VIOLENCE, ILLICIT CROPS AND DEVELOPMENT IN THE COLOMBIAN PACIFIC REGION

by

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Abstract

Colombia has faced a prolonged armed conflict related to poverty, inequality, corruption, and drug trafficking. Despite government efforts and the 2016 peace agreement with the FARC guerrillas, the problem persisted and has spread to multiple regions, leading to increased illicit crop production and violence. The Colombian Pacific region is a strategic hub for the illicit drug trade, due to its geographical suitability for cultivation and access to the Pacific Ocean. This study focuses on the relationship between the rise in coca cultivation and multiple violent outcomes such as homicides, displacement, extortion, and kidnapping, differentiating urban-rural divide within the Colombian Pacific during the transitional phase of the peace agreement. Analyzing a data panel covering 178 municipalities considering urban-rural classifications in the Pacific region from 2011 to 2021; I use OLS fixed effects, Tobit regression, and a two-stage least squares model instrumenting for coca production with the manual eradication to correct for possible endogeneity and examine causal effect on these violent outcomes. The results indicate that increases in coca cultivation in rural municipalities are associated with increases in homicides and household displacement, while there is no evidence that it has a significant effect in urban municipalities.

Keywords Conflict, Drugs, Peace Agreement, Local Development, Colombian Pacific.

List of Abbreviations Used

CNP	Colombian National Police
DANE	National Administrative Department of Statistics
DNE	National Directorate of Narcotics
ELN	National Liberation Army
FARC	Revolutionary Armed Forces of Colombia
FE	Fixed Effects
GDP	Gross Domestic Product
IV	Instrumental Variables
ODC	Observatory on Drugs of Colombia
OLS	Ordinary Least Squares
PNIS	Program for the Substitution of Illicit Crops
SIEDCO	Statistical, Delinquency, Offenses and Operations Information, System of the National Police of Colombia
SIMCI	Illicit Crop Monitoring System
UNODC	United Nations Office on Drugs and Crime

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Chapter 1 Introduction

Colombia has a long and complex history of violence and conflict, often related to high levels of poverty and inequality, and the influence of drug trafficking (Sanchez et al., 2005). Despite notable progress in addressing these issues over recent decades, the nation still experiences high levels of crime, according to the Global Organized Crime Index (GOCI, 2021), it ranks as the second most crime-affected country in the world. Additionally, Colombia established a new record for coca cultivation (UNODC, 2023), solidifying its position as the largest coca producing country in the world.

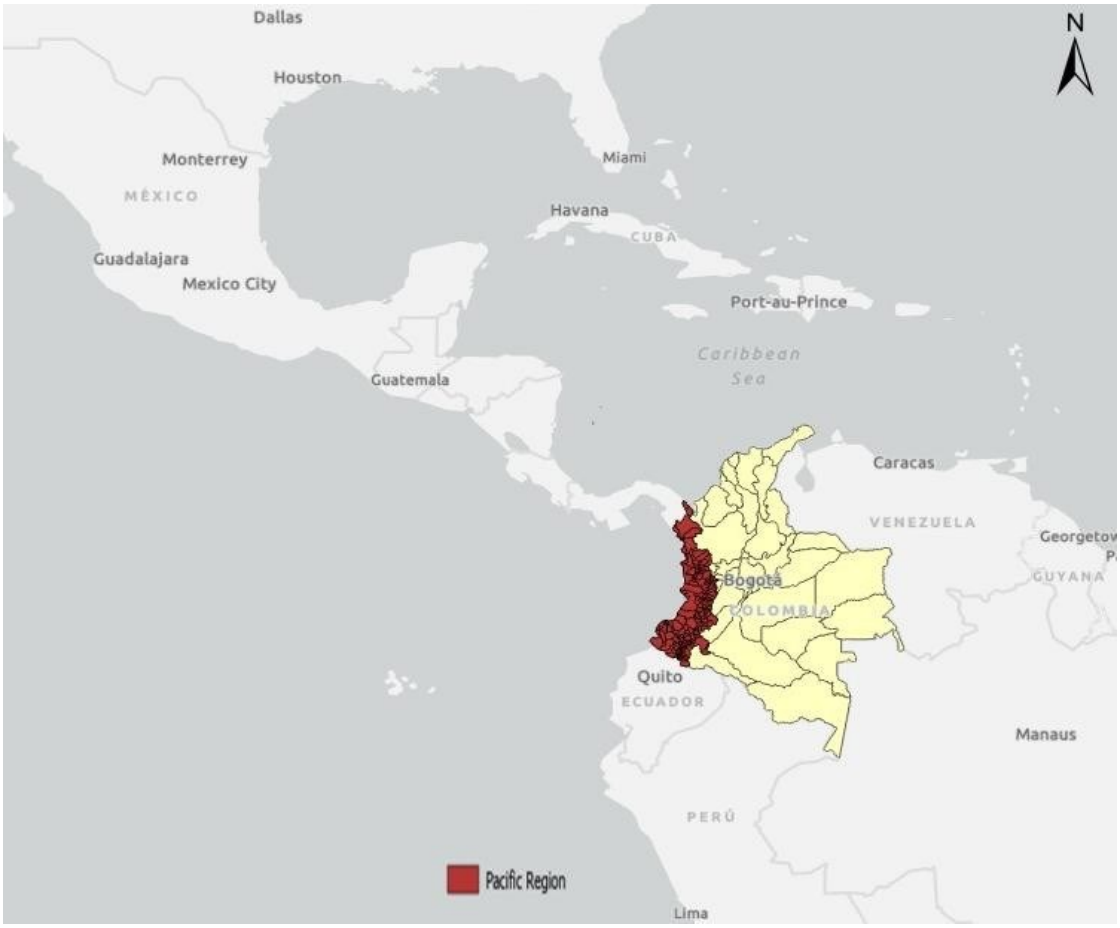
Highlighting the profound impact of violence in Colombia, estimates reveal that the armed conflict between 1958 and 2012 resulted in 220,000 fatalities. Notably, 81.5% of these fatalities being civilians emphasize the disproportionate impact on non-combatant populations. (National Center for Historical Memory, 2013). To put this in perspective, official statistics indicate that between 1998 and 2012, the average mortality rate due to car accidents was 16.3 per 100,000 inhabitants, compared to a homicide mortality rate of 53.7 per 100 inhabitants during the same period (DANE, 2019). Additionally, in 2013, approximately 5,700,000 individuals were internally displaced, constituting 12.5% of the population and ranking Colombia among the countries with the highest number of displaced people globally (Schultz et al., 2014). Moreover, reports have documented 25,000 cases of missing persons and 27,000 incidents of kidnappings associated with armed conflict spanning the period between 1970 and 2010 (National Center for Historical Memory, 2013). Despite having lower casualties compared to some other wars, the Colombian conflict is marked by its enduring low to medium intensity over an extended period, a characteristic that continues to be present today.

Conversely, the signing of the Peace Agreement between the Colombian Government and the Revolutionary Armed Forces of Colombia (FARC) in November 2016 engendered a sense of optimism regarding the potential de-escalation of the armed conflict. The peace agreement included agrarian reforms, political guarantees for opposition parties,

a coca substitution program, and a legal framework for war crimes, faced partial implementation following the 2018 change in administration. In response, dissident FARC groups, the National Liberation Army (ELN) and paramilitaries reemerged, disputing control of abandoned territories, and exploiting coca substitution programs for increased cultivation. Consequently, certain regions in the country witnessed an unforeseen escalation in violence and coca cultivation, particularly in impoverished rural areas (Nussio, 2020). Notably, it is the inhabitants of these regions who have suffered the adverse consequences stemming from the altered dynamics of the armed conflict.

The country, located in Latin America, is divided into 32 departments, further divided into 1,122 municipalities (see Figure 1). As of 2023, the population stands at approximately 52 million people (DANE, 2023). The Colombian Pacific region, specifically comprised of four departments— Cauca, Choco, Nariño, and Valle— has long been plagued by the interplay between illicit drug production and violence, which has had profound socio-economic and security implications. Moreover, the Colombian Pacific region has historically been characterized by socio-economic deprivation, pervasive violence, and geographical constraints, resulting in a fragile state presence. This weak presence of state institutions has created fertile ground for the establishment of criminal governance by armed groups, leaving the local population at their mercy. A significant consequence of this phenomenon has been the mass displacement of thousands of individuals from rural areas to larger cities within the same region. The convergence of poverty, violence, and inadequate infrastructure amplifies the vulnerability of the population, intensifying the challenges encountered during the transitional phase of the peace agreement.

Figure 1. Pacific Colombian Region



Source: DANE (2023).

Moreover, between 2001 and 2012, the Pacific Region experienced a notable increase of approximately 70% in the cultivation of coca crops, according to the Illicit Crop Monitoring System (SIMCI), a satellite study of coca crops overseen by the United Nations Office on Drugs and Crime (UNODC), that estimates the number of hectares dedicated to coca cultivation in each municipality of Colombia since 2001.

Notably, the department of Nariño has consistently accounted for the largest proportion, representing an average of 74% of coca cultivation concentrated within this region. However, it is noteworthy that, despite Choco and Valle having the smallest areas dedicated to coca cultivation in this zone of the country, they experienced

substantial increases of 869% and 162% respectively (Rincon-Ruiz., 2016). Additionally, Cauca observed a growth of 38% in coca cultivation, while Nariño experienced a 43% increase. To provide context, of the 677,158 hectares of arable land in the Colombian Pacific, 89,265 hectares were allocated for coca crops in 2021, constituting 13.2% of the total arable land in this region. This trend indicates a significant shift in the geographical distribution of illegal coca activity towards the plains of the Colombian Pacific over the past decade.

The Colombian Pacific's diversity offers a unique opportunity to explore how illicit crop cultivation during the Peace Agreement's transition affects regional security, allowing for meaningful comparisons with other subregions. This study aims to examine the relationship between illicit drug production and violence within the Colombian Pacific region during the transitional period of the peace agreement. By analyzing data spanning from 2011 to 2021, the study will investigate multiple outcomes of violence, including homicides, extortion, displacement, and kidnappings. The findings provide valuable insights into the patterns, trends, and potential causal links between drug production and violence, thereby contributing a comprehensive understanding of the multiple forms of violence in the region. Moreover, the research outcomes will contribute to evidence-based policymaking, supporting the pursuit of sustainable peace and development in the Colombian Pacific region. Specifically, the study is designed to answer the key question: *What is the relationship between illicit drug production and violence during the transition period of the peace agreement in the rural-urban divide of the Colombian Pacific region?*

Studying the impact of the coca production had on violence in the Pacific Region is fundamental due to its importance as a key region for coca cultivation and one of the country's most violent regions. This analysis also aids in evaluating the effectiveness of government anti-drug policies. Evidence indicates that coca-growing regions are often marked by higher poverty rates, unmet basic needs, lower institutional presence, and

limited access to essential public services such as electricity and roads (Zuleta, 2017). Therefore, it is crucial to study the violent consequences of illicit drug production in a determining region like the Colombian Pacific, particularly during the peace agreement of the armed conflict between 2011 and 2021.

This analysis uses data for the period 2011-2021 from Illicit Crop Monitoring System (SIMCI) and United Nations Office on Drugs and Crime (UNODC) for the coca information; Statistical and Delinquency System of the National Police of Colombia (SIEDCO) for violence outcomes such as homicides, extortions, kidnappings, and displacement information; I cross this information with municipal demographic statistics from National Administrative Department of Statistics (DANE). Using these data, I first ran a municipality year fixed effects OLS and Tobit regressions to analyze the correlation between coca production and the multiple violent outcomes. I then correct for potential endogeneity estimating a two-stage least squares regression (2SLS-IV), instrumenting coca production with manual coca eradication to examine the causal effect of coca production on these outcomes. The empirical findings suggest a positive correlation between increased coca production and a rise in homicide rates, as well as a significant positive effect on the displacement rates in rural municipalities during the study period. In contrast, there is no relevant evidence showing either correlation or impact on violent outcomes in the urban municipalities.

This thesis is structured into five chapters as follows: Chapter 2 provides the theoretical background, beginning with a comprehensive literature review that examines conflict and previous research on the relationship between drug production and violence. Subsequently, it delves into the impact of the War Against Drugs and Plan Colombia, followed by an exploration of the 2016 Peace Agreement. Chapter 2 concludes with an in-depth analysis of the Colombian Pacific region, considering its unique characteristics and relevance to the study. In chapter 3, the data and estimation strategy are outlined, detailing the sources of data and the methodology employed. Chapter 4 presents the results, providing empirical evidence on the evolving dynamic relationship between drug

production and violence outcomes. Finally, chapter 5 discusses the conclusions drawn from the study and its limitations, highlighting key findings and their implications for policy and future research.

Chapter 2 Theoretical Background

The chapter begins with a literature review section focusing on the theory of the economics of crime and conflict. It examines empirical research concerning the causes and consequences of conflict and civil wars, exploring their relationship with economic development. Subsequently, the following section addresses into the context of the illicit drug trade and the Colombian conflict, situated within the framework of two main anti-drug policies implemented in the country over the past two decades: Plan Colombia and the *National Program for the Substitutionof Illicit Crops*, PNIS. Lastly, the third section provides an overview of the Colombian Pacific region, emphasizing its strategic importance in the illicit drug trade and its elevated levels of violence within the country.

2.1. Literature Review

This section briefly reviews the existing theoretical and empirical literature regarding the causes and economic consequences of violence on civil war and conflict. Becker's (1968) economic theory of crime postulates that individuals allocate their time and labour between legal market options and illicit or criminal activities based on expected returns associated with each option and the perceived likelihood of the punishment. Ehrlich (1973) further finds criminal activities are positively related to the income inequality within a society. Grossman (1991) applies these ideas to model rebellion, where civilians may find stronger incentives to rebel in the face of declining household income and reduced economic opportunities. Subsequent research (Acemoglu and Robinson, 2001; Besley and Persson, 2010; Esteban et al., 2012) has expanded theoretical frameworks, establishing links between development and political economy. This occurs in contexts marked by competition both between and within societies and groups, especially in regions experiencing conflicts and civil wars.

Moreover, Fearon and Laitin (2003) find that conditions of state weakness, characterized by factors such as a large population, political instability, and poverty, are more likely to lead to the insurgency of armed groups like guerrillas, thereby leading to increased

conflict. Additionally, the authors find that higher economic growth is correlated with a lower incidence of civil wars, with the state and its institutional structure playing a crucial role in determining the prevalence of conflict within nations.

Blattman and Miguel (2010) provide a synthesis of the repercussions of civil war and conflict within economic literature. Their findings indicate massive loss of life, destruction of physical infrastructure and human capital, and pervasive impacts on social and political institutions. Moreover, these conflicts lead to displacement, the spread of diseases, and the illicit trade of weapons and drugs.

Finally, some research has focused on non-economic variables related to conflict. Esteban et al. (2012) find that ethnic divisions framed within contexts of wealth inequality, such as the provision and distribution of public goods, can exacerbate the level of conflict in a country.

In the economic literature on conflict, the predominant approach involves using the count of casualties or conflict events as a measure of violence intensity to assess its implications for economic development (Besley and Persson, 2010; Collier et al., 2009; Dube and Vargas, 2013; Esteban et al., 2012; Fearon and Laitin, 2003; Miguel et al., 2009). However, due to inherent disparities in population sizes among countries and regions, coupled with substantial heterogeneity across them, Mueller (2016) develops a framework based on a per capita model of conflict intensity that captures local effects of violence and allows within-country analysis.

Moving from the broader literature on violence and its economic impact, the discussion now centers on the characteristics of illicit drugs and violence patterns in Colombia. Collectively, Colombia, Peru, and Bolivia contribute to over 98% of the global land area dedicated to coca cultivation (Moreno-Sanchez et al., 2003), with Colombia being the primary producer among these three countries (see Figure 2) contributing up to 70% of the total cocaine production (Franz, 2016). Although all of them are cultivating countries, the dynamics of the drug trafficking trade and the patterns of violence differ among them. Consequently, some authors have conducted studies to examine the relationship

between coca cultivation and the occurrence of violence.

Figure 2. Andean Coca Production 2009-2022

Source: United Nations Office on Drugs and Crime -UNODC (2023).

Holmes et al. (2006) offer empirical evidence that diverges from conventional findings in the literature that attributes violence only to the presence of coca crops. Their study explores department-level and find that the levels of violence in Colombia, perpetrated by guerrilla forces, and the eradication of coca are more accurately explained by economic factors. Moreover, this conflict is identified as a key factor that has impeded the economic and social development of the country. Franz (2016) obtains similar results, indicating that drug trafficking and cocaine production have adversely affected Colombia's economic performance since the 1990s, as there is a negative correlation between violence and economic growth.

In the Colombian context Angrist and Kugler (2008) examine the impact of exogenous shocks in coca prices and demand on the living conditions of the predominantly rural population dependent on coca cultivation. The authors find that rural areas experiencing a substantial increase in coca cultivation experienced modest improvements in their economic conditions through self-employment income and increased labor supply among adolescents. However, these regions also experienced a significant rise in violent deaths, as the cultivation of coca may be associated with insurgent and paramilitary groups. Dammert (2008) adopts a similar approach, finding that a reduction in the coca income of small growers in Peru results in an increase in child labor in the rural areas where coca is cultivated. This demonstrates that growers respond to economic incentives and changes in drug policies announced by the government.

On the other hand, Dube and Vargas (2013) examine the impact of income shocks on the armed conflict, considering two opposing effects: the opportunity cost effect, where higher salaries reduce conflict by diminishing the labor supply dedicated to illicit activities and the rapacity effect, in which an increase in contestable income leads to higher profits due to appropriation by armed groups. The authors specifically explore how exogenous price shocks in international commodities, such as oil and coffee, which are intensive in capital and labor, respectively, differentially affect the conflict in the country. They find that higher oil prices increase contestable income, resulting in increased kidnappings and paramilitary attacks through the rapacity mechanism. Conversely, coffee price shocks have significant effects on wages and hours worked, escalating violence by all armed groups through the opportunity cost effect. Spatial disparities in the country, reflecting the concentration of different natural resources in distinct regions, contribute to variations in the types of violence and the perpetuating groups.

This paper contributes to the existing literature by providing micro-level evidence by exploiting shocks in coca production across diverse municipalities within the heterogeneous Colombian Pacific region. Despite its status as one of the largest coca-

producing regions characterized by elevated levels of violence, there is an absence of studies that specifically address the effects of increased coca cultivation on violence within this region. Moreover, the study focuses on relevant policy initiatives—the transitional peace negotiations with FARC guerrillas and the Program for the Substitution of Illicit Crops PNIS. In contrast to previous research with a similar approach, this paper incorporates both rural and urban distinctions at the municipal level, facilitating the estimation of multiple violent outcomes in a per capita model and thus differentiating the potential effects of illicit crops for different populations in the study region.

2.2. Colombia and The War Against Drugs

The most extensive anti-drug policy has been Plan Colombia. With the support of the United States towards Colombia on addressing the illegal drug industry and trafficking, Plan Colombia started from 1999 until 2006 and has been a controversial strategy. The $7.5 billion plan aimed to combat drug production, reduce violence and human rights violations, and promote economic and social development (Plan Colombia, 1999). Moreover, 74% of the funds allocated to Plan Colombia, have been dedicated to enhancing military capabilities. This allocation has been primarily utilized for acquiring weaponry, equipment, and receiving military technical assistance (CNMH, 2012).

The policy program evaluation has been made multiple times with diverse results. On one hand, studies indicate notable improvements in security indices and a reduction in drug-related violence (DNP, 2006; GAO, 2008). On the other hand, contrasting findings by other authors suggest that the intensified military component may be contributing to an upswing in humanitarian crises, particularly instances of displacement inside the country (Moreno-Sanchez, 2003; Dion and Russler, 2008). Furthermore, the aerial eradication with glyphosate lacked precision, indiscriminately damaging both illegal and legal crops. Therefore, not only coca growers but also legitimate crop farmers had to move from rural to urban areas or join guerrilla and paramilitary groups to find alternative economic income (Franz, 2016).

Plan Colombia is criticized for its high-cost relative to perceived ambiguous results. Firstly, aerial eradication was inaccurate, targeting both illegal and legal crops indiscriminately. Secondly, despite an annual investment amounting to US$1.2 billion, roughly 1.5% of Colombia's GDP, the objective of reducing coca crops by 50% between 2000 and 2006 achieved limited success (Franz, 2016). According to Mejia and Restrepo (2008), the reduction in coca crops resulted in only a 14% decline in potential cocaine production. Furthermore, a 'balloon effect' resulted in a geographical shift of coca production towards Peru and Bolivia, leading to an increase in Colombia's national production after the conclusion of the program in 2006.

On the other hand, efforts have been made towards the manual eradication and aerial spraying of illicit crops. However, the outcomes of these efforts have not been uniformly favorable. While there have been instances of reduced production in certain areas, there has been an observable increase in cultivation in other regions. Specifically, the Colombian Pacific region went from having 11,160 hectares in 2001 to having 18,970 hectares in 2012, representing an increase of 70% of coca crops on their arable land (Rincon-Ruiz., 2016). Additionally, the use of chemicals and pesticides like glyphosate during the fumigation process has led to adverse effects on other crop varieties and long-term health impact has had implications on the local population (Patten, 2016).

Figure 3 presents the coca leaf production in hectares from 1999 to 2021, revealing two distinct trends. The initial period from 2000 to 2012 witnessed a substantial decline of 70%, with production plummeting from 163,300 hectares to 47,788 hectares. However, from 2013 to the latest available data in 2021, coca leaf production experienced a dramatic surge, escalating from 48,190 hectares to 204,257 hectares, representing around 10.8% of cultivated area[1] and an exponential increase of 320%.

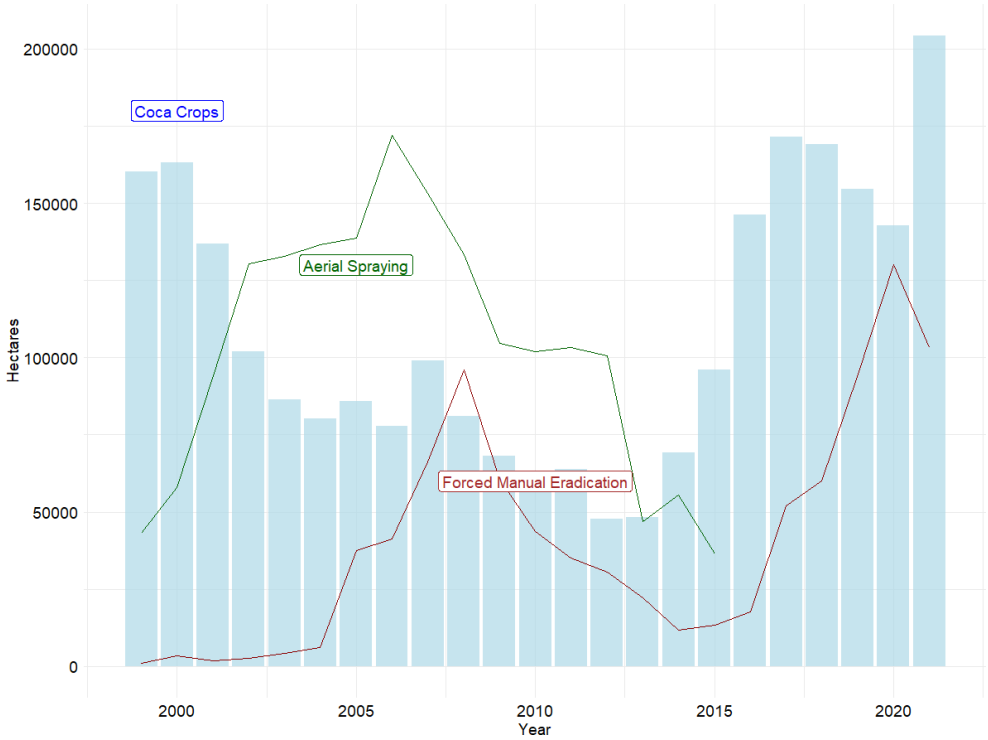
On the contrary, both aerial and manual eradication of coca crops[2] displayed an upward

[1] Data retrieved from the World Bank Open Data in 2023, indicating Colombia's total arable land as 1,993,000 hectares. Source: https://data.worldbank.org/indicator/AG.LND.ARBL.HA?locations=CO

[2] The data on manual and aerial eradication of coca crops is provided by the Colombian Anti-Narcotics Police and is automated documented by Global Positional Systems (GPS) units from fumigation aircrafts.

trend until 2006 and 2008, respectively, followed by a subsequent decline in the subsequent years. Nevertheless, manual eradication of coca leaves experienced another increase starting from 2015, coinciding with the period when coca leaf production was already on the rise. The inefficiency of coca eradication programs is usually attributed to growers expanding their crops more extensively in response to increased manual and aerial eradication, seeking to compensate for the economic losses caused by these measures (Moreno-Sanchez, 2003).

Figure 3. Colombian Coca Production and Eradication 1999-2021



Source: United Nations Office on Drugs and Crime -UNODC (2023).

Figure 3 also shows the transformation in illicit drug dynamics in Colombia during the peace process with the FARC guerrillas. While the formal agreement was signed in 2016, the negotiation process commenced in 2012, which notably coincides with the beginning period of escalated coca leaf production in the country. The observed substantial surge is attributed to the prohibition of aerial eradication, leading to the relocation of crops to

poorest areas such as the Colombian Pacific (Rincon-Ruiz et al., 2016). Furthermore, the evidence indicates that the Colombian government's negotiation efforts and announcements regarding coca substitution programs unintendedly created perverse incentives for coca growers, resulting in an escalation of illicit crop production (Prem et al., 2023).

The government's implementation of the Program for the Substitution of Illicit Crops (PNIS) since 2017 may be a contributing factor to the unintended increase in coca leaf production. The program constitutes an integral part of an alternative development policy, with its core objective being the provision of socioeconomic development opportunities to communities adversely affected by the illegal drug economy. To achieve this, the program emphasizes voluntary eradication of illicit crops, facilitates the creation of alternative productive projects, reinforces the states institutional presence, and fosters the consolidation and enhancement of participatory community mechanisms (UNODC, 2022). To date, the Program for the Substitution of Illicit Crops (PNIS) has achieved the voluntary eradication of 46,000 hectares. Nevertheless, the implementation of PNIS has had negative repercussions on the autonomy and diversity of rural farming communities, as it has not effectively facilitated access to land, technical assistance, and financial support (Velez-Torres and Lugo-Vivas, 2021).

As a result, in 2022 Colombia achieved a historical record with the cultivation of 230,028 hectares of coca crops (UNODC, 2023) out of the country's total arable land of 1,993,000 hectares[3], which represents approximately 11.5% of Colombia's total arable land being utilized for coca cultivation. This marked a substantial increase of 12.62% in comparison to the preceding year, 2021, when the cultivated area encompassed 204,257 hectares. Additionally, the productive enclaves, characterized by intensive coca cultivation with higher density per square kilometer and having maintained this pattern for at least four

[3] Data retrieved from the World Bank Open Data in 2023, indicating Colombia's total arable land as 1,993,000hectares. Source: https://data.worldbank.org/indicator/AG.LND.ARBL.HA?locations=CO

of the last five years, have experienced increased cultivation, with a new enclave emerging in the Colombian Pacific region.

Table 1 presents the distribution of productive enclaves and their corresponding coca cultivation areas in the year 2022. Notably, these productive enclaves constitute the source of 44% of the nation's potential coca leaf production. Additionally, ten out of the fifteen productive enclaves are situated within the Pacific region which represents 46% of the total potential production across all enclaves in the nation.

Productive enclaves emerge and consolidate as a consequence of four distinct categories of factors (UNODC, 2023): *i)* geographic factors, encompassing attributes such as accessibility to rivers, traffic routes, and proximity to national borders; *ii)* institutional weaknesses, signified by elevated levels of monetary poverty and multidimensional poverty, a prevalence of informal employment, and limited law enforcement and armed forces presence; *iii)* the predominance of armed groups that exercise control over the entire production and distribution chain; and *iv)* the efficacy of production processes, facilitated by the high inherent productivity of the land.

Table 1. Area with coca in productive enclaves in 2022

Enclave	Region	Cultivable Area by region	Coca Area (Has)	% of cultivable area
Putumayo Border	Amazonian	53,177	12,112	22.8%
Orito-Vides			2,113	4.0%
Catatumbo	Andean	868,583	27,766	3.2%
Valdivia-Tarazá-Cáceres			5,908	0.7%
San Pablo-Taracué	Caribbean	339,430	1,986	0.6%
Argelia-El Tambo	Pacific	377,072	10,099	2.7%
El Charco-El Turbio			378	0.1%
El Charco-Olaya Herrera			11,088	2.9%
El Naya			1,390	0.4%
Tumaco Border			14,780	3.9%
Policarpa-Patía			975	0.3%
Roberto Payán-Isagualp			916	0.2%
Telembí-Crista			1,131	0.3%

Timba-Jamundí-Buenos Aires	1,436	0.4%
Timbiquí-Saija	170	0.0%
Total	**92,248**	

Source: UNODC (2023). The fifth region Orinoquia is not shown since there has not been productive enclave.

Conversely, it is relevant to delineate the urban-rural division in the dynamics of the drug trafficking and violence in Colombia. This distinction arises due to productive enclaves tending to emerge and consolidate in rural municipalities, which are often situated at a considerable distance from densely populated urban centers.

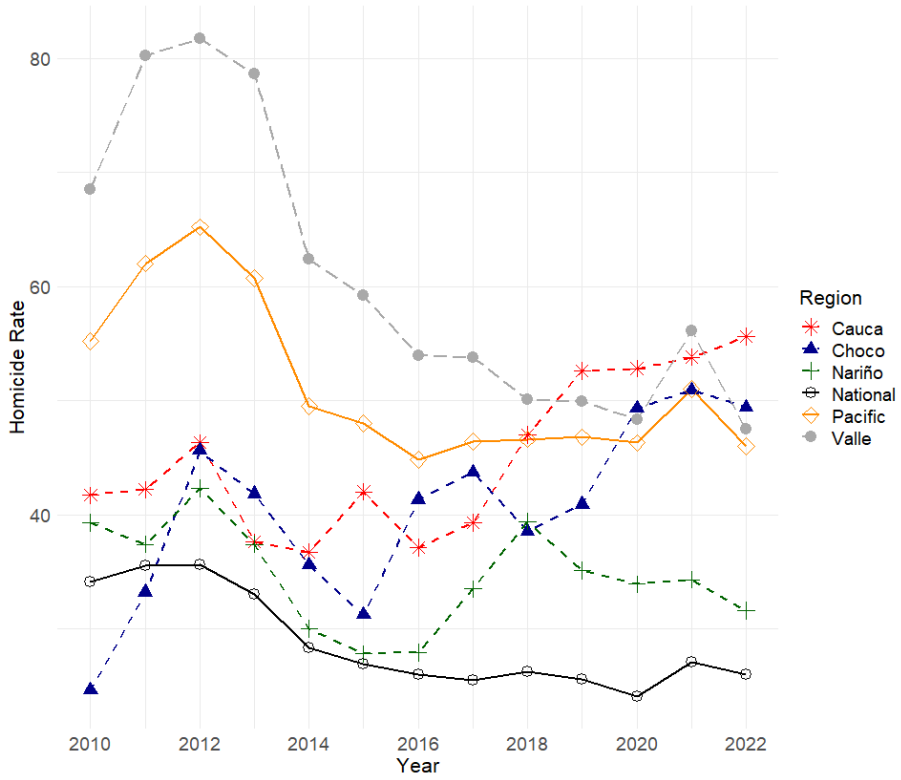
While most of the coca production is concentrated in rural municipalities, some cities also have considerable coca cultivation. One notable example is Tumaco in Nariño, which, despite having a population of 246,000 people, recorded an estimated production of 23,148 hectares of coca in 2016. Other intermediate cities with populations ranging from 120,000 to 320,000 individuals, such as Buenaventura, Jamundi, and Ipiales, consistently report an average annual crop size surpassing 1,300 hectares between 2011 and 2021. This pattern can be explained by the administrative and political structure in Colombia, where municipalities incorporate both urban and rural areas with different economic activities in each. In these rural areas, access to essential services is frequently lacking, and the institutional framework is typically underdeveloped and deficient (UNODC, 2023). Consequently, the inhabitants around productive enclaves face substantial challenges in terms of accessing illicit crop substitution programs under the National Comprehensive Program for the Substitution of Illicit Crops (*Programa Nacional Integral de Sustitución de Cultivos de Uso Ilícito, PNIS*) and transitioning into legal economic activities.

2.3. The Colombian Pacific Region

The Colombian Pacific Region encompasses four departments: Cauca, Choco, Nariño, and Valle. As of 2022, the region's population was estimated to be approximately

8,440,000, accounting for approximately 16% of the total Colombian population (DANE, 2022). The capital cities of the four departments in the Colombian Pacific region, namely Popayan, Quibdo, Pasto, and Cali, have around 3,160,000 individuals, accounting for 37.4% of the region's total population. However, when considering the population residing in intermediate cities with a population size exceeding 100,000 inhabitants, the urban population in the Pacific region amounts to approximately 5,134,730 individuals, representing 60.8% of the total population in the region. Hence, 40% of the population in the Colombian Pacific is distributed among smaller or rural municipalities.

Figure 4. Homicide rate at the national level and departments in the Pacific region, 2010-2022

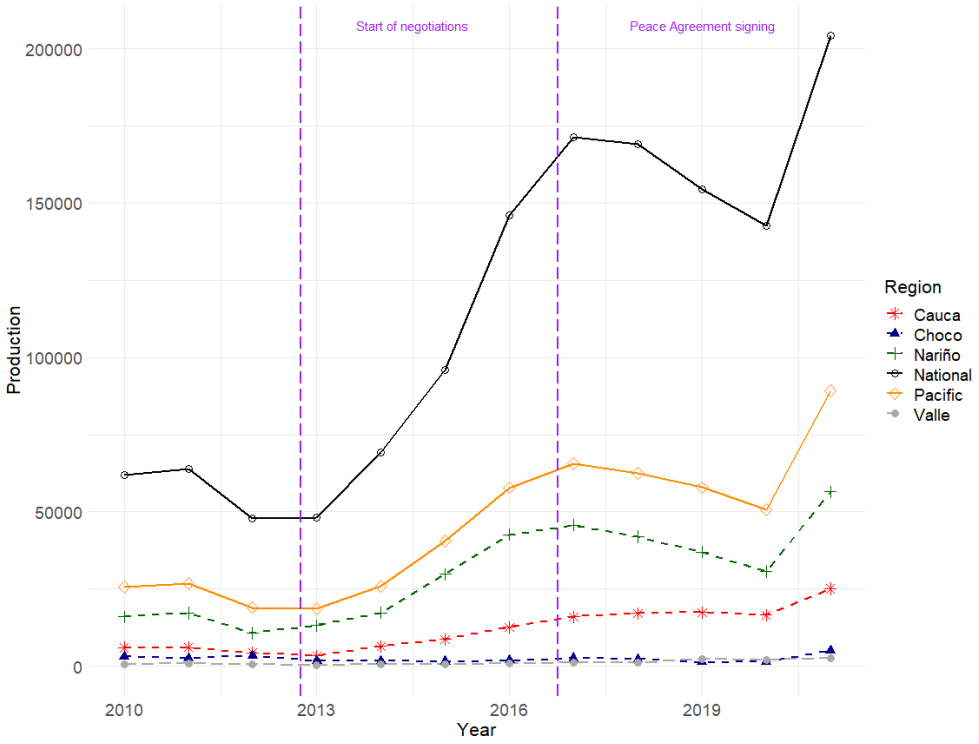


Source: *Statistical, Delinquency, Offenses and Operations Information System of the National Police of Colombia*- SIEDCO (2023), and *National Administrative Department of Statistics* - DANE(2023).

Figure 4 presents the homicide rate at both the national level and the departmental level within the Colombian Pacific region. It is evident that, in general, the four departments

of Cauca, Chocó, Nariño, and Valle, along with the overall Pacific region, exhibit a higher homicide rate compared to the national average, which stands at 28.8 homicides per 100,000 inhabitants. Particularly noteworthy is the department of Valle, which registers the highest homicide rate with an average of 60.8 homicides per 100,000 inhabitants, constituting approximately 65% of all homicides within the Pacific region. The remaining departments of Cauca, Chocó, and Nariño exhibit rates of 45, 40.5, and 34.6, respectively. Notably, both Cauca and Chocó have experienced an upward trend in their homicide rates in recent years.

Figure 5. Coca production (Has) at the national level and departments in the Pacific region, 2010-2021



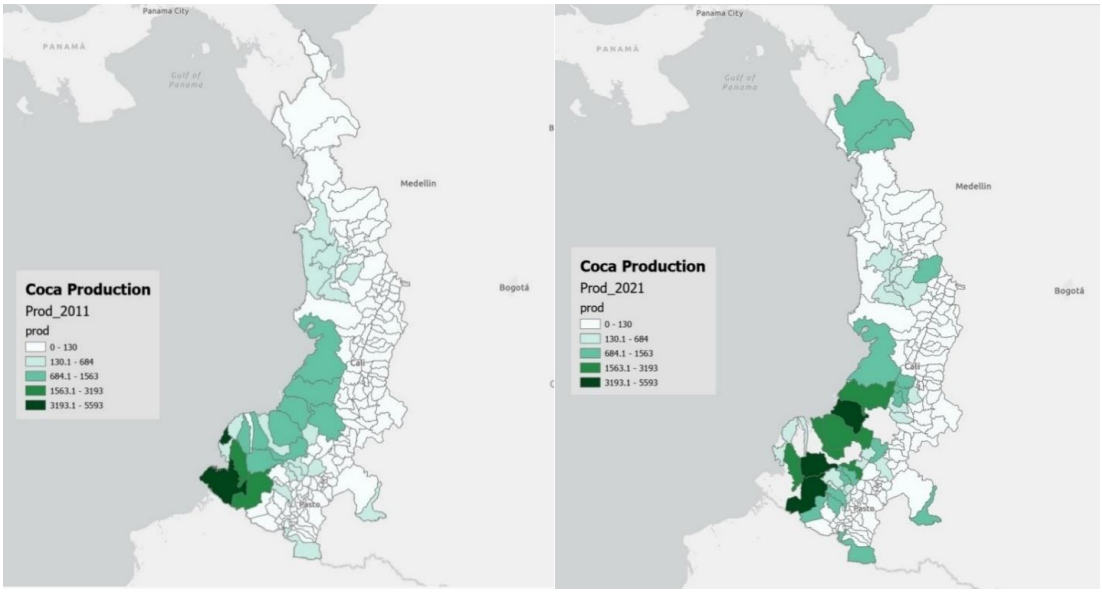
Source: United Nations Office on Drugs and Crime -UNODC (2023).

The Figure 5 presents the coca production in hectares at both the national and departmental levels within the four states comprising the Colombian Pacific region. The data reveal that the largest production has been concentrated predominantly in two departments, namely Cauca and Nariño. Their geographical and mountainous attributes

contribute to their high productivity in cultivating coca leaf, accounting for approximately 40% of the total national production in 2021. In contrast, the departments of Chocó and Valle make comparatively minor contributions, constituting only 2.5% and 1.3% of the total national production, respectively. Notably, the department of Valle, despite its lower production of illicit crops, exhibits elevated rates of violence, as evidenced in the previous Figure 4. This implies that urban areas with lower coca production, such as Valle, the relationship between coca crops and violence may not be direct and could be influenced by the presence of other factors, in contrast to more rural and growing areas like Cauca and Nariño. In this context, this research differs from previous studies such as Angrist and Kugler (2008) by incorporating non-growing and large-city departments, given they are situated within the same geographical region.

Moreover, ten out of the fifteen productive enclaves in the country are geographically located within the Colombian Pacific region. Among these enclaves, Algeria-El Tambo emerges as the most productive, with an estimated coca leaf production capacity of 12 metric tons per hectare per year, the highest record in the studies on coca crop productivity (UNODC, 2023). Consequently, the Colombian Pacific region emerges as a favorable area for coca cultivation and its subsequently commercialization.

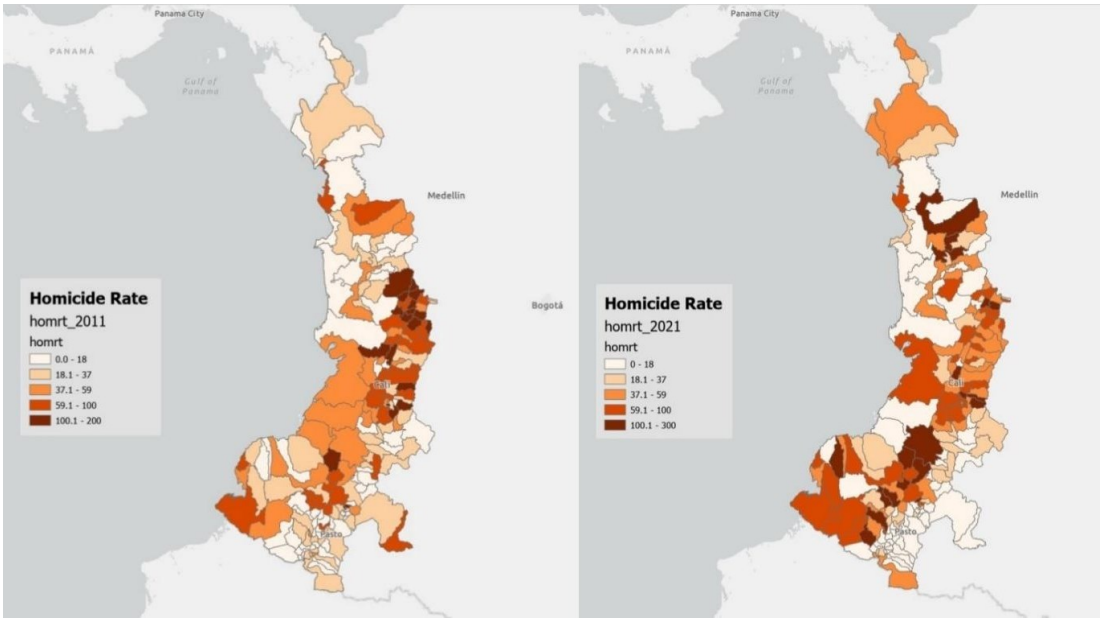
Figure 6. Map of coca production (Has) in Pacific Colombian Region 2011 vs 2021



Source: United Nations Office on Drugs and Crime -UNODC (2023).

Figure 6 shows the maps of coca production at municipality level for 2011 and 2021. In 2011, the concentration of coca cultivation was focalized in the southwest of the region and along the borders with Ecuador. However, by 2021, there is a diversification, with an increased number of municipalities participating in coca production within the region. Additionally, a substantial rise is notable in the northern region and coastal municipalities, attributable to their strategic positioning with access to the Pacific Ocean. On the other hand, figure 6 does not show a significant change in the municipalities located in the interior of the country, where the absence of illicit crops remains the same.

Figure 7. Map of Homicide Rates in Pacific Colombian Region 2011 vs 2021



Source: *Statistical, Delinquency, Offenses and Operations Information System of the National Police ofColombia*- SIEDCO (2023), and *National Administrative Department of Statistics* - DANE (2023).

Figures 7 indicates the maps for the homicide rate at the municipality level in the Colombian Pacific region for the years 2011 and 2021. Both maps highlight a widespread dispersion across municipalities. While in 2011 the municipalities with the highest homicide rates were concentrated in the interior of the region, in 2021 there is a notable shift in the trend, with municipalities with the highest homicide rates are dispersed throughout the region.

Finally, Appendix A presents the homicide rate change in the Colombian Pacific Region during the study period from 2011 to 2021, revealing a notable increase in a considerable number of municipalities. Moreover, most of these municipalities are in proximity to the Pacific Ocean, highlighting their relevance in drug trafficking routes.

In the context of the Colombian Pacific coast, a notable heterogeneity is evident among its subregions, encompassing variations in composition, economic activities, and

violence rates, particularly when considering the distinctions between urban and rural municipalities. The region exhibits a dual condition, characterized by a domestic drug market that operates primarily within Colombian cities and is marked by violence. Simultaneously, a global drug market operates with heightened violence in cocaine production centers and along the routes connecting these centers to export ports. Additionally, this global market exerts its influence in cities involved in the logistics of drug distribution, allowing drugs to reach consumers worldwide (Jiménez-García et al., 2023). Consequently, the unique characteristics of each municipality in the Colombian Pacific region provide them different impacts by both the domestic and global drug markets.

Chapter 3 Data

The data used in this study is derived from multiple sources. Criminal statistics, which include information on homicides, threats, and kidnappings are obtained from the SIEDCO application managed by the Colombian National Police (CNP). The Observatory on Drugs of Colombia (ODC) and the National Directorate of Narcotics (DNE) provide data on drug-related aspects, such as the annual cultivation of coca leaves and the number of coca hectares manually eradicated. Socioeconomic statistics, such as population, GDP per capita, and school enrollment rates are sourced from The National Administrative Department of Statistics (DANE). Additionally, the number of displaced persons is gathered from the Unit for Comprehensive Care and Reparation for Victims (UARIV).

In this study, I include variables that change over time at the municipality level to capture time- varying heterogeneity and are traditional determinant of crime (Buonanno and Vargas, 2019). The first measure is defined as *law enforcement* as the number of arrests in a municipality during a year, normalized by the total population size of that municipality. The second control corresponds to *average household size (Number of people per household*) and is quantified as the total population of the municipality divided by the number of households representing the average number of individuals constituting a household in that specific area. Armed groups commonly recruit and garner support from households situated in rural conflict zones. The economic activities and composition of these households play pivotal roles in shaping their responses and adaptations to the challenges presented by violent conflicts (Justino, 2009). Moreover, some authors (Gruenewald and Remer, 2006; Bircan et al., 2017) control violence rates with household size and find an inverse relationship between them.

Finally, the analysis incorporates the *School Enrollment Rate*, representing the ratio of students enrolled in primary, secondary, and high school to the population within the theoretically eligible age range for these levels, spanning from 5 to 16 years. The Colombian educational system consists of early education, preschool, basic education

(primary and secondary), and high school. Each of these levels has established age ranges, which belong to a broader category known as the school age, ranging from 5 to 16 years.

Table 2 presents the descriptive statistics for the pooled sample spanning from 2011 to 2021 for the four departments and their respective municipalities. Panel A shows the statistics of 1,122 municipalities at the national level, while Panel B displays the statistics of 944 municipalities located outside the Pacific region. Finally, Panel C displays the statistics of 178 municipalities situated in the Pacific region. Across all panels, on average, the population size remains relatively similar among municipalities. However, there are notable differences concerning the level of economic activity, as measured by GDP (constant 2011 price in billions of Colombian Pesos) and GDP per capita (constant 2011 price in millions of Colombian Pesos). Specifically, municipalities in the Pacific region exhibit lower economic activity in comparison to the national average.

Furthermore, a concerning trend is evident in Panel C, where municipalities in the Pacific region have twice the number of homicides per year, resulting in a homicide rate that doubles the national average. Moreover, coca production in hectares is significantly higher in the Pacific region, exceeding the national average by more than doubled.

The rates presented in Table 2 are per 100,000 inhabitants. To estimate the rates of *homicide*, *extortion*, *displacement*, *kidnappings*, and *arrests*, I calculate the number of events in municipalities m during year t. This count is then divided by the population of municipality m in the same year t, and multiplied by 100,000, as follows:

$$Rate_{i,t} = \frac{Events_{i,t}}{Population_{i,t}} x100{,}000$$

Extortion is forcing someone, through violence, to act against their will for illicit profit or economic gain for oneself or a third party (SIEDCO, 2023). In this context, the extortion rates shown in panel C for the Pacific region are slightly higher than the national average indicated in panel A. However, when contrasted with the rates excluding the Pacific region as presented in panel B, they are notably less.

On the other hand, forced displacement is defined as the coerced relocation of individuals or groups from their homes or workplaces, typically due to coercion, intimidation, armed group actions, human rights violations, or conflict impact (Comision de la Verdad, 2022). The displacement rate exhibited in panel C for the Pacific region is roughly 14 times higher than the national average rate delineated in panel A and approximately 3.4 times higher than the national average when excluding the Pacific region, as illustrated in panel B. This violent outcome stands out as one of the most affected in the Pacific region. Finally, Appendix B shows the correlation matrix between the dependent variables, coca production and the control variables.

Table 2. Descriptive Statistics from 2011 to 2021

Variable	Panel A: National Level				
	Obs	Mean	Std. Dev.	Min	Max
Population	1,122	42,181	252,034	240	7,823,334
Homicides	1,122	11.97	65.93	0	1,962.00
Homicides Rate	1,122	25.58	32.88	0	482.13
Extortions	1,122	4.98	32.82	0	1,721.00
Extortions Rate	1,122	3.04	15.39	0	322.97
Displacements	1,122	193.00	1,017.91	0	52,969.00
Displacements Rate	1,122	131.85	2,631.65	0	68,332.95
Kidnappings	1,122	0.19	1.14	0	49.00
Kidnapping Rate	1,122	0.58	3.21	0	119.95
Coca Production (Has)	1,122	106.40	734.55	0	23,148
GDP	1,122	726.85	64,449.36	0.52	267,728.26
GDP per Cap	1,122	13.48	17.66	1.06	475.62
Arrests	1,122	210.20	1,519.14	0	54,254.00
Arrests Rate	1,122	266.00	704.47	0	4,335.16
Household Size	1,122	3.36	0.60	1.74	10.07
School Enrollment Rate	1,122	0.95	0.25	0	1.00
State Unemployment Rate	1,122	11.20	3.11	3.20	23.20

Variable	Panel B: National Level (Without Pacific Region)				
	Obs	Mean	Std. Dev.	Min	Max
Population	944	41,638	264,401.2	240	7,823,334
Homicides	944	9.86	52.88	0	1,638.00
Homicides Rate	944	22.44	30.15	0	482.13
Extortions	944	4.71	33.34	0	1,721.00
Extortions Rate	944	9.18	15.79	0	322.97
Displacements	944	127.60	512.35	0	18,431.00
Displacements Rate	944	553.55	2,206.85	0	39,791.82
Kidnappings	944	0.17	1.09	0	49.00
Kidnapping Rate	944	0.50	3.10	0	119.95
Coca Production (Has)	944	76.91	585.72	0	22,229.60
GDP	944	726.85	6,920.63	0.52	267,782.26
GDP per Cap	944	14.23	18.78	1.69	475.62
Arrests	944	213.70	1,616.09	0	54,254.00
Arrests Rate	944	396.60	750.94	0	20,642.20
Household Size	944	3.39	0.62	1.74	10.07
School Enrollment Rate	944	0.98	0.22	0	1.00
State Unemployment Rate	944	11.10	3.14	3.20	23.20
Variable	**Panel C: Pacific Region**				
	Obs	**Mean**	**Std. Dev.**	**Min**	**Max**
Population	178	45,059	172,210	2,820	2,271,293
Homicides	178	23.19	111.49	0	1,962.00
Homicides Rate	178	42.26	40.78	0	303.80
Extortions	178	6.46	29.81	0	595.00
Extortions Rate	178	4.76	13.07	0	127.36
Displacements	178	539.60	2,235.70	0	52,969.00
Displacements Rate	178	1,903.80	4,037.24	0	68,332.90
Kidnappings	178	0.35	1.36	0	27.00
Kidnapping Rate	178	1.00	3.71	0	56.22
Coca Production (Has)	178	262.80	1,246.31	0	23,148.00
GDP	178	596.42	2,858.54	7.60	48,331.44
GDP per Cap	178	9.52	8.77	1.06	9.52
Arrests	178	192.00	834.21	0	16,792.00
Arrests Rate	178	307.08	361.88	0	4,335.15
Household Size	178	3.23	0.46	2.11	5.45
School Enrollment Rate	178	0.95	0.25	0	1.00
State Unemployment Rate	178	11.40	2.92	5.50	22.30

GDP is in billions of Colombian Pesos (COP), and GDP per Capita is in millions of Colombian Pesos(COP) both adjusted for inflation using the base year 2011 as the reference period.

All rates are presented per 100,000 inhabitants, providing a standardized comparison across different municipalities contexts.

Chapter 4 Empirical Methodology

To capture the relationship of illicit crops production on violence for rural locations, I use the following model:

$$y_{i,t} = \beta_0 + \beta_1 prod\_local_{i,t} + \beta_2 X_{i,t} + \alpha_i + \gamma_t + \varepsilon \qquad (1)$$

Where $y_{i,t}$ represents the dimension for each violence measure such as the rates for homicide, extortion, displacement, or kidnapping in municipality i during year t. The variable $prod\_local_{i,t}$ represents the number of hectares of coca planted in municipality i during year t. $X_{i,t}$ is a control vector of the municipality characteristics, including the GDP per capita, arrestment rate, average household size, unemployment rate, and school enrollment. Finally, α_i represents the fixed effect of municipality i to control for shocks that affect all municipalities, and $\gamma_t$represents the fixed effect of year t to control for variables that do not change over time.

Considering the heterogeneity patterns within larger and densely populated urban centers, which tend to exhibit higher crime levels (Gaviria and Pagés, 2002), this research categorizes urban centers as those with a population exceeding 99,000 residents. Subsequently, the study employs the ensuing model for estimation:

$$y_{i,t} = \beta_0 + \beta_1 prod\_state_{j,i,t} + \beta_2 X_{i,t} + \alpha_i + \gamma_t + \varepsilon \qquad (2)$$

Where $y_{i,t}$ represents the dimension for each violence measure such as the rates for homicide, extortion, displacement, or kidnapping in municipality i during year t. The variable $prod\_state_{i,t}$ represents the number of hectares of coca planted in state *j* of the municipality i during year t. $X_{i,t}$ is a control vector of the municipality characteristics, including the GDP per capita, arrestment rate, average household size, unemployment rate, and school enrollment. Finally, α_i represents the fixed effect of municipality i, and γ_t represents the fixed effect of year t.

Considering that intermediate and large cities do not serve as primary producers of illicit

crops but rather serve as strategic hubs for cocaine trafficking, involving activities such as commercialization, distribution, negotiation, and money laundering, the illicit crop production association on violence is primarily influenced by state-level production rather than local production. In both estimation approaches, it is hypothesized that the production of illicit crops will result in an escalation of all types of violence, suggesting a positive coefficient $\beta_1 > 0$ for the relationship between illicit crop production and violence.

Using ordinary least squares (OLS) estimates for datasets containing municipalities with zero occurrences in both the dependent variable, violent events, and explanatory variables, illicit crop production, will not be appropriate. Considering that certain municipalities, spanning both urban and rural areas, exhibit zero values in their violent outcomes during certain time periods, signifying the potential censoring of some dependent variables within the model, the analysis extends Tobit models as an alternative to the conventional OLS estimation.

However, it is important to emphasize that the specifications described above may face endogeneity issues. This is because rural municipalities engaged in coca production might generate a higher income within the economy, for instance through money laundering, compared to rural municipalities without coca crops. Additionally, these municipalities may experience higher rates of law enforcement interventions due to the increased prevalence of illicit activities concentrated in these areas, potentially leading to reverse causality. Conversely, both models may also suffer from the presence of significant omitted variables, such as the occurrence of armed group activities, including guerrilla or paramilitary actions.

Considering these potential challenges, the instrumental variables (IV) method is used as a second identification strategy. The IV method utilizes the number of hectares of coca manually eradicated by the Colombian government as an instrumental variable. The identification strategy assumes that there is no relationship between manual coca eradication and violent outcomes, armed groups do not retaliate against the population

for government actions such as the manual eradication of coca. To assess the validity and strength of the instrument, a first-stage regression is estimated as follows:

$$coca\_production_{i,t} = \beta_0 + \beta_1 manual_{i,t} + \beta_2 X_{i,t} + \alpha_i + \gamma_t + \varepsilon \quad (3)$$

Where the dependent variable $coca\_production_{i,t}$ represents the number of hectares of coca planted in the municipality i during year t; while the independent variable $manual_{i,t}$ represents the number of hectares of coca eradicated manually in the municipality i during year t, and the variable $X_{i,t}$ is a control vector of the municipality characteristics, including the GDP per capita, arrestment rate, average household size, unemployment rate, and school enrollment. α_i represents the fixed effect of municipality i to control for shocks that affect all municipalities, and $\gamma_t$represents the fixed effect of year t to control for variables that do not change over time.

Once the validity of the instrument has been established, the Second Stage Least Squares (2SLS) regression is estimated as follows, where $\widehat{coca\_production}$ is the predicted value of the first stage:

$$y_{i,t} = \beta_0 + \beta_1 \widehat{coca\_production}_{i,t} + \beta_2 X_{i,t} + \alpha_i + \gamma_t + \varepsilon \quad (4)$$

Chapter 5 Results

5.1 OLS and Tobit estimations

Table 3 displays the association estimations for coca leaf production, measured in hectares, on the homicide rate in both rural and urban municipalities. The findings indicate that the coefficients of coca crop production in columns (1) and (2) are statistically significant and positive with respect to homicides rates in rural municipalities, with same magnitude size for both OLS and Tobit estimations. In particular, one hectare coca cultivation is associated with an increase of 0.009 homicide rate points in rural municipalities. Conversely, in urban centers, the coefficient in column (3) does not show a strong association between coca production and homicides. All the control variables included in the estimates show statistical significance, except for the unemployment rate in both rural and urban municipalities.

For instance, consider the case of Unguia municipality in Choco in 2011, where coca production covered only 6 hectares, and the homicide rate was 25.35 per 100,000 inhabitants. In 2021, coca production increased significantly to 411.48 hectares, correlating with a rise in the homicide rate to 36.33 per 10,000 inhabitants. The estimation suggests that the increase in coca production is correlated with a 3.70-unit increase in the homicide rate, while the actual observed change amounted to 10.99 units. In other words, approximately 33.70% of the increase in the homicide rate between 2011 and 2021 in Unguia can be associated to the increase in coca production.

Similarly, economic activity, measured as GDP per capita exhibits a negative relationship on the homicide rate within rural municipalities, in sharp contrast to the positive association observed in the larger urban municipalities of the Colombian Pacific region. This inverse relationship is observed consistently in both Tobit and OLS estimates in columns (1) and (2) respectively with similar correspondence sizes at 10% of confidence level. This empirical finding may suggest that in rural municipalities characterized by

economic growth, improved living conditions follow for their residents. Consequently, these improved conditions may diminish the incentives for involvement in illicit undertakings such as the cultivation of coca plants, consequently reducing the probability of individuals falling victim to acts of violence perpetrated by drug cartels and armed groups. In contrast, the nature of the relationship in urban centers displays a positive and stronger association, characterized by a more substantial outcome size. This phenomenon implies that homicides in urban settings are not exclusively connected to drug- related issues but may also be closely linked with other forms of illegal activities.

The variable measuring law enforcement, *arrests rate*, exhibits a statistically significant and positive correlation on homicide rates, for both rural municipalities and urban centers. This relationship may manifest in a reciprocal manner, whereby an escalation in homicides would increase law enforcement measures by authorities, thereby resulting in a greater frequency of arrests related to this type of crime. Specifically, an increase of one unit in the arrests rate is associated with an increase around 0.015 and 0.013 homicide rate point in rural areas according to columns (1) and (2), while in urban areas, this increase is more pronounced, corresponding to an approximate rise of 0.025 points in the homicide rate.

These findings may appear counterintuitive when considering the notion that a higher number of arrests would correspond to a lower incidence of crimes. However, coercive measures such as arrests typically respond to escalating crime rates, and as a result, regions with high crime rates often exhibit elevated arrest rates. Furthermore, the variations in magnitudes between rural and urban areas may be influenced by the specific types of crimes prevalent in each region, a distinction that the arrest rate variable may not effectively capture.

Conversely, the variable representing size of households shows a significant and negative association on both outcomes for both rural municipalities and urban centers. Specifically, an increase on one person in the average household size in rural regions is associated with a decrease in the homicide rate by approximately 32.65 and 30.74 units

according to columns (1) and (2); while in urban regions the decrease in even greater with around 41.10 units. Considering the relatively smaller household size in the Colombian Pacific compared to the national average (refer to panels B and C of Table 2), the Pacific region has an average household size of 3.23 individuals. This ranges from 2.11 individuals in the municipality with the smallest average household size to 5.45 individuals in the largest municipality. Consequently, any shift in the average composition of households in the Pacific region is expected to have a significant correlation on the incidence for violent outcomes in the region.

Finally, the coefficients for school enrollment in columns (1) and (2) are positive and statistically significant, one point change in school enrollment is correlated with an increase of homicide rates in rural areas by 0.14 and 0.13 respectively. On the other hand, the coefficient in urban municipalities in column (3) shows a weaker statistical relationship. This suggests that homicides are more closely linked to drug trafficking activities in rural municipalities while in urban centers are more being driven by economic cycles and other factors.

Table 3. Estimates for Homicide Rates

	Rural Municipalities		**Urban Municipalities**
	Tobit	**OLS**	**OLS**
Intercept	116.262***	114.753***	129.71
	(24.679)	(23.529)	(83.455)
Coca Production	0.009***	0.009***	-0.001*
	(0.002)	(0.002)	(0.001)
GDP per Capita	-0.344*	-0.275*	1.065***
	(0.18)	(0.159)	(0.407)
Arrests Rate	0.015***	0.013***	0.025***
	(0.005)	(0.005)	(0.009)
Household Size	-32.654***	-30.742***	-41.104*
	(7.49)	(7.121)	(24.397)
Unemployment State Rate	0.294	-0.013	-1.228
	(0.427)	(0.403)	(0.771)
School Enrollment	0.141***	0.125***	0.224*
	(0.036)	(0.034)	(0.12)
R-Squared:		0.64948	0.80363
Adj. R-Squared:		0.61084	0.7577

F-statistic:		16.8104	17.4982
Observations:	1804	1804	154

$*\ \rho < 0.1, **\ \rho < 0.05, ***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses. Tobit analysis is not included for urban municipalities as there are no zeros in the sample.

Table 4 displays the estimations of the association of coca leaf production, measured in hectares, on the extortions rate both rural and urban municipalities. The findings suggest that coca production shows no correlation with the extortion rate in rural municipalities, as indicated by columns (1) and (2). Additionally, while the estimates of coca production in urban municipalities are statistically significant in columns (3) and (4), both coefficients are zero. This implies that coca production does not exhibit a direct relationship with the extortion rate, even in urban municipalities. Additionally, results suggest that homicides are more closely associated with drug-trafficking in rural areas, while extortion is influenced by other economic activities. For instance, an increase in one point on the state unemployment rate is associated with an increase in the extortion rate by around 0.58 and 0.60 in rural areas according to columns (1) and (2), while in urban areas is associated with an increase by approximately 1.44 points, as indicated in columns (3) and (4). In this context, extortion is influenced by economic cycles, and this influence demonstrates a stronger correlation in urban regions compared to rural ones. Lastly, average household size exhibits a statistically significant and negative correlation with extortion in urban municipalities. Specifically, an increase in one person in the average household size is correlated with a decrease in extortion rate by 5.64 in urban municipalities according to columns (3) and (4).

Table 4. Estimates for Extortion Rates

	Rural Municipalities		Urban Municipalities	
	Tobit	**OLS**	**Tobit**	**OLS**
Intercept	3.574	4.754	192.1***	192.06***
	(16.65)	(8.991)	(60.22)	(67.113)
Coca Production	0	0	0**	0**
	(0.001)	(0.001)	(0)	(0)
GDP per Capita	-0.11	0.051	-0.508*	-0.508
	(0.159)	(0.061)	(0.292)	(0.325)
Arrests Rate	0.004	0.002	0.002	0.002
	(0.003)	(0.002)	(0.006)	(0.007)
Household Size	-8.608*	-3.778	-56.4***	-56.396***
	(5.16)	(2.721)	(17.48)	(19.477)
Unemployment State Rate	0.576**	0.603***	1.442**	1.442**
	(0.273)	(0.154)	(0.611)	(0.68)
School Enrollment	-0.006	-0.008	0.026	0.026
	(0.024)	(0.013)	(0.083)	(0.093)
R-Squared:		0.401		0.759
Adj. R-Squared:		0.335		0.705
F-statistic:		6.069		14.041
Observations:	1804	1804		154

$*\ \rho < 0.1$, $**\ \rho < 0.05$, $***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

Table 5 displays the estimations for coca leaf production, measured in hectares, on the displacements rate both rural and urban municipalities. The findings suggest illicit crops have a statistically significant and positive association with the homicide rate in rural municipalities, while shows a negative association in urban municipalities. According to columns (1) and (2), an increase of one coca hectare is associated with an increase on displacement rate by around 0.63 and 0.57 points in rural municipalities, while in urban areas is associated with a decrease by 0.16 points, as indicated in column (3). This latter result is reasonable, considering most displaced individuals are from rural communities forced to abandon their homes and crops due to the escalation of illicit activities in rural areas and relocating to larger urban centers. In contrast, the coefficients of the arrest

rate in rural regions demonstrate a statistically significant and positive relationship. Specifically, an increase of one point in the arrest rate is associated with a rise in the displacement rate by 1.52 and 1.40 points in rural areas, as indicated in tables (1) and (2). These findings suggest that displacement is a considerably more responsive outcome in rural areas. Implementing policies, such as reducing coca cultivation or increasing law enforcement, may result in more pronounced and observable effects in these regions.

Table 5. Estimates for Displacement Rates

	Rural Municipalities		Urban Municipalities
	Tobit	**OLS**	**OLS**
Intercept	-1176	-1785.712	-6203.824
	(2873)	(2970.187)	(9207.049)
Coca Production	0.633***	0.566**	-0.16**
	(0.215)	(0.223)	(0.074)
GDP per Capita	-27.82	-24.533	65.753
	(19.42)	(20.095)	(44.896)
Arrests Rate	1.522***	1.387**	0.307
	(0.563)	(0.579)	(0.995)
Household Size	923.2	1295.338	1831.424
	(871.1)	(898.862)	(2691.526)
Unemployment State Rate	-22.47	-64.26	-57.082
	(49.86)	(50.876)	(85.005)
School Enrollment	5.97	5.049	4.037
	(4.194)	(4.34)	(13.236)
R-Squared:		0.401	0.779
Adj. R-Squared:		0.335	0.728
F-statistic:		6.069	15.098
Observations:	1804	1804	154

$*\ \rho < 0.1$, $**\ \rho < 0.05$, $***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses. Tobit analysis is not included for urban municipalities as there are no zeros in the sample.

Finally, the findings presented in Table 6 suggest that the production of illicit crops does not exert a statistically significant relationship on the kidnapping rate. Additionally, the control variables used in the estimations do not show a significant association, except for unemployment state rate, which exhibits a slightly positive influence on rural

municipalities, however there is no evidence for any relationship in urban municipalities.

Table 6. Estimates for Kidnappings Rate

	Rural Municipalities		Urban Municipalities
	Tobit	**OLS**	**OLS**
Intercept	-12.13	-1.307	3.393
	(23)	(3.425)	(6.895)
Coca Production	0.001	0	0
	(0.001)	(0)	(0)
GDP per Capita	0.261	0.024	0.022
	(0.203)	(0.023)	(0.033)
Arrests Rate	-0.006	-0.001*	-0.002**
	(0.006)	(0.001)	(0.001)
Household Size	-2.384	1.01	-0.272
	(7.132)	(1.036)	(2.001)
Unemployment State Rate	1.400***	0.098*	0.032
	(0.472)	(0.059)	(0.07)
School Enrollment	-0.026	-0.004	-0.005
	(0.033)	(0.005)	(0.01)
R-Squared:		0.130	0.357
Adj. R-Squared:		0.054	0.207
F-statistic:		1.351	2.374
Observations:	1804	1804	154

$*\ \rho < 0.1, **\ \rho < 0.05, ***\ \rho < 0.01$. Fixed effects for municipalities and time controls arenot shown in the table. Standard errors are in parentheses. Tobit analysis is not included for urban municipalities as there are no zeros in the sample.

5.2 2SLS-IV Estimations

Table 7 summarizes the results for the first-stage regression when testing for manual coca eradication is an instrument of relevance, according to equation (3). In Column (1), the F-statistic is 184 for the benchmark model, which includes both rural and urban municipalities. Columns (2) and (3) present F- statistics of 82.5 and 25.6 for rural and urban municipalities respectively. Since the rule of thumb requires an F-value of at least 10 (Staiger and Stock, 1997) to assess the weakness of the instrument, the result suggests that manual coca eradication is a strong instrument addressing potential

endogeneity concerns into the specification and enhancing the causal inference interpretation in the estimates. Considering there is a small sample size for urban municipalities, the estimates should be seen in the context of the scope of this thesis.

Table 7. First-Stage estimates. **Dependent Variable: manual coca eradication.**

	Pacific Region (1)	**Rural (2)**	**Urban (3)**
Intercept	80.065	17.528	13610***
	(183.853)	(117.671)	(3688)
Coca Production	0.806***	1.356***	0.542***
	(0.025)	(0.069)	(0.079)
GDP per Capita	-1.712	-1.07	-21.03
	(2.775)	(2.104)	(14.56)
Arrests Rate	-0.127*	-0.115**	-3.401***
	(0.063)	(0.042)	(0.863)
Household Size	161.758**	125.668***	-568.8
	(51.191)	(32.83)	(824.5)
Unemployment State Rate	-41.466***	-30.308***	-353.4***
	(8.07)	(5.365)	(79.05)
School Enrollment	0.967	0.879	-42.85*
	(0.928)	(0.589)	(17.79)
R-Squared:	0.361	0.216	0.511
F-Statistic (First-stage)	184	82.54	25.63
Observations	1958	1804	154

$*\ \rho < 0.1$, $**\ \rho < 0.05$, $***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

The results for the estimates of Equation (4) using 2SLS-IV regressions are presented below. In Table 8, Column (1) displays the estimates of homicide rates in rural municipalities, while Columns (2) and (3) incorporate fixed effects for time and municipalities, respectively. Finally, Column (4) presents estimates with both fixed effects for time and municipalities. The results from both Columns (1) and (2) indicate a statistically significant and positive effect of coca production on the homicide rate in rural municipalities. An increase of one hectare of coca is associated with an expected 0.014 and 0.018 points increase in homicide rates in rural municipalities. However, when time fixed effects are introduced, as seen in Columns (3) and (4), coca production in these areas does not appear to have a causal effect on the homicide rate.

The relationship between GDP per capita in rural municipalities and the homicide rate exhibits a positive association in columns (1) and (2). However, when controlling for municipality fixed effects, the direction of this association shifts to become negative in columns (3) and (4). On the other hand, the arrest rate coefficient exhibits statistical significance with a consistent magnitude across all four estimations. Specifically, a one-point increase in the arrest rate is associated with a rise in the homicide rate ranging from 0.009 to 0.013 points in rural municipalities, as indicated in columns (1) to (4). This suggests that an escalation in law enforcement measures may be a reactive response to the surge in criminal activities. This response involves an increased state intervention through the augmentation of police or military personnel and a higher number of arrests of individuals affiliated with military groups in rural areas. In such small, and close communities, the rise in homicides may amplify the demand for government intervention.

The coefficients related to the average size of households reveal a statistically significant and negative correlation with the homicide rate in rural areas. A rise of one person in the average size of households in rural areas is correlated to a reduction in the homicide rate ranging from 6.41 to 32.86 points, as indicated in columns (1) - (4). Reducing household size is typically linked to income increases (Fiegehen and Lansley, 1976), implying that alterations in composition have an indirect effect on homicide rates.

The effect of the state unemployment rate is positive and significant even when controlling for time fixed effects in columns (1) and (2), although the results are no robust to the inclusion of controls for municipality fixed effects in columns (3) and (4) since the unemployment rate is at state level and not at municipality level. However, a positive association is expected since higher levels of unemployment and limited economic opportunities bring individuals in rural areas to turn to coca cultivation or engage in illegal activities.

Table 8. Homicides Rates Estimates for 2SLS-IV regressions in Rural Municipalities between 2011-2021

	(1)	(2)	(3)	(4)
Intercept	35.311***	47.64***	26.513**	122.827***
	(7.353)	(10.076)	(12.982)	(24.284)
Coca Production	0.014***	0.018***	0.001	-0.001
	(0.003)	(0.003)	(0.006)	(0.006)
GDP per Capita	0.588***	0.624***	-0.357**	-0.299*
	(0.132)	(0.137)	(0.158)	(0.161)
Arrests Rate	0.009***	0.01***	0.012**	0.013***
	(0.003)	(0.003)	(0.005)	(0.005)
Household Size	-14.271***	-19.709***	-6.417*	-32.86***
	(2.122)	(2.498)	(3.598)	(7.309)
Unemployment State Rate	3.275***	3.894***	0.41	-0.176
	(0.356)	(0.424)	(0.303)	(0.419)
School Enrollment	0.067*	0.059	0.153***	0.127***
	(0.037)	(0.037)	(0.035)	(0.035)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.126	0.142	0.634	0.643
Adjusted R-squared:	0.123	0.135	0.596	0.604
Observations:	1804	1804	1804	1804

$*\ \rho < 0.1$, $**\ \rho < 0.05$, $***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

Columns (1) and (2) in Table 9 demonstrate a statistically significant association between coca production and the homicide rate in urban municipalities, with an approximate increase of one hectares of cultivated coca leading to 0.005 points increase in the homicide rate. This effect size is notably smaller in comparison to the coefficients observed in estimates for rural municipalities. However, when reviewing columns (3) and (4) with municipal fixed effects, the results are less significant, and the relationship turns negative which suggest there is no evident causal effect of coca production on the

homicide rate in these urban areas when there are controls for time fixed effects. In other words, municipality fixed effects seem to be the main driver of differences in homicide rates.

The control variables, including GDP per capita, household size, and school enrollment, respond differently when fixed effects for time and municipality are included. Their levels of statistical significance and magnitudes vary compared to the results obtained through OLS estimation in Table 3. Additionally, the unemployment rate shows a positive relationship with the homicide rate in urban areas, with statistical significance at the 1% level in column (1). However, when controlling for time fixed effects in column (2) and municipality fixed effects in columns (3) and (4), the statistical relevance diminishes or disappears. This could be due to the fact that unemployment rate is at the state level, and larger cities generally have more substantial economic activity and a more active labor market compared to the region. Consequently, this variable might not fully capture the effect of unemployment at the urban level.

Table 9. Homicides Rates Estimates for 2SLS-IV regressions in Urban Municipalities

	(1)	(2)	(3)	(4)
Intercept	-130.2***	-68.246	130.607	345.197*
	(41.52)	(74.85)	(123.322)	(184.208)
Coca Production	0.005***	0.005***	-0.013*	-0.008*
	(0.001)	(0.001)	(0.007)	(0.005)
GDP per Capita	0.523***	0.5***	-0.748	0.82
	(0.131)	(0.128)	(0.828)	(0.581)
Arrests Rate	-0.005	-0.013	0.025*	0.027**
	(0.01)	(0.013)	(0.015)	(0.012)
Household Size	21.45***	9.07	-31.311	-91.015*
	(7.23)	(10.85)	(26.357)	(47.279)
Unemployment State Rate	2.839***	2.735*	-1.134	-2.446*
	(0.948)	(1.438)	(1.387)	(1.334)
School Enrollment	0.65***	0.552**	-0.073	-0.087
	(0.174)	(0.221)	(0.339)	(0.265)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.159	0.260	0.176	0.632
Adjusted R-squared:	0.125	0.174	0.059	0.546
Observations:	154	154	154	154

$* \rho < 0.1$, $** \rho < 0.05$, $*** \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

Tables 10 and 11 present estimations regarding the impact of coca production on extortion rates in rural and urban municipalities, respectively. In Table 10, the coefficient for coca production in columns (1) – (4) suggests no empirical evidence of an association between coca production and the extortion rate in rural areas when also controlling for municipal and time fixed effects. Therefore, it can be inferred that coca production does not establish a causal relationship with extortion rates in rural municipalities.

Furthermore, the controls included in the estimates also do not show statistical relevance when comparing the coefficients, with only household size and the unemployment rate being relevant at the 1% level in at least two of three estimates. Household size has a negative effect on the extortion rate in rural areas while the unemployment rate exerts a positive impact.

Table 10. Extortions Rates Estimates for 2SLS-IV regressions in Rural Municipalities

	(1)	(2)	(3)	(4)
Intercept	25.58***	2.793	90.402	97.546
	(2.204)	(2.876)	(66.699)	(115.636)
Coca Production	0	-0.001	0.004	0.002
	(0.001)	(0.001)	(0.004)	(0.003)
GDP per Capita	0.146***	0.031	0.382	-0.382
	(0.039)	(0.039)	(0.448)	(0.365)
Arrests Rate	0.002**	0.001**	0.009	0.001
	(0.001)	(0.001)	(0.008)	(0.008)
Household Size	-6.344***	-2.788***	-32.567**	-35.344
	(0.636)	(0.713)	(14.255)	(29.679)
Unemployment State Rate	-0.05	0.495***	1.266*	2.422***
	(0.107)	(0.121)	(0.75)	(0.837)
School Enrollment	0.022*	0.017	0.156	0.106
	(0.011)	(0.011)	(0.184)	(0.166)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.081	0.182	0.326	0.393
Adjusted R-squared:	0.078	0.175	0.257	0.326
Observations:	1804	1804	1804	1804

$* \rho < 0.1$, $** \rho < 0.05$, $*** \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

The results in Table 11 for urban municipalities exhibit a similarity to those presented in the previous table for rural counterparts. Column (1) indicates a statistically weak and negative impact of coca production on the extortion rate in large cities. However, when accounting for fixed effects of time and municipalities in Columns (2), (3), and (4), the findings do not reveal a causal relationship between coca production and extortion in urban areas.

Similarly, the coefficients of the controls for urban regions exhibit a similar trend to those for rural regions as shown in Table 10. This suggests that these controls may not be sufficiently explaining the behavior of extortion in both rural and urban regions.

Table 11. Extortions Rates Estimates for 2SLS-IV regressions in Urban Municipalities

	(1)	(2)	(3)	(4)
Intercept	84.05***	-140***	90.402	97.546
	(31.59)	(49.12)	(66.699)	(115.636)
Coca Production	-0.002*	0	0.004	0.002
	(0.001)	(0.001)	(0.004)	(0.003)
GDP per Capita	-0.245**	-0.252***	0.382	-0.382
	(0.1)	(0.084)	(0.448)	(0.365)
Arrests Rate	-0.015**	0.01	0.009	0.001
	(0.007)	(0.008)	(0.008)	(0.008)
Household Size	-11.7**	23.85***	-32.567**	-35.344
	(5.5)	(7.12)	(14.255)	(29.679)
Unemployment State Rate	-1.11	0.868	1.266*	2.422***
	(0.721)	(0.944)	(0.75)	(0.837)
School Enrollment	0.027	0.429***	0.156	0.106
	(0.132)	(0.145)	(0.184)	(0.166)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.060	0.385	0.535	0.720
Adjusted R-squared:	0.022	0.313	0.469	0.655
Observations:	154	154	154	154

$* \rho < 0.1$, $** \rho < 0.05$, $*** \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

The results regarding the estimates of displacement rates in rural municipalities, as presented in Table 12, reveal a statistically significant and positive association between coca production and displacement rates in such regions. Notably, all estimates exhibit a similar magnitude even when controlling for time and municipality fixed effects: with a one-hectare increase in coca production in these regions, the displacement rate is anticipated to rise by 2.9, 3.0, 3.4, and 3.3 points according to the findings in Columns (1), (2), (3), and (4), respectively. It can be explained by the notion that the rise in coca cultivation results in the displacement of poorer households, not involved in cultivation, towards urban areas with increased economic and legal opportunities.

Furthermore, the coefficient for household size shows a statistically significant and positive relationship with the displacement rate at the 1% significance level in columns (1) – (3) and at the 5% significance level in column (4). In contrast, the other control variables do not exhibit the same level of statistical significance when compared to the inclusion of time and municipality fixed effects.

Table 12. Displacement Rates Estimates for 2SLS-IV regressions in Rural Municipalities

	(1)	(2)	(3)	(4)
Intercept	-3841.324***	-2340.628**	-7063***	-4072
	(754.614)	(1038.681)	(1695)	(3176)
Coca Production	2.928***	3.002***	3.375***	3.317***
	(0.324)	(0.343)	(0.846)	(0.832)
GDP per Capita	-44.722***	-31.342**	-23.22	-17.54
	(13.507)	(14.098)	(20.65)	(21.11)
Arrests Rate	-0.171	-0.162	1.403**	1.251**
	(0.271)	(0.271)	(0.604)	(0.607)
Household Size	1902.818***	1661.194***	2708***	1895**
	(217.758)	(257.477)	(469.7)	(956)
Unemployment State Rate	16.675	-54.452	48.88	-18.16
	(36.5)	(43.668)	(39.58)	(54.87)
School Enrollment	-6.712*	-6.678*	5.308	4.422
	(3.791)	(3.797)	(4.529)	(4.542)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.061	0.070	0.3629	0.377

Adjusted R-squared:	0.058	0.062	0.2974	0.309
Observations:	1804	1804	1804	1804

$*\ \rho < 0.1$, $**\ \rho < 0.05$, $***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

Finally, Columns (1) and (2) in table 13 reveal a positive and statistically significant relationship between coca production and the rate of displacement in urban municipalities. The effect size is consistent, indicating that an increase of one hectare of coca planted in these areas is associated with an expected increase of 0.4 and 0.6 points in the displacement rate, respectively. However, when including controls for municipality fixed effects, coca production does not exhibit a discernible causal effect on the displacement rate in urban municipalities.

The household size coefficient is statistically significant at the 1% level for columns (1) and (2). However, when municipality fixed effects are introduced in columns (3) and (4), the results do not suggest a direct relationship between household size and the displacement rate in urban regions. The difference between these findings and those presented for rural areas in table 12 can be attributed to the predominant internal migratory pattern of the country, which involves movement from rural to urban areas. As a result, migratory patterns within larger cities may be influenced by other factors unrelated to drug trafficking activities.

Table 13. Displacement Rates Estimates for 2SLS-IV regressions in Urban Municipalities

	(1)	**(2)**	**(3)**	**(4)**
Intercept	-18640***	-35590***	-6812.947	-423.596
	(3659)	(6968)	(7089.165)	(15229.593)
Coca Production	0.441***	0.576***	-0.366	-0.348
	(0.111)	(0.137)	(0.414)	(0.396)
GDP per Capita	2.508	0.04	48.939	59.173
	(11.58)	(11.92)	(47.579)	(48.007)
Arrests Rate	-0.284	1.544	0.847	0.348
	(0.866)	(1.205)	(0.843)	(1.024)
Household Size	5416***	7930***	1930.519	492.608
	(637.2)	(1010)	(1515.153)	(3908.807)

Unemployment State Rate	90.92	274.3**	-59.369	-89.743
	(83.53)	(133.8)	(79.752)	(110.263)
School Enrollment	3.312	34.77*	3.337	-4.287
	(15.3)	(20.54)	(19.514)	(21.918)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.400	0.448	0.751	0.763
Adjusted R-squared:	0.380	0.388	0.718	0.71
Observations:	154	154	154	154

$*\ \rho < 0.1$, $**\ \rho < 0.05$, $***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

Lastly, Appendices C and D present the estimation results of the influence of coca production on kidnapping rates for urban and rural municipalities, respectively. However, the results do not provide evidence supporting a causal relationship between coca crops and the incidence of kidnappings in these areas.

Future research should focus on the potential influence of these other activities associated with drug trafficking within urban areas located in the Colombian Pacific Region. Moreover, subsequent research could consider the inclusion of additional variables, such as the informal employment levels in municipalities, and the counts of incidents involving attacks, ambushes or confrontations between armed groups and law enforcement entities, including the police and the national army. Lastly, a geographical analysis may be conducted, considering the spatial distances regard to the proximity of productive enclaves to urban centers, ports, and land borders, determining the geographic significance of the points under examination.

Chapter 6 Conclusion

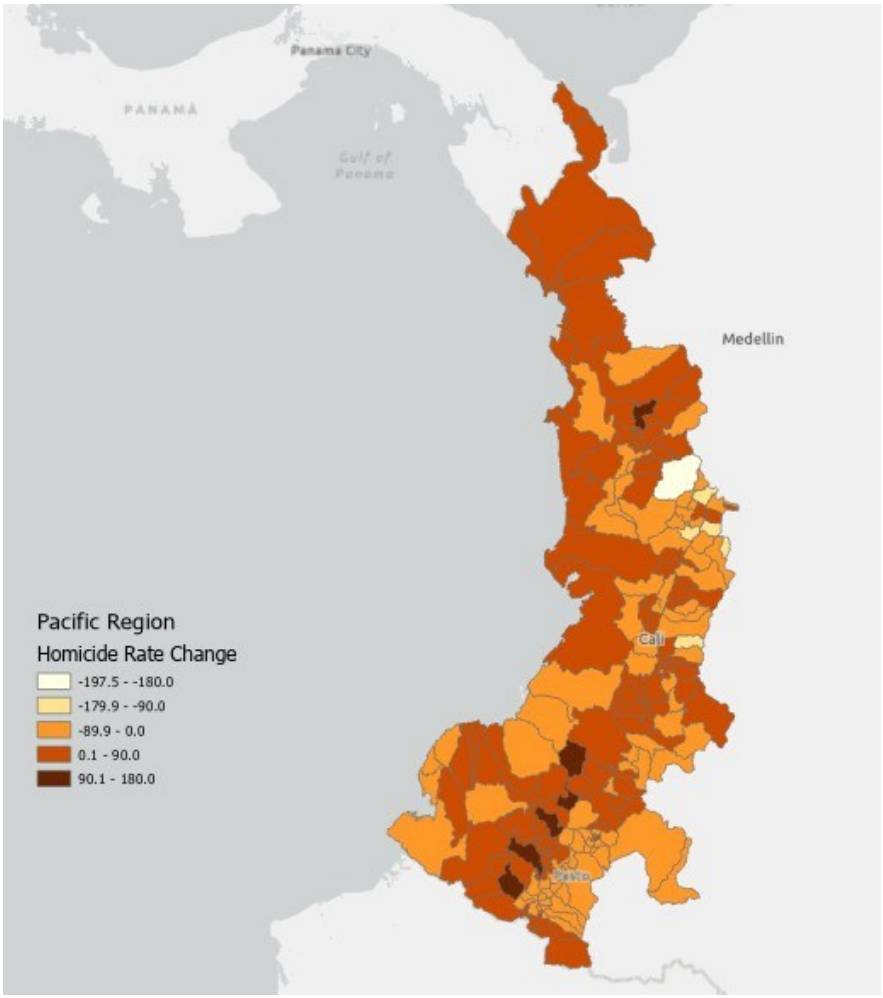
The principal objective of this paper is to estimate the relationship of illegal drug production on violent conflict outcomes in the heterogeneous Pacific Colombian Region during the transitional period of the peace agreement from 2011 to 2021. A study that has not been undertaken in prior economic literature. Previous research has mainly focused on illicit crop production and violence at state level but not by municipality level, resulting usually in a lack of analysis that differentiate between urban and rural entities.

I have employed three different statistical approaches including OLS fixed effects, Tobit, and instrumental variable fixed effect regression to investigate the potential effect of coca cultivation on homicides, extortions, displacement, and kidnappings. The findings from all estimations indicate that an escalation in coca cultivation is associated with elevated homicide, at the same time exerts a positive causal effect on displacement in rural areas where such regions serve as key areas for coca cultivation and the establishment of productive enclaves. Increasing one hectare of coca cultivation is associated with an increase in displacement rate by 3.3 points in these rural areas. In contrast, there is no significant evidence of a strong relationship between coca production and violent outcomes in urban municipalities. One explanation that may contribute to this is that homicides in urban centers are not exclusively related to drug issues but may also be due to other illegal activities.

Notably, evidence shows other violent outcomes such as extortion and kidnappings do not appear to be strongly influenced by coca cultivation in either urban or rural municipalities. Moreover, despite substantial investments in anti-drug policies such as Plan Colombia and the National Comprehensive Program for the Substitution of Illicit Crops (PNIS), global coca production has reached historic highs. Simultaneously, worldwide cocaine consumption has increased by 26% compared to the last decade (UNODC-SIMCI, 2023). Given these results, policy recommendations should focus not

only on the supply side taking eradication and interdiction measures. Nonetheless, this paper contributes to the literature by offering empirical evidence on the impact of the shift in coca production toward the Colombian Pacific on homicides and displacement in rural municipalities within this region.

Appendix A. Homicide Rates Variation in the Pacific Region 2011 vs 2021



Source: *Statistical, Delinquency, Offenses and Operations Information System of the National Police of Colombia*- SIEDCO (2023), and *National Administrative Department of Statistics* - DANE(2023).

Appendix B. Correlation Matrix

	Coca Production	Homicides Rate	Threats Rate	Extortions Rate	Displacements Rate	Kidnapping Rate	Arrests Rate	GDP per Capita	Household Size	Unemployment State Rate
Coca Production	1.000	0.127	0.069	0.055	0.173	-0.010	-0.051	-0.074	0.043	-0.135
Homicides Rate		1.000	0.219	0.109	0.130	0.041	0.084	0.194	-0.089	0.205
Threats Rate			1.000	0.424	-0.074	0.004	0.189	0.272	-0.208	-0.063
Extortions Rate				1.000	-0.094	0.019	0.100	0.136	-0.222	-0.007
Displacements Rate					1.000	0.014	-0.085	-0.164	0.276	-0.046
Kidnapping Rate						1.000	-0.030	0.000	0.033	0.023
Arrests Rate							1.000	0.120	0.025	0.051
GDP per Capita								1.000	-0.115	0.297
Household Size									1.000	0.217
Unemployment State Rate										1.000

Appendix C. Kidnapping Rates Estimates for 2SLS-IV regressions in Rural Municipalities

	(1)	(2)	(3)	(4)
Intercept	0.623	2.378**	-1.154	-1.007
	(0.726)	(0.995)	(1.862)	(3.504)
Coca Production	0	0	-0.001	0
	(0)	(0)	(0.001)	(0.001)
GDP per Capita	0.009	0.013	0.024	0.023
	(0.013)	(0.014)	(0.023)	(0.023)
Arrests Rate	0	0	-0.001*	-0.001
	(0)	(0)	(0.001)	(0.001)
Household Size	0.32	-0.016	1.206**	0.931
	(0.209)	(0.247)	(0.516)	(1.055)
Unemployment State Rate	0.012	0.031	-0.001	0.092
	(0.035)	(0.042)	(0.043)	(0.061)
School Enrollment	-0.007**	-0.008**	-0.003	-0.004
	(0.004)	(0.004)	(0.005)	(0.005)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.000	0.019	0.1162	0.128
Adjusted R-squared:	-0.002	0.010	0.02476	0.033
Observations:	1804	1804	1804	1804

$*\ \rho < 0.1, **\ \rho < 0.05, ***\ \rho < 0.01$. Fixed effects for municipalities and time controls arenot shown in the table. Standard errors are in parentheses.

Appendix D. Kidnapping Rates Estimates for 2SLS-IV regressions in Urban Municipalities

	(1)	(2)	(3)	(4)
Intercept	-2.017	-1.539	0.999	12.503
	(1.925)	(3.582)	(5.703)	(12.535)
Coca Production	0	0	0	0
	(0)	(0)	(0)	(0)
GDP per Capita	-0.006	-0.005	-0.007	0.011
	(0.006)	(0.006)	(0.038)	(0.04)
Arrests Rate	0	0	-0.001	-0.002*
	(0)	(0.001)	(0.001)	(0.001)
Household Size	1.151***	1.265**	0.845	-2.379
	(0.335)	(0.519)	(1.219)	(3.217)
Unemployment State Rate	-0.049	-0.091	-0.054	-0.021
	(0.044)	(0.069)	(0.064)	(0.091)
School Enrollment	-0.002	-0.004	-0.013	-0.018
	(0.008)	(0.011)	(0.016)	(0.018)
Municipality fixed effects:	No	No	Yes	Yes
Time fixed effects:	No	Yes	No	Yes
R-Squared:	0.118	0.173	0.140	0.169
Adjusted R-squared:	0.088	0.083	0.018	0.025
Observations:	154	154	154	154

$*\ \rho < 0.1, **\ \rho < 0.05, ***\ \rho < 0.01$. Fixed effects for municipalities and time controls are not shown in the table. Standard errors are in parentheses.

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