COVID-19 crisis period and post-crisis.

## 3. Methodology

A non-experimental research is carried out, with application of the quantitative method, descriptive and correlational design, in which the mean values of labour participation by gender and GPG are presented.

To obtain the wage gap, a Mincerian equation is estimated using OLS, in which the average returns to human capital endowments for each gender are measured (Mincer, 1974). This theory establishes that the higher the level of human capital, the higher the expected income; then, the wage gap by gender is measured using the Oaxaca-Blinder technique (1973) and the selection bias is corrected with the Heckman command (1979).

The database used was the microdata from the National Occupation and Employment Survey (ENOE, 2019, 2020 and 2022), the third quarter was taken as the most stable in terms of staff turnover and the target population is composed of subordinate salaried workers, aged 15 to 70 years. The following variables were selected from the survey:

- Gender: the variable is classified into male and female, defined by the sex of the respondent (proxy variable).
- Gender: the proxy variable sex of the survey was considered, men are assigned the number one and women two, with this variable the gender is classified in the models.
- Age: variable with consecutive values from 15 to 70 years.
- Logarithm of hourly wage: variable defined according to hourly income, due to the fact that workers have different working hours per month, and by means of this variable the calculation of wage inequality is objective; the natural logarithm of income variable was created, based on hourly income.
- Education: Consecutive variable defining years of formal education.
- Experience: Consecutive variable capturing years of work experience.
- Diminishing returns to experience: Consecutive variable that captures the square of the years of work experience and defines the negative return to human capital.
- Marital status: This variable is constructed in a dichotomous way, married people were assigned a value of one and the rest were given a value of zero, in order to measure the contribution of married marital status to income.
- Zone of residence: this variable takes into account the number of inhabitants per locality and was created in a dichotomous way by assigning a value of one to individuals belonging to localities with more than 15,000 inhabitants and zero to those belonging to localities with up to 14,999 inhabitants; this criterion was taken from the ENOE survey. The area variable assumes that belonging to an urban area increases the individual's wage, this is attributed to the externalities generated by this environment.
- Working hours: this is constructed as a dichotomous variable based on the length of the working week as defined in the ENOE survey; workers who worked up to 39 hours per week were classified as half-time and were given a value of zero, while those who worked 40 to 72 hours per week were assigned a value of one, this being the full working day; with the intention of estimating the contribution to wages according to the allocation of working hours and to know if this variable affects the earnings of women, since they occupy more part-time positions.

The wage equation model for each gender is defined as follows:

$$Lny_i^G = \beta_0^G + \beta_1^G Edu^G + \beta_2^G Exp^G + \beta_3^G Exp^{2\,G} + \beta_4^G Civ^G + \beta_5^G Zon^G + \beta_6^G Lab^G + \varepsilon^G \quad (1)$$

Subsequently, it is possible to employ the decomposition of the wage differential with the Oaxaca-Blinder (O-B) command developed by Jann Benn (2008), with selection bias correction with the Heckman command, in the STATA statistical package; to determine the amount of the earnings gap that corresponds to differences in human capital endowments, as well as the unexplained part that is attributable to existing labour market discrimination towards women.

## 4. Results

This section presents the average values of labour participation by gender and the results of the OLS wage equation models and their decomposition with the B-O methodology (Blinder, 1973, and Oaxaca, 1973) and the Oaxaca command in Stata (Jann, 2008) for Mexico for the years 2019, 2020 and 2022. The objective of this application is to identify the effect of shocks on wages by gender and the GPG, in order to understand the behaviour of labour participation by gender in the formal and informal economic sectors and how it impacts on wage inequality.

As a first point, labour participation by gender is presented (Table 1), in the year 2019 an average participation of 39 per cent in subordinate women was observed at the national level; in contrast, in the same year for the state of Coahuila female participation in the labour market was 37.5 per cent overall, i.e., lower than the national percentage by 2 per cent. When reviewing this criterion by economic sector, the percentage of female labour participation is higher in the informal sector, as was assumed, as well as a higher female participation in part-time work.

The percentages of women's labour participation in 2020 reported changes in values as a result of male unemployment in formal and full-time activities, resulting in a decrease in the percentage of women's participation in the informal sector and part-time work, although it does not necessarily mean that the number of women in these working conditions has decreased, but rather that due to the context of economic recession, men who for some reason lost their formal and full-time jobs, have had the need to be employed in informal or part-time jobs, this situation in both regions, nationally and for the state of Coahuila.

Subsequently, in 2022, in a post-pandemic and economic recovery context, labour participation by gender returned to proportions similar to those of 2019 and in some cases the same, both nationally and for Coahuila. What does the above behaviour of labour participation by gender mean? It shows that in crisis contexts, the proportion of women employed in the formal sector increases, due to the dismissal of men from their formal jobs and their entry into informal activities, on the one hand.

In addition, women who were outside the economically active population need to enter the labour market to support their households' economy.

In summary, crises affect the dynamism of labour participation by gender by encouraging women to enter the labour market, although, once the economic situation improves, female labour participation returns to prevailing informal and part-time jobs.

| | 2019 | | | | 2020 | | | | 2022 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | National | | Coahuila | | National | | Coahuila | | National | | Coahuila | |
| | Man | Women | Man | Women | Man | Women | Man | Women | Man | Women | Man | Mujer |
| General | 60.9 | 39.1 | 62.5 | 37.5 | 60.2 | 39.7 | 62.3 | 37.6 | 59.9 | 40.1 | 62.1 | 37.9 |
| Formal | 61.0 | 39.0 | 64.0 | 36.0 | 58.4 | 41.6 | 61.8 | 38.1 | 61.0 | 39.0 | 63.5 | 36.5 |
| Informal | 60.7 | 39.3 | 57.8 | 42.2 | 64.4 | 35.5 | 65.3 | 34.6 | 59.0 | 41.0 | 57.9 | 42.1 |
| Full Day | 61.7 | 38.3 | 63.4 | 36.6 | 65.1 | 34.8 | 65.9 | 34.1 | 60.3 | 39.7 | 62.9 | 37.1 |
| Half Day | 46.9 | 54.1 | 41.1 | 58.9 | 46.9 | 53.0 | 52.1 | 47.8 | 45.2 | 54.8 | 41.9 | 58.1 |

**Table 1** Labour participation by gender in 2019, 2020 and 2022 (figures expressed as percentages)
*Source: Own elaboration with data from the ENOE 2019, 2020 and 2022 survey, from INEGI*

On the other hand, regarding the analysis of the parameters of the Gender Wage Gap (Table 2), the GPG was estimated for the country and the state of Coahuila, with the intention of comparing the phenomenon for the two regions.

| | 2019 | | 2020 | | 2022 | |
|---|---|---|---|---|---|---|
| | National | Coahuila | National | Coahuila | National | Coahuila |
| General | 3.2 | 4.3 | -1.4 | 0.08 | 3.7 | 4.8 |
| Formal | 2.0 | 8.3 | 0.5 | -0.1 | 4.5 | 4.5 |
| Informal | 3.5 | 7.2 | 1.0 | 5.0 | 1.9 | 2.4 |
| Full Day | 6.3 | 13.9 | 6.1 | 5.9 | 6.7 | 14.3 |
| Half Day | 3.9 | 1.5 | -3.2 | 4.3 | 0.3 | 0.8 |

**Table 2** Gender Pay Gap in 2019, 2020 and 2022 (figures expressed as percentages)
*Source: Own elaboration with data from the ENOE 2019, 2020 and 2022 survey, from INEGI*

The behaviour of the GPG in the period stands out, as its percentages tended to close in 2020 in a context of crisis and subsequently expanded again in 2022, during the period of reactivation of activities and economic recovery.

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In the overall estimate for the year 2020 in the country, it was observed that the percentage of GPG was negative, i.e. a disadvantageous gap towards the male gender was estimated. This means that women's wages were slightly higher than men's and the difference was counted in negative parameter. In the same year in Coahuila, the gap was practically closed in the general and formal sector estimation, although in full-time jobs there was almost a 6 per cent gap, a situation that was accentuated in the year 2022, as a 14.3 per cent wage gap was estimated in full-time jobs to the detriment of women's earnings. In other words, women employees in general are affected in their wage income, however, the International Labour Office (2018) agrees with the statement that women employed in part-time jobs are less affected in their hourly earnings compared to those in full-time jobs.

## Conclusions

The gender pay gap in Mexico is a phenomenon that has narrowed over time, and research for the country agrees that the central factor in the narrowing of the gap is the increase in women's average education, resulting in greater opportunities in the labour market; however, a substantial part of the GPG remains unexplained.

On the other hand, it is argued that crisis periods tend to reduce the gap because overall average wages are pushed down and tend to level off with those of women, but there is no consensus on this. Similarly, labour market segmentation infers that the GPG tends to increase, as women seek flexible jobs that are more often obtained in the informal market with lower average wages and no benefits.

With the review of empirical evidence and the estimates made, it is shown that the GPG tends to decrease, but it persists and the reason for its existence cannot be fully justified.

Based on the above arguments, public policy recommendations focus on reducing the differences in the professional growth and performance of individuals in the labour market regardless of gender.

A key element is the improvement in the coverage and quality of education in the country, because the higher the level of education, the better opportunities and salaries for women in the labour market. Specifically, professional education provides women with negotiation tools that help to reduce the GPG, eliminate the glass ceiling and denounce acts of gender discrimination, which guarantee their professional development.

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