

# Migration And Female Labor Market: Post-Border Opening Analysis 2023 In San José De Cúcuta

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## Abstract

*This study analyzes the impact of the reopening of the Colombia-Venezuela border in 2023 on the female labor market in San José de Cúcuta, a region characterized by high human mobility and structural inequalities. Through a quantitative, descriptive-correlational approach and a synthetic control model, indicators such as the female unemployment rate, labor force participation, and average income were examined. The results reveal a complex labor environment. After the reopening, female unemployment fluctuated between 10% and 15%, with an ATE of -0.054, while labor force participation reached 44.3%. However, labor informality (65%) and wage gaps persist, affecting both locals and migrants. Migrant women face additional barriers, such as a lack of educational certification and work experience, which hinder their access to formal employment. The synthetic control analysis concludes that, although the female unemployment rate tended to decline in 2023, it experienced a slight increase in 2024, remaining in double digits. Employment competition, exacerbated by migratory flows, has limited opportunities for women. It is concluded that the reopening has not improved their working conditions, highlighting the need for comprehensive policies to promote gender equity and socio-economic inclusion.*

**Keywords:** Migration, Female labor market, Gender inequality, Colombia-Venezuela border, Socioeconomic inclusion.

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## Introduction

The border interaction between Colombia and Venezuela has generated profound changes in San José de Cúcuta, impacting both the local population and migrants seeking better opportunities. This transformation scenario has particularly affected the female labor market, where challenges such as unemployment and gender inequality persist. The reopening of the border in 2023 presents a unique opportunity to assess the economic and social consequences in a region characterized by high human mobility and complex economic structures.

According to economic theory, external events, such as the reopening of borders, influence the labor market through alterations in key indicators such as unemployment, labor market participation, and wage differences. These shocks generate adjustments in the supply and demand of labor, especially impacting the most vulnerable groups, such as women and migrants. In this sense, the analysis of these indicators allows us not only to understand the immediate effects, but also to identify medium-term patterns in terms of inclusion and equity.

The labor market also reacts to structural shocks, such as technological advances, that modify the demand for skills. According to Autor, Levy, and Murnane (2013), these changes have reduced the need for repetitive manual work, while increasing the demand for cognitive skills, accentuating labor polarization. These types of shocks tend to be more noticeable in economies dependent on activities vulnerable to automation, which increases labor challenges in regions such as San José de Cúcuta.

The impacts of these shocks are not uniform and affect certain groups, particularly women and young people, with greater intensity. The International Labour Organization (ILO, 2021) stresses that recent global crises, such as the COVID-19 pandemic, have disproportionately affected women due to their greater

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representation in more vulnerable and less protected sectors of the workforce. This highlights structural inequalities in the labour market.

In the existing literature, the complexity of labor transitions in contexts of high migration has been highlighted. Previous studies indicate that, in situations of external shocks, the most vulnerable groups, such as migrant women, tend to face higher rates of unemployment and greater labor informality due to factors such as discrimination, lack of accreditation of skills, and market segmentation (Rodríguez & Pérez, 2022; Vargas et al., 2023).

At the international level, research in other border regions has shown that opening borders can have positive effects on economic growth, but it does not always guarantee improvements in gender equality or job quality.

On the other hand, the Labor Segmentation Theory, proposed by Reich, Gordon, and Edwards (1975), explains the existence of wage inequalities and unfavorable working conditions by segmenting the market into different strata with varying characteristics in terms of wages, working conditions, and benefits. Workers tend to stay in a specific sector throughout their careers (Reich et al., 1975). In the context of migration, women are often concentrated in more precarious and lower-paid jobs due to gender norms and labour structures, such as informal employment.

As for the congruence of the jobs that migrants have with respect to their skills, it can be observed that, due to the urgency they feel to integrate into the labor market, it is likely that they accept working conditions that do not meet adequate standards or correspond to their level of qualification and experience. In the medium term, this situation can lead to problems of dissatisfaction and instability. In this context, it can be deduced that, despite the various difficulties associated with migration, the individuals in question manage to find employment in accordance with their skills and expectations. However, a significant part of them still do not consider that they have reached the job they are really looking for (González et al., 2021).

Despite the efforts made to adapt, migrant women face additional challenges that complicate their insertion into the labor market. They are often concentrated in lower-skilled jobs, such as domestic service and personal care, where working conditions are unfavourable and wages are low. This segregation in the workplace not only restricts their possibilities for professional growth, but also reinforces wage disparities compared to men, who tend to find employment in higher-paying sectors, such as construction and industry (Hernández & López, 2021).

Although female labour market participation rates have increased in recent years, there are still significant barriers to equality in the workplace. Occupational segregation, both horizontal and vertical, remains a matter of concern, as women are overrepresented in low-income sectors, such as care and health services, while men dominate in more lucrative areas, such as construction and technology (Eurofound, 2021). This unequal distribution not only harms the quality of employment available to women, but also makes them more vulnerable to the emotional demands of work and limits their access to vocational training in fields where they might excel.

Likewise, wage inequality continues to be a relevant problem, since women in the European Union earn, on average, 16% less per hour than their male colleagues. This difference can translate into up to 6,000 euros less per year in countries such as Spain, reflecting both a wage gap and a "glass ceiling" that prevents women from reaching leadership positions on equal terms (Instituto de la Mujer, 2020). Motherhood also negatively affects women's labor force participation, resulting in significantly lower employment rates among those with children compared to men in similar circumstances. This highlights the need for public policies that promote greater co-responsibility in family care, including equitable paternity leave and accessible childcare services (UN Women, 2021).

In addition, the absence of social support networks in destination countries aggravates the situation of many migrant women, who often feel isolated and vulnerable, especially those without regular migration status. It is essential that public policies are adapted to address these challenges effectively. Public employment services can play a critical role by providing targeted training and opportunities to recognize skills acquired abroad, which would allow them to access better jobs and fairer working conditions (Economic Commission for Latin America and the Caribbean [ECLAC], 2021).

Public employment services (PES) have an essential role to play in promoting gender equality. Implementing initiatives that offer training in traditionally male sectors, as well as making working hours more flexible and providing support to women in vulnerable situations, is crucial to facilitate their economic integration. Successful examples, such as the "Women4IT" programme in Latvia, which promotes female participation in the ICT sector, illustrate how meaningful opportunities can be generated for women in the workplace (European Commission, 2020). However, a more comprehensive and gender-sensitive approach to employment policies is needed to address existing inequalities and promote genuine inclusion in the labour market.

As one examines the background related to migration and its impact on the female labor market, especially in San José de Cúcuta, it is evident that the challenges and opportunities faced by migrant women are multifaceted and deeply interconnected with economic, social, and cultural factors.

San José de Cúcuta, being a border city with Venezuela, has become a nerve center of migration and an ideal scenario to analyze the transformations in the labor market based on various economic and social dynamics. In this regard, it is important to note that, in recent years, the city has faced a number of challenges and opportunities, especially with regard to gender, migration and the labour market. Labor participation and unemployment rates in Cúcuta and its metropolitan area, during the mobile quarter from June to August 2022, reached an unemployment rate of 11.8%. This represents a decrease of 4.3% compared to the same period of the previous year, placing Cúcuta in twelfth place in the national ranking.

As for the most relevant economic activities, the manufacturing and trade sectors stand out, as well as vehicle repair, which cover a considerable portion of the employed population. Specifically, trade and automotive repair represent 25.5% of the employed population, while the manufacturing industry reaches 12.8% in the analysis corresponding to the year 2022. (Cámara de Comercio de Cúcuta, 2022)

San José de Cúcuta, with a diverse population and a complex socioeconomic context, has been particularly affected by border dynamics. According to recent data, the region faces significant challenges in terms of poverty and employment, with an overall unemployment rate of 15% in 2022 and a high incidence of informal work, especially among women and migrants (DANE, 2023). These figures reflect the structural difficulties of the local labour market, which are exacerbated by migratory pressures and gender inequality.

The objective of this study is to analyze the impact of the recent reopening of the border on the female labor market in San José de Cúcuta, providing empirical evidence and formulating relevant public policy recommendations both for the region and for other similar border contexts. This analysis is particularly significant, as it examines the specific effects of the reopening on gender and employment dynamics, and on the other, it offers a comprehensive view of the situation of the female labour market. This seeks to foster academic and policy discussions that promote inclusion and equity in environments characterized by high human mobility. In this way, it aspires to contribute to the design of more effective strategies adapted to local realities, with the potential for replicability in regions with similar conditions.

In addition, the research underscores the importance of studying the female labor market in San José de Cúcuta, a unique space marked by its border economy and inherent social complexities. The analysis reveals that women, both local and migrant, face significant barriers to accessing formal employment, forcing them to enter informal sectors or occupy low-skilled positions. In the case of migrant women, this problem is intensified due to additional obstacles such as the lack of recognition of their credentials and previous work experience, which limits their opportunities in the formal market.

The importance of this research lies in its ability to identify labor gaps from a gender and migration perspective, as well as in its contribution to the design of strategies that promote inclusion and equity in employment. The findings highlight that opening the border, while presenting economic opportunities, has failed to significantly reduce the female unemployment rate and existing disparities. This context underscores the need for a comprehensive approach that addresses not only labor inclusion, but also the promotion of gender equity and the integration of migrant women into the local economy.

By analyzing the situation of the female labor market from a multidimensional approach, this paper provides relevant inputs for various actors. The recommendations aimed at governments, universities and companies seek to articulate efforts to generate a more inclusive and equitable labor ecosystem. With this, a roadmap is established that could serve as a model to face labor challenges in other regions with border dynamics or high migration, promoting economic and social sustainability.

### *Context San José de Cúcuta*

San José de Cúcuta, being a border city with Venezuela, has become a nerve center of migration and an ideal scenario to analyze the transformations in the labor market based on various economic and social dynamics. In this regard, it is important to note that, in recent years, the city has faced a number of challenges and opportunities, especially with regard to gender, migration and the labour market.

**Table 1. Labor Indicators City of Cúcuta Cut August 2022**

LABOR INDICATORS						
Cúcuta A.M (%)				Colombia* (%)		
	2021	2022	Var (p.p)	2021	2022	Var (p.p)
Global Participation Rate	62,3	61,9	0,4	61,3	63,5	2,2
Occupancy Rate	52,2	54,6	2,4	53,4	56,7	3,3
Unemployment Rate	16,1	11,8	-4,3	12,9	10,6	-2,3

Note: Var (p.p): Change in percentage points

Source: Authors' elaboration based on the economic observatory of the Chamber of Commerce of Cúcuta.

During the mobile quarter from June to August 2022, Cúcuta and its metropolitan area reached an unemployment rate of 11.8%, which represents a decrease of 4.3% compared to the same period of the previous year. This placed the city in twelfth place nationally. In terms of economic activities, trade and vehicle repair accounted for 25.5% of the employed population, while the manufacturing sector accounted for 12.8%, standing out as key sectors for employment in 2022 (Cúcuta Chamber of Commerce, 2022).

Between 2022 and 2023, employment in Cúcuta showed significant momentum thanks to the trade sector, which generated approximately 15,000 new positions. Other sectors such as accommodation, food services, public administration, education and health also contributed significantly, creating around 12,400 jobs. According to the National Planning Department (DNP), real estate activities and accommodation and food services led employment growth, with annual increases of 22.0% and 21.2%, respectively.

However, some sectors experienced significant job losses. Artistic activities, industry, construction, transportation and storage registered a total decrease of 17,534 positions during the last year. In particular, the arts and entertainment sector suffered the largest decline, with a reduction of 7.5% compared to increases in other economic branches (DNP, 2023).

**Table 2. 2022-2023 Variation of Employed People by Economic Sector**

Economic Sector	Cúcuta	
	I-2023 vs I-2022	
	Job creation	Percentage change
Busy	17.145	4,3
Commerce	14.994	15,1
Accommodation and food services	6.319	21,2
Public Administration, Education and Health	6.045	13,8
Professionals and techniques	5.147	18,1
Real Estate Activities	839	22,0
Financial and Insurance Act	789	14,5
Information and communications	546	19,9
Transport and storage	-246	-0,7
Construction	-3.156	-8,6
Industry	-3.601	-5,9
Other branches	-4.314	-28,0
Artistic and entertainment activities	-6.217	-14,9

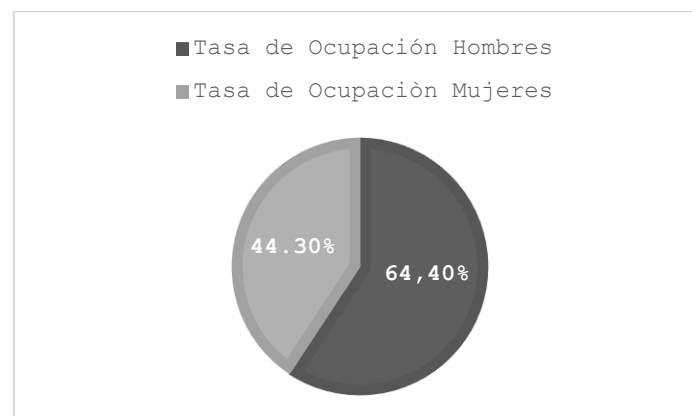
Source: own elaboration based on DNP 2023

In this context, female labor participation reflects a notable disparity in Cúcuta. As shown in Table 4, which presents the rates of unemployment, employment, and gender gaps, the difference in labor participation between men and women during the mobile quarter from December 2022 to February 2023 was 20%. In Cúcuta, the employment rate for women reached 44.3%, indicating that the male population had greater employment opportunities during this period. In addition, the unemployment gap for the same interval was -1.7%, with the female population registering the highest levels of unemployment in the city.

**Table 3. Unemployment Rates, Employment and Gender Gaps.**

Unemployment Rate			Occupancy Rate		
Men	Women	Gap	Men	Women	Gap
13,6	15,3	-1,7	64,4	44,3	20,1

Source: Authors' elaboration based on DANE – GEIH 2023

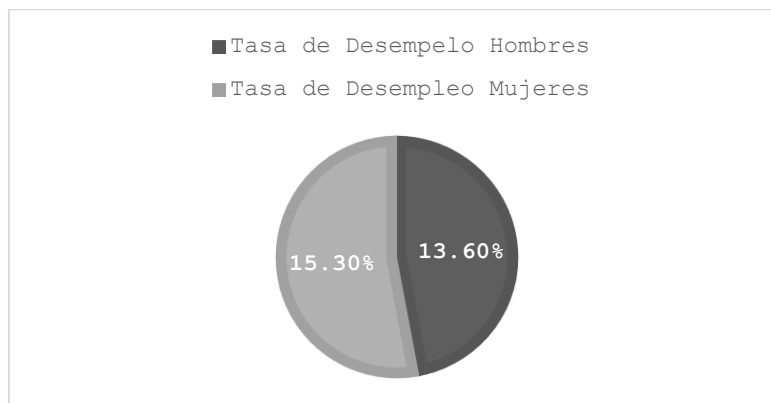
**Figure 1. Occupancy Rate.**

Source: Authors' elaboration based on DANE – GEIH 2023. In original language Spanish

Although there has been an increase in female labor participation in Cúcuta, men continue to dominate the labor market with an employment rate of 64.4%, compared to 44.3% for women. This places the city in eighth place among the 13 metropolitan areas analyzed, with a participation gap of 20% (DANE, 2023).

During the mobile quarter from December 2022 to February 2023, the female participation rate showed a significant increase, from 38.3% to 44.3% compared to the previous year. This progress is linked to economic empowerment and training programs, which have encouraged the return of women to the labor market, mainly in feminized sectors such as commerce (32%), services (27%), and manufacturing (15%) (DNP, 2023). However, the insertion of women in sectors such as technology and construction is still limited. In addition, 65% of employed women work in informal conditions, with restricted access to social security and labor benefits.

**Figure 2. Unemployment Rate.**



Source: Authors' elaboration based on DANE – GEIH 2023. In original language Spanish

Between December 2022 and February 2023, the female unemployment rate in Cúcuta reached 15.3%, exceeding the male rate of 12.8% by 2.5 percentage points. During 2022, this disparity was even more pronounced, with female unemployment at 17.5% compared to 12.8% for men. Factors such as gender discrimination, domestic responsibilities, and educational barriers explain this difference (DANE, 2023). In addition, according to the report "Cúcuta Cómo Vamos", women faced the highest levels of unemployment, reaching 26% at the most critical point of the labor market in the city (Cúcuta Chamber of Commerce, 2022).

**Table 4. Gap Between Men and Women in the Average Labor Income.**

Average Labor Income			Average hourly labor income		
Men (thousands)	Women (thousands)	Gap (%) (M-M)	Men (thousands)	Women (thousands)	Gap (%) (M-M)
1.005	875	12,9	4,7	5,0	-4,9

Source: own elaboration based on DANE – GEIH 2022

Women, both nationally and regionally, face significant wage inequalities. On average, their incomes are 20% lower than men's, mainly due to their concentration in lower-paid sectors and lower-ranking positions (DNP, 2023). In Cúcuta, the gap in average labor income is 12.9% in favor of men; however, when analyzing the average hourly income, this gap is reversed, favoring women by 4.9% (DANE, 2022). These data reflect the complexities of gender disparity in the labour market.

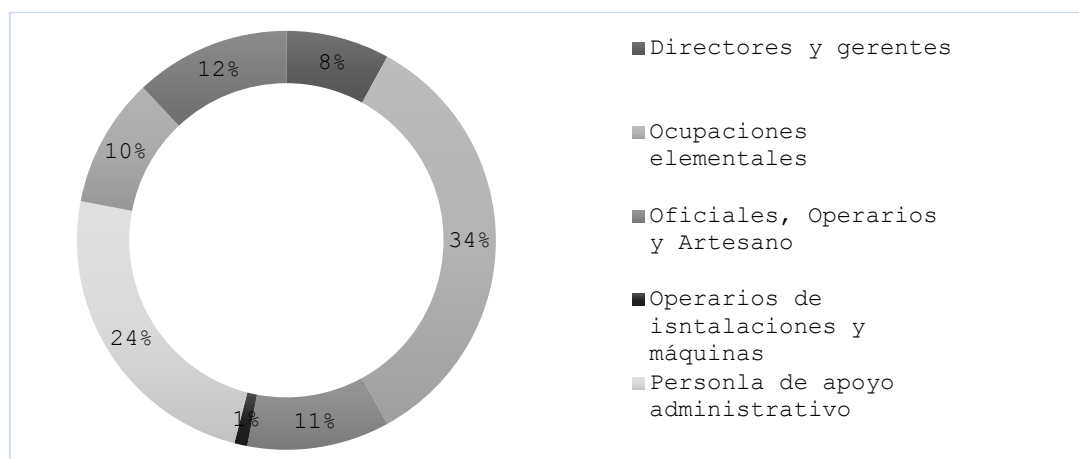


On the other hand, San José de Cúcuta has established itself as a key destination for Venezuelan migrants in recent years. According to USAID and the DNP, as of September 2022, 2,463,307 pre-registrations were registered in the Temporary Protection Statute for Venezuelan Migrants (ETPV), with Cúcuta hosting 11% of this population. At the national level, 15,979 Venezuelan women were registered in the Single Registry of Foreign Workers, representing 38% of the total. However, long-term unemployment affects 28.85% of these women, according to Sisbén IV (DNP, 2022).

In 2022, Venezuelan migrants made up approximately 20% of the labor force in Cúcuta, with a female participation rate of 48%, lower than that of Colombian women due to legal and documentation barriers. The majority of migrants, including men and women, work in informal sectors such as street trading (40%) and domestic services (25%). In addition, the lack of recognition of professional qualifications limits access to formal employment, concentrating women in household activities (32.53%) and informal jobs (DNP, 2022).

In Cúcuta, the elementary occupations sector employs 34% of migrant women, followed by support personnel (24%) and a reduced 10% in professional and intellectual areas. Despite these challenges, the Civil Engineering program stands out with a job engagement rate of 88.2% and an average starting salary of \$1,966,513, according to reports from IOM, UNHCR and ILO (2022).

**Figure 3. Number of Female Registrations by General Economic Activity**



Source: Prepared by the author based on Venezuelan population records in the single registry of foreign workers RUTEC. In original language Spanish

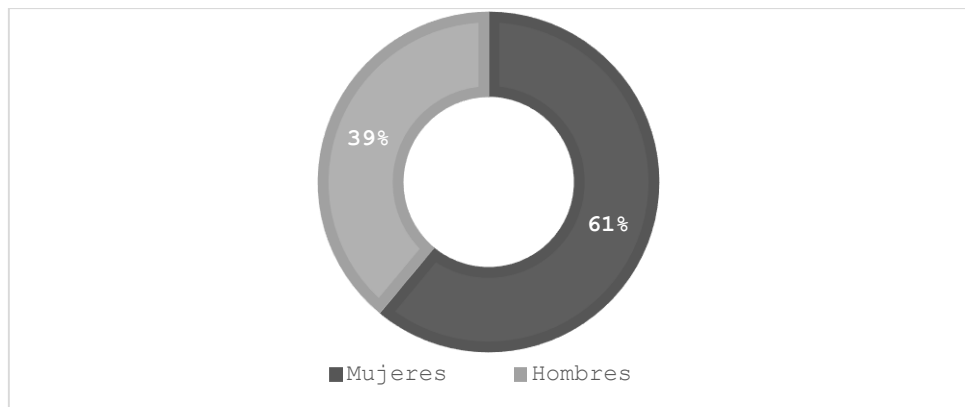
Migrant women face working conditions marked by informality, which reflects the high rate of informal employment in Cúcuta. Many work without contracts or access to labor benefits, which exposes them to labor exploitation. In addition, the job offer available to refugees, migrants and returnees does not match their skills, due to legal and cultural barriers and information deficiencies, which limits their access to formal and productive jobs. According to IOM, migrants are often employed in commerce, hotels, restaurants and transport, while those with higher education are concentrated in professional or administrative activities (IOM; UNHCR; ILO, 2022).

At the national level, there are several labor formalization programs, some focused on women and migrants, although with limited effectiveness. The National Learning Service (SENA) standardizes labor competencies, with 2,612 standards in force, of which 916 are applied to certify and evaluate competencies of the general population. SENA is responsible for 95% of certifications in the country and also analyzes certifications for refugees and migrants. Since 2020, some certifications have been awarded virtually, allowing participation in all departments. Venezuelan migrants mainly obtain certifications in areas such as professional activities, administrative services, commerce, transportation, and manufacturing. In Bogotá, certifications in professional activities and administrative support predominate, while in Cúcuta they are

concentrated in sectors such as public administration, education, health, mining and agriculture (OIM;ACNUR;OIT, 2022).

According to the Migration Observatory, for the 2022 cut-off, it was recorded that in San José de Cúcuta, 1,411 SENA places were granted for qualified and complementary training, aimed at the Venezuelan population. Of these, the largest number, 1,019, corresponds to special courses, 312 to technicians and operators, and the rest to technologists, operatives and assistants. As can be seen in Figure 6, in terms of quotas by gender, the male population has a lower participation, with 528 quotas for men, while for women there were 883 quotas (DNP, 2022)

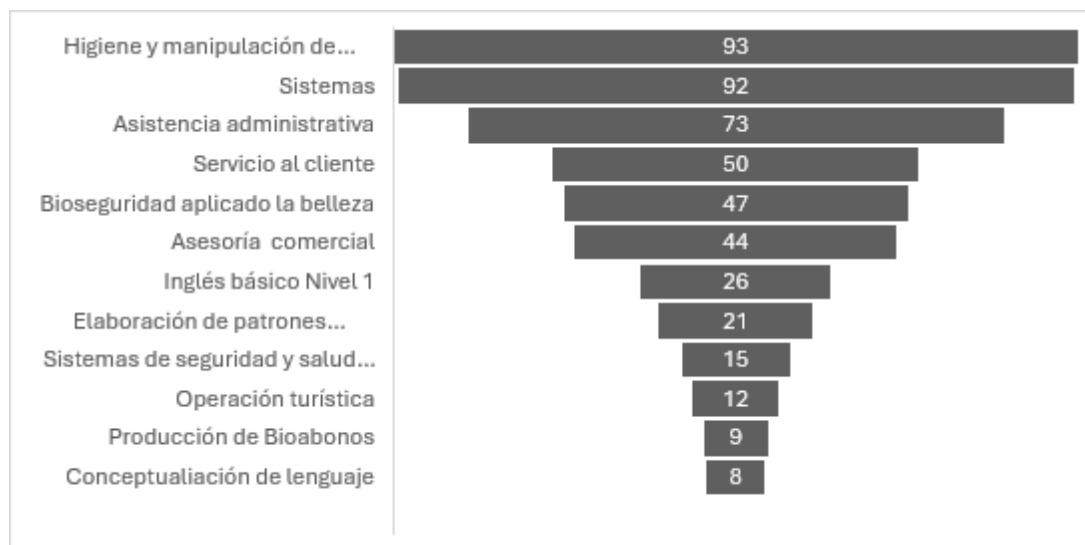
Figure 4. Quotas By Gender



Source: Authors' elaboration based on the SENA quotas in graduate and complementary training occupied by the Venezuelan population. In original language Spanish

The above explains why the training programs in hygiene and food handling, systems, administrative assistance, customer service, biosecurity in the beauty sector and commercial advice were the ones that offered the most quotas, as shown in Figure 5.

Figure 5. Quotas for Training Programs.



Source: Authors' elaboration based on the SENA quotas in graduate and complementary training occupied by the Venezuelan population. In original language Spanish



In Cúcuta, the transition from informal to formal employment shows a slight improvement, with 12% for women and 15% for men, although it is still insufficient to considerably reduce informality. According to the National Department of Statistics (DANE), between the first quarter of 2022, the labor informality rate decreased by 8%, while formal employment increased by 28%. This reduction was more significant among men (-8.4%) compared to women (-6.7%) (DNP, 2023).

As a border city, San José de Cúcuta reflects the dynamics of migration and gender in the labor market, with a decrease in unemployment and an increase in formal employment, especially in commerce and services. However, problems of informality persist, especially among migrant women, who face precarious working conditions without benefits. Despite efforts to formalize employment and train the migrant population, gender gaps in labor participation and wages remain evident. The female unemployment rate is higher, and women face discrimination in access to formal employment and remuneration. In addition, the lack of recognition of their skills limits opportunities for Venezuelan migrants.

### *Empirical Strategy*

For the development of the empirical analysis, previous research on migration and the female labor market was reviewed, as well as reports from international and national organizations, such as UNHCR and IOM, which addressed the situation of the migrant population in similar contexts. A detailed analysis of the DANE and DNP databases was also carried out, which provided information on the migrant population in San José de Cúcuta and the evolution of the labor market from 2018 to the first quarter of 2024. This data collection made it possible to identify trends and challenges documented in the literature, favoring a deeper understanding of the phenomenon and its context. In addition, local and national regulations governing migrants' access to employment and labour rights were examined, ensuring that the theoretical framework was supported by robust and up-to-date evidence.

The data collected were analyzed using the statistical software STATA 18.5. Descriptive statistical techniques were used to summarize the information and inferential techniques, such as hypothesis testing and regression analysis, were used to assess the relationships between variables.

To evaluate the effects of the opening of the Colombian-Venezuelan border in San José de Cúcuta, a synthetic controls model was used to compare the evolution of labor indicators in San José de Cúcuta with a synthetic unit built from other Colombian cities that did not experience the reopening of the border. The model specification was made as follows:

#### *Selection of Treatment and Control Groups:*

*Treatment Group: San José de Cúcuta.*

*Control Group: Comparable cities in Colombia that did not experience border reopening in 2023, such as Bucaramanga and Valledupar.*

#### *Construction of the Synthetic Unit:*

The weighted least squares method was used to combine the comparison cities, so that the synthetic unit would mimic as closely as possible the pre-opening characteristics of San José de Cúcuta.

For each outcome variable  $Y_{it}$ , a synthetic unit  $Y_{\text{synthetic},t}$  was constructed using the comparison cities  $j$  with weights  $w_j$ .

$$Y_{\text{Sintético},t} = \sum_j w_j Y_{jt}$$

Where the weights  $w_j$  are chosen to minimize the difference between  $Y_{\text{Cúcuta},t}$  and  $Y_{\text{synthetic},t}$

in the run-up to 2023.

### *Data*

To strengthen the theoretical and normative foundation, activities focused on the collection and analysis of relevant documentation were carried out. Previous studies on migration and the female labour market were examined, along with reports from international and national entities such as UNHCR and IOM, which describe the situation of the migrant population in comparable contexts. In addition, an exhaustive review of DANE and DNP databases was carried out, which provided detailed information on the migrant population in San José de Cúcuta and the evolution of the labor market between 2018 and the first quarter of 2024. This process made it possible to identify key trends and challenges documented in the literature, contributing to a comprehensive understanding of the phenomenon and its environment. Local and national regulations related to access to work and the labour rights of migrants were also analysed, ensuring that the theoretical framework was supported by up-to-date and reliable evidence.

The analysis of the collected data was carried out using statistical software, specifically STATA 18.5. Descriptive techniques were applied to summarize the data and inferential techniques, such as hypothesis testing and regression analysis, to explore the relationships between variables.

The synthetic controls method was used to construct a "synthetic unit" that would act as a counterfactual control group. This synthetic unit is a weighted combination of other regions not affected by the intervention (opening of the border) and resembles the characteristics of the treated unit (San José de Cúcuta) before the intervention. The comparison between the results observed in San José de Cúcuta after opening and the estimated results for the synthetic unit allowed us to evaluate the effects of the intervention.

Definition of the treated unit and treatment period:

*Unit treated: San José de Cúcuta.*

Treatment period: After the opening of the border in 2023 (first quarter).

Selection of units of control:

Bucaramanga and Valledupar were selected as control units due to their socioeconomic similarities with San José de Cúcuta prior to the intervention. These cities formed the group of donors for the synthetic analysis.

The synthetic model was designed considering Cúcuta as the treated unit. The treatment period begins at time 21 (first quarter of 2023), while the pre-treatment period spans from time 5 (first quarter of 2019) to time 20 (fourth quarter of 2022).

### *Data Collection*

Quarterly data of the following indicators were collected between 2018 and 2024 for San José de Cúcuta and the control cities:

Female labor participation rate.

Female unemployment rate.

Average income of female migrants.

Variables used:

$Y_{it}$ : Dependent variable (female unemployment rate) for city  $i$  at time  $t$ .

Zit: Vector of covariates (socioeconomic indicators) for city  $i$  at time  $t$ .

The analysis of the descriptive statistics of the key variables of the labor market in San José de Cúcuta reveals trends that reflect the economic and social dynamics of the region. In particular, the female labour force participation rate, the female unemployment rate and migrant incomes are examined, with special emphasis on migrant women. The results obtained show considerable variability in these indicators, reflecting both the structural challenges of the labour market and the economic inequalities present, especially after the reopening of the border. This analysis provides a comprehensive view of working conditions and identifies the main barriers faced by migrants and women in accessing formal jobs and improving their economic situation.

**Table 5. Descriptive Statistics.**

Variable	Obs	Mean	Std. dev.	Min	Max
Female labor force participation rate	75	51.93368	5.852612	32.36025	63.06694
Female unemployment rate	75	17.36136	5.465625	7.720134	32.38781
Average female migrant income.	75	659205.6	230911.9	140000	1193448

Source: Authors' elaboration based on Sata 18.5

Note: The observations were taken from the National Administrative Department of Statistics DANE. Obs: Total Observations. Mean: Media. Std.dev. : standard deviation. Min: Valor Minino. Max: Maximum value.

Statistics indicate that participation and unemployment rates vary, with a considerable range in migrant incomes, suggesting economic disparities within the group studied. Overall, unemployment and participation rates remain relatively balanced, while the income distribution of migrant women is more unequal, which could be linked to labor market informality and other structural factors.

## Results

Before analyzing the estimation results, it is essential to understand the concept of the synthetic controls model, developed by Abadie et al. (2010). This econometric approach, originally applied to evaluate the impact of the tobacco control program in California, allows the effect of an intervention to be estimated in a specific unit. It does so by comparing the evolution of that unit with a weighted combination of untreated units that act as counterfactual. Through weighting techniques, the model generates a "synthetic control" that simulates the counterfactual trajectory of the treated unit in the absence of the intervention (Abadie et al., 2010).

### *Synthetic Control*

The results obtained through this methodology offer significant observations on the impact of the opening of the border on the female population, both local and migrant, of San José de Cúcuta. These conclusions are of great value within the context of this research.

In this analysis, the group of donors is composed of Valledupar and Bucaramanga, cities with socioeconomic characteristics similar to Cúcuta in the period prior to the intervention. Cúcuta is defined as the treated unit, with the treated period identified as time 21 (first quarter of 2023). The pre-treatment period runs from time 5 (first quarter of 2019) to time 20 (fourth quarter of 2022). Based on these elements, the synthetic model is formulated:

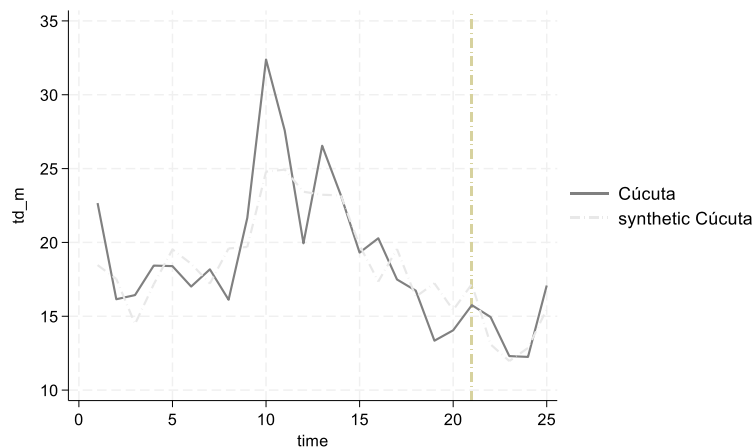
$$Y_{Sintético,t} = \sum j_{wj} Y_{jt}$$

Variables of interest for model prediction include:

- **td\_m** (Female Unemployment Rate): Dependent variable that measures female unemployment in the unit treated.
- **to\_m** (Female Employment Rate): Relevant independent variable that influences female unemployment.
- **tgp\_m** (Global Female Participation Rate): Another significant independent variable.
- **ingreso\_migm** (Income of Migrant Women): Indicator that evaluates the income of migrant women and its impact on the labor market.

The quality of the synthetic model is crucial and is evaluated according to its ability to replicate the evolution of the treated unit before the intervention. In this case, Figure 8 graphically illustrates the trajectory of Cúcuta, comparing its performance before and after the opening of the border with that of its synthetic unit.

Figure 6. Synthetic Unity



Source: Authors' elaboration based on Stata 18.5. In original language Spanish

The results of the synthetic control model show that the "synthetic Cúcuta" manages to adequately replicate the trend observed in the period prior to the opening of the border, with a correlation of 0.786. This reinforces the validity of the analysis. After the opening of the border, projections for the "synthetic Cúcuta" indicate that the female unemployment rate remains below 15%.

Table 6. Correlation.

	y_observada	y_synth
y_observada	1.0000	
y_synth	0.7860	1.0000

Source: Authors' elaboration based on Stata 18.5

To measure the accuracy of the model, the *Root Mean Squared Prediction Error* (RMSPE) was calculated, which quantifies the average discrepancy between observed and predicted values. The RMSPE obtained was 2.86, indicating that, on average, the synthetic control predictions deviate by 2.86 units from the actual values. This suggests a high degree of accuracy in the model.

Also, in Table 7. Average of the Predictor Variables, a comparison between the means of the predictor variables for the treated unit and the synthetic control is presented:

**Table 7. Average of the Predictor Variables.**

	Treated	Synthetic
to_m	40.30082	40.297
tgpm	50.31938	50.21989
ingreso_migm	549982.3	551916.2

Source: Authors' elaboration based on Stata 18.5

The similarity between the means confirms a good balance in the model, especially in the overall female participation rate, where the differences are minimal.

#### *Average Causal Effect of Treatment*

The analysis of the *Average Treatment Effect* (ATE) for the female unemployment rate yielded a coefficient of -0.054. This implies that, on average, the intervention reduced the female unemployment rate by 0.05 units. The p-value associated with the coefficient is 0.03, confirming that this effect is statistically significant at the 5% level.

**Table 8. Results Causal Effect.**

td_m	Robust Coefficient	Std. err.	P>z
TIE	-0,0542434	0.75	0.03

Source: Authors' elaboration based on Stata 18.5

Note: ATE: Average Treatment effect (measures the average impact of an intervention). Robust Coefficient : Robust Coefficient; Std. err.: Standard error; P>z: The p-value indicates the level of statistical significance of the coefficient.

The analysis of the Average Treatment Effect (ATE) reveals a coefficient of -0.054 for the female unemployment rate. This indicates that, on average, the intervention has managed to reduce the female unemployment rate by 0.05 units in the treatment unit.

The p-value associated with this coefficient is 0.03, confirming that the treatment effect is statistically significant at the 5% level. Since the p-value is less than 0.05, we can reject the null hypothesis that posits that the treatment effect is zero, concluding that the intervention has a significant impact on the unemployment rate.

The standard error associated with the ATE coefficient is 0.75. The robustness of the results is assessed by additional tests that confirm that the effects remain consistent under different specifications of the model. This reinforces the reliability of the observed effect, evidencing a positive and significant impact of the intervention on the female unemployment rate.

As part of the robustness analysis, an analysis of period permutations is carried out, applying the synthetic control in two different trimesters for treatment. The first permutation corresponds to the 2021-1 quarter and the second to the 2022-1 quarter, obtaining the following results:

Comparison charts:

Figure 7. Permutation One.

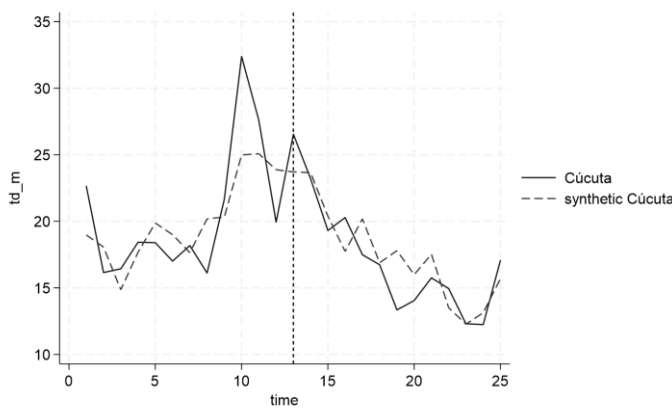
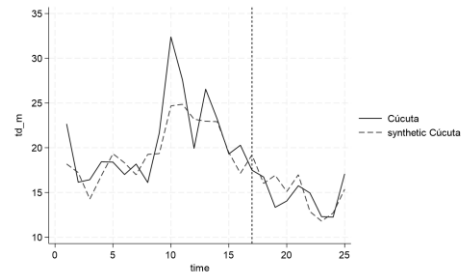


Figure 8. Permutation Two.



Source: Authors' elaboration based on Stata 18.  
Source: Authors' elaboration based on Stata 18.5. In original language Spanish

This behavior is in line with the results obtained from the synthetic control model in period permutations, which show that the trend observed in synthetic Cúcuta prior to the opening of the border is fading. Likewise, after the reopening, a significant gap is identified accompanied by peaks of difference between the actual data and the projections of the model for synthetic Cúcuta.

Average of the Predictor Variables:

Table 9. Average of the Predictor Variables Permutations

Permutation 1	Treated	Synthetic	Permutation 2	Treated	Synthetic
to_m	41.06447	40.8685	to_m	41.13885	41.06185
tgp_m	51.33486	50.61117	tgp_m	51.79759	50.98603
ingreso_migm	471071.6	535558.8	ingreso_migm	482292.1	543994.2

Source: Authors' elaboration based on Stata 18.5

Note: Treated; Synthetic: Synthetic Unit

As in the graphical analysis, the tables shown show that, after the permutations carried out, the equilibrium previously observed in the synthetic control model is lost. This discrepancy is evidenced by the lack of fit between the means of the predictor variables of the treatment unit and the synthetic unit. A clear example of this is the variable *ingreso\_migm* in the first permutation, where the values recorded were 471,071.6 and 535,558.8, respectively, which reveals a significant discrepancy.



To evaluate the accuracy of the model in each permutation, the *Root Mean Squared Prediction Error* (RMSPE) was calculated, obtaining a value of 3.184072 for the first permutation and 3.039371 for the second. This shows that, on average, the predictions of the synthetic model are further away from the actual data compared to the initial treatment, whose RMSPE was approximately 2.86 units. These results highlight that the original synthetic model presents a more precise fit, which is corroborated by this quantitative measure of accuracy. Finally, when calculating the squared errors, a coefficient of 0.0000012 was determined, which reaffirms the high precision of the synthetic controls model to estimate the impact of the opening of the border on the female unemployment rate in San José de Cúcuta.

The analysis of the synthetic control reveals that the opening of the border had a significant impact on the female unemployment rate in San José de Cúcuta, with an initial decrease, but remaining above 10%. Women, especially migrant women, face barriers such as informality and limited access to formal jobs. The study highlights the labor and social dynamics that affect women, with an emphasis on Venezuelan women, evidencing problems such as low employment rates, high unemployment and job insecurity. These conditions limit their income and economic opportunities, exacerbated by the additional barriers they face in accessing social services and integrating into the community. The results underscore the urgent need for public policies that promote gender equity, strengthen employability and facilitate the socio-economic inclusion of all women in the labour market.

## Conclusions

In developing the objectives proposed in this research, it is concluded that, due to the economic particularities of Cúcuta as a border region, the labor market presents notorious inequalities related to gender and migratory status. Women face higher unemployment rates and earn significantly lower incomes compared to men.

Since Cúcuta is characterized by a high level of labor informality, both local and migrant women face limited formal employment opportunities, being forced to participate in the informal sector and in low-skilled jobs. In the case of migrant women, these difficulties are aggravated by barriers such as lack of certification of studies and previous work experience. Although the national government has implemented initiatives to promote formal employment among the local and migrant population, wage gaps and high levels of informality persist despite a gradual increase in labor participation.

The analysis of the synthetic control model to assess the impact of the opening of the border on the female unemployment rate in San José de Cúcuta shows that, after the reopening, the unemployment rate tended to decrease during 2023, but experienced an increase in the first quarter of 2024. However, these variations remained between 10% and 15%, leaving Cúcuta with a double-digit female unemployment rate. This is largely attributed to the migratory flow, which has intensified labor competition, exacerbating hardships for local women who were already facing significant challenges in the labor market. In addition, the predominant role of women in family care and domestic responsibilities reduces their ability to adapt to the demands of the labor market.

In conclusion, considering the socioeconomic conditions of San José de Cúcuta, the opening of the border has not generated a significant positive impact on the female labor market. Rather, a challenging environment persists for both national and migrant women, with the transition to formal employment representing an increasingly competitive challenge, especially for the latter. The situation of the labor market, far from improving, has shown the urgent need for comprehensive policies that promote labor inclusion, gender equity, and the effective integration of migrant women into the local labor community.

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