

## **Mexico: Remittances, Organized Crime and US Drug Overdose Crisis in Borderlands (2015-2021)**

México: remesas, crimen organizado y la crisis de sobredosis de Drogas  
en las zonas fronterizas de Estados Unidos (2015-2021)

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**Resumen:** The present article aims at shedding some light to the question whether Mexico's boom in remittances between 2015 and 2021 was the result of low rates of unemployment in the USA or of higher revenues of drug trafficking made by Mexican Criminal Groups. We found that Mexican migration to the USA took off up 2019 and accelerated with Covid-19 pandemic. Since higher rates of unemployment matched with larger number of remittances and a spike in drug overdose deaths in the USA, a hypothesis aroused stating that Mexican remittances could be related to drug trafficking revenues. An Exploratory Data Analysis (EDA) found a normal negative correlation (not causation) between US-unemployment rate and remittances from 2015 to 2019 but an abnormal negative correlation from 2020 to 2021. We conclude that the record level in Mexican remittances between 2020 and 2021 could be the result of an increase in Mexican migration but also from a windfall in drug trafficking earnings mirrored in a spike of drug overdose deaths in the USA.

**Palabras clave:** Remittances, Mexican Criminal Organizations, Borderlands, US Drug-overdose deaths

**Abstract:** El presente artículo pretende arrojar algo de luz a la cuestión de si el auge de las remesas de México entre 2015 y 2021 fue resultado de las bajas tasas de desempleo en EE.UU. o de los mayores ingresos del narcotráfico generados por los grupos criminales mexicanos. Un hallazgo del trabajo es que la migración mexicana a los EE.UU. aumentó hasta 2019 y se aceleró con la pandemia de Covid-19. Dado que las mayores tasas de desempleo coinciden con un mayor número de remesas y un aumento de las muertes por sobredosis de drogas en los EE.UU., surgió la hipótesis de que las remesas mexicanas podrían estar relacionadas con los ingresos del narcotráfico. Un Análisis Exploratorio de Datos (AED) encontró una correlación negativa normal (no causal) entre la tasa de desempleo en EE.UU. y las remesas de 2015 a 2019, pero una correlación negativa anormal de 2020 a 2021. Concluimos que el nivel récord en las remesas mexicanas entre 2020 y 2021 podría ser el resultado de un aumento en la migración mexicana pero también de una ganancia inesperada en los ingresos del narcotráfico reflejada en un pico de muertes por sobredosis de drogas en los Estados Unidos.

**Palabras clave:** Remesas, organizaciones criminales mexicanas, fronteras, muertes por sobredosis en EE. UU.

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## Introduction

At the beginning of 2021, the US Congress approved a 1.2 billion USD to finance an infrastructure project proposed by Joe Biden. In Mexico, such announcement made government officials believe that remittances were going to grow even more in the coming years, since that project was supposed to create jobs for Mexican migrants. In 2021, remittances reached a record level of more than 52.7 billion USD, 25% more than a year before but 215% in comparison with 2014. That means, that remittances doubled in seven years which is a remarkable accomplishment. Whether the US economy nor the labor market were extraordinary favorable for migrants between 2019-2021. On the contrary, Covid-19 pandemic triggered unemployment rates to a two-digit level. According to Juan José Li Ng from BBVA-Report, employment under Mexican migrants fell by 20% in April 2020 vs February 2020 (Ng, 2022). Li Ng points out that unemployment among Mexican migrants soared to 17% in April 2020 and slowly began to sink along 2021 remaining at around 5%. Manuel Orozco and Matthew Martin affirmed that remittances in Latin America increased by 26% from 2020 to 2021 to 134.4 billion USD (Martin, 2022). They inferred that Mexico's boom in remittances can be explained by the increase in migration from Latin America in the United States, with Mexico being among the main contributors. They observed that many new migrants start sending money in the same year of arrival. They backed their hypothesis showing an increment of Mexicans detained at border; this number went from 15,000 in April 2020 to 70,000 in April 2021, remaining in a monthly average of 60,000. On the other hand, organized crime has struck Mexico intensively from 2014 and 2021 driving the country to historical levels of violence in terms of murders. In the US, the opioid crisis began to worry authorities due to the rapid increase in drug overdose deaths derived from the consumption of those substances typically manufactured in Mexico by the Transnational Criminal Organizations (TCO). The literature on this topic is still scarce. Michael Ahn Paalberg concludes that remittances of criminal activity occur at individual and state level (Paarlberg, 2022). Brito Steve, Ana Corbacho and René Osorio found that remittances were correlated with a contraction of homicides per 100,000 inhabitants at a municipal level (Steve Brito, 2014).

In the face of this conundrum, we want to inquire whether there is enough evidence to correlate the boom in Mexico's remittances with Mexican TCO and the outbreak of the drug overdose death crisis in the United States up 2015. We have posed three questions to guide this inquiry. Where do Mexican migrants choose to establish themselves in the United States and how has migration been changing in the last four decades? what kind of relationship does exist between Mexican TCO and its activities on the one side and Mexican migrants living in the USA on the other? And finally, what can be drawn from an Exploratory Data Analysis (EDA) using public data related to these variables? In the first section, we identify the main origins and destinations of Mexican migrants in the USA to see how migration has changed along the last decades. In second part, we addressed the drug overdose death crisis in the USA and focus on the most affected region establishing possible linkages with migration, remittances, and criminality in Mexico. In the third section we conducted an EDA using data between QI-2015 and QIII-2021. We then ran correlations between drug overdose deaths, remittances, and unemployment between California and Texas versus Mexico, Jalisco, Michoacan, CDMX and Guerrero and between New Mexico versus Mexico, CDMX and Guerrero. We found evidence that Covid-19 changed conditions by the Mexican migrant's employment market making it possible to trigger an outstanding number of remittances. However, the possibility that this boom in remittances could be also linked with a windfall in drugs revenues made by Mexican TCO cannot be ruled out.

### **Mexican Migration: origins and destinations**

Douglas S. Massey published a paper named "The Geography of Undocumented Mexican Migration" (Douglas S Massey, 2010) in which he shared some facts that we are quoting to make this analysis. It was possible to conduct a census regarding the origin of Mexican migrants through the Matrícula Consular, a document issued by Mexican authorities that could be used by undocumented Mexican people living in the USA as identification card and which was recognized by the US authorities and other US organizations. The origin of Mexican migrants per region appears in table 1. As can be seen, two regions, Historical and Central, account for 82.6% of the total migrants; the most important is the first one with 45.2% composed mainly by Guanajuato

(8.8%), Jalisco (10.8%) and Michoacan (12.6%). The second one with a share of 37.4% comprises Mexico City (CDMX) (6.6%), Guerrero (7.6%), Mexico (5.1%) and Oaxaca (5.5%) among others.

**Table 1 Regional and State Origins of Migrants Who registered in Mexico's Matricula Consular Program, 2006**

Region	Share (%)	Region	Share (%)
<b>Historical</b>	<b>45.2</b>	<b>Central</b>	<b>37.4</b>
Aguascalientes	0.9	Mexico City (CDMX)	6.6
Colima	0.7	Guerrero	7.6
Durango	2.9	Hidalgo	2.8
Guanajuato	8.8	Mexico	5.1
Jalisco	10.8	Morelos	2.2
Michoacan	12.6	Oaxaca	5.5
Nayarit	1.8	Puebla	6
San Luis Potosi	2.9	Queretaro	1.2
Zacatecas	4.2	Tlaxcala	0.6
<b>Border</b>	<b>10.7</b>	<b>Southeast</b>	<b>6.4</b>
Baja California	1.1	Campeche	0
Chihuahua	2.3	Chiapas	1.2
Coahuila	1.1	Quintana Roo	0.2
Nuevo Leon	1.5	Tabasco	0.2
Sinaloa	2.0	Veracruz	4.3
Sonora	0.9	Yucatan	0.5
Tamaulipas	1.8		

Source: Compiled by Gerardo Reyes based on (Douglas S Massey, 2010)

From 1910 to 1960, 90% Mexican immigrants stayed in borderlands (California, Arizona, New Mexico, and Texas), as well as the industrial hub of Illinois. By 1960, 42% of all Mexican immigrants lived in California, 36% in Texas, 6% in Arizona and 2% in New Mexico. In 1980, 57% stayed in California, 23% in Texas and 8% in Illinois. After 1986, migration became more difficult due to stricter border controls derived from Immigration Reforms. From 1993 on, the US Border Patrol began to militarize several chunks of the border like El Paso and San Diego. At the same time, the US government began to build a wall along the border. These measures led illegal migrants to explore new routes, and the borderlands and Illinois stopped to be the main destination of subsequent migration waves. After 2003, Mexican migrants went to the northwest

(Idaho, Nevada, Oregon Utah and Washington); the northeast (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont); the Great Lakes (Illinois, Indiana, Michigan, Ohio and Wisconsin); the deep south (Alabama, Arkansas, Kentucky, Louisiana, Mississippi, and Tennessee), and the plains (Colorado, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, North Dakota, Oklahoma, South Dakota and Wyoming). In 2006, 60.9% of all documented Mexicans lived in the borderlands, 8.5% in the northwest, 12% in the Great Lakes, 2.9% in the northeast, 9.6% in the southeast, 1.5% in the deep south and 4.7% in the plains. In this context, the same document (Douglas S Massey, 2010) traced the top five preferred cities by Mexican migrants before 2006: Los Angeles 13%, Chicago 9.8%, Dallas 6%, Santa Ana 5.5%, and Houston 4.9%. After 2006, the new favorite cities were Atlanta 3.9%, Phoenix 3.1%, Raleigh-Durham 2.6%, and Portland 2.2%.

Douglas S. Massey informs about the state-to-state flows involving 10,000 and more migrants. The most important flows connect California with Jalisco and Michoacan involving 64,000 people; these flows are followed by Guerrero-California: 30,000 and Mexico City-California: 26,000; Guanajuato-California, Oaxaca-California and Puebla-California: 23,000 migrants each. Secondly, Texas-Guanajuato: 22,000 and Texas-San Luis Potosi: 19,000. Thirdly, Arizona-Tamaulipas, Illinois-Tamaulipas, Arizona-Michoacan and Illinois-Michoacan: 13,000 each. The same source concluded that 60% of the forty-five flows registered, involved traditional regions of origin and destination. In terms of State-to City flows, the most outstanding were Los Angeles as the main destination of migrants coming from Jalisco, Michoacan, Puebla and Mexico City; Chicago with Jalisco, Michoacan, Mexico, Guerrero, Guanajuato and Dallas with Guanajuato.

Net flows from Mexico to the US have varied since 1990. Daniel Chiquar and Alejandrina Salcedo (Salcedo, November 2013) estimated that from 1990 to 2000, 466,000 Mexicans used to emigrate to the US annually. Net flows began to sink reaching its lowest level at the economic crisis of 2008. Apart from the subprime crisis and Obama's deportation program (Brotherton, 2018), three elements could have driven down Mexican migration: a) a more stable economy in Mexico, b) stricter controls in the Mexican-US border and c) aging of Mexican population as well as a constant reduction in fertility rate. During 1990-2000, most of migrants had a low

qualification profile and worked in agriculture and construction sectors located in borderlands, mainly in California. After that period, the number of migrants diminished, and their skills improved. Migrants had better education, were fewer in numbers and went to other states of North America including the northeast. Chiquiar and Salcedo also found that as digitalization started to replace jobs with computers and gadgets a qualitative change in jobs taken by Mexicans took place, going from simple repetitive activities to more complex ones. This was also accompanied by a slightly reduction of wage in areas typically taken by Mexicans. Furthermore, the Ana Gonzalez from the Pew Research Center (Barrera, 2020, July) distinguished four overlapping episodes that reflect net flow between Mexico and US. In the first one (1990-2000), 670,000 Mexicans returned to Mexico from the US and 2,940,000, went from Mexico to the USA, making a positive net outflow of 2,270,000; in the second one (2005-2010) 1,390,000 came back and 1,370,000 left for the US, resulting in a negative net flow of 20,000; in the third one (2009-2014), 1,000,000 went back to Mexico and 870,000 emigrated to the US, making a negative flow of 130,000 and in the fourth episode (2013-2018), 710,000 came back and 870,000 went to the USA, which equals a positive outflow of 160,000. Gonzalez Barrera noticed a drop by 1.4 million Mexican immigrants going from 12.8 million in 2007 to 11.4 million in 2019. The same source pointed out that in 1970 almost 1 million Mexican immigrants lived in the US; 9.4 million in 2000 and 12.8 million in 2007. Drops were also registered by entry permissions granted to Mexicans during the pandemic, e.g., tourist and business visas; Green Cards and working visas like H-2A or H-1B. However, apprehensions of illegal Mexicans in the border soared from 166,458 in 2019 to 253,118 in 2020, outnumbering the non-Mexican illegal migrants for the first-time since 2013. Many managed to become legal citizens through family sponsored channels. Many others benefited from the Deferred Action for Childhood Arrivals Program or (DACA) by which they were allowed to work, study and remain in the USA. It is estimated that more than 500,000 people were benefited from this program (Batalova, 2020).

### **Drug Overdose Deaths, Mexican TCO and Migration**

According to the Wall Street Journal, it was estimated that 107,000 people in the US died of Drug-Overdose in 2021, related with illicit forms of fentanyl. Since 2000, one million overdose deaths

have taken place in the US with more than half occurring up 2015. Most of illegal fentanyl consumed in the US is produced in clandestine labs in Mexico. Fentanyl is 50 times more potent than heroin, rather cheap, easy to get and is classified as a synthetic drug because it is made of chemicals. Deaths are related with consumption of cocktails of fentanyl-methamphetamines and fentanyl-cocaine, as well as fake fentanyl-lace pills (Kamp, 2022). Table 2 shows the most affected states by the drug overdose death crisis. Based on information published by State Health Facts, all states are in the northeast region of the US, with West Virginia, Ohio, Pennsylvania, Kentucky and Massachusetts popping up among the top ten from 2015 to 2019 (State Health Facts, 2022).

**Table 2 All Drug Overdose Death Rate per 100,000 people**

	<b>2015</b>	<b>2017</b>		<b>2019</b>	
<b>W. Virginia</b>	41.5	W. Virginia	57.8	W. Virginia	52.8
<b>New Hampshire</b>	34.3	Ohio	46.3	Delaware	48
<b>Kentucky</b>	29.9	New Hampshire	44.3	D. of Columbia	43.2
<b>Ohio</b>	29.9	D. of Columbia	44	Ohio	38.3
<b>Rhode Island</b>	28.2	Pennsylvania	37.2	Maryland	38.2
<b>Pennsylvania</b>	26.3	Kentucky	37	Pennsylvania	35.6
<b>Massachusetts</b>	25.7	Maryland	37	Connecticut	34.7
<b>New Mexico</b>	25.3	Massachusetts	36.3	Kentucky	32.5
<b>Utah</b>	23.4	Delaware	34.4	Massachusetts	32.1
<b>Tennessee</b>	22.2	Rhode Island	31.8	New Hampshire	32
<b>Connecticut</b>	22.1	Maine	31	New Jersey	31.7
<b>Delaware</b>	22	Connecticut	30.9	Tennessee	31.2

Source: (State Health Facts, 2022).

According to information published by the Migration Policy Institute (Migration Policy Institute, 2020), between 2015 and 2019, 1,800 Mexicans lived in West Virginia making a share of 0.0% of all immigrants from Mexico at that time (11,250,500); Delaware: 16,700 (1%); Pennsylvania: 56,500 (0.5%); Ohio: 45,000 (0.4%); Maryland 37,200 (2%); Connecticut 17,400 (0.2%); New Jersey 110,200 (1%); Massachusetts 14,900 (0.1%); New Hampshire, 2,100 (0.0%); Rhode Island 3,000 (0.0%); Kentucky 32,400 (0.3%) and Tennessee 91,100 (0.8%). Conversely,

borderlands showed a larger proportion of Mexican migrants, e.g., California 4,076,100 (36%); Arizona 511,900 (4.5%); New Mexico 135,700 (1.2%) and Texas 2,516,700 (22.4%). This means that the share of Mexicans living in the states where the opioid crisis upraised is rather poor (Migration Policy Institute, 2020). Therefore, the drug overdose deaths registered there is not correlated with the number of Mexicans living in that region.

However, the 2020 National Drug Threat Assessment (Drug Enforcement Administration (DEA), 2021), affirms that while cocaine production and supply have been left to Colombian Cartels, which collect their product from Colombia, Peru and Bolivia, Mexican criminal organizations are in charge of trafficking with cocaine, but they also widely dominate the heroin and synthetic drugs market in the USA. Colombian and Dominican criminal groups use the Eastern Pacific routes by means of go-fast vessels to move cocaine from South America to Mexico, but once in US soil, US criminal groups, as well as street gangs perform the mid-and-retail level distribution. The various ways to reach customers include the dark web too. The same source points out that 74% of the cocaine transportation takes place through the Eastern Pacific Vector, 16% Western Caribbean Vector and 8% use the Caribbean Corridor. Crack cocaine is managed by US criminal groups and street gangs. The intensity of cocaine trade has been calculated through the seizures registered in Florida, California, Pennsylvania, and Puerto Rico.

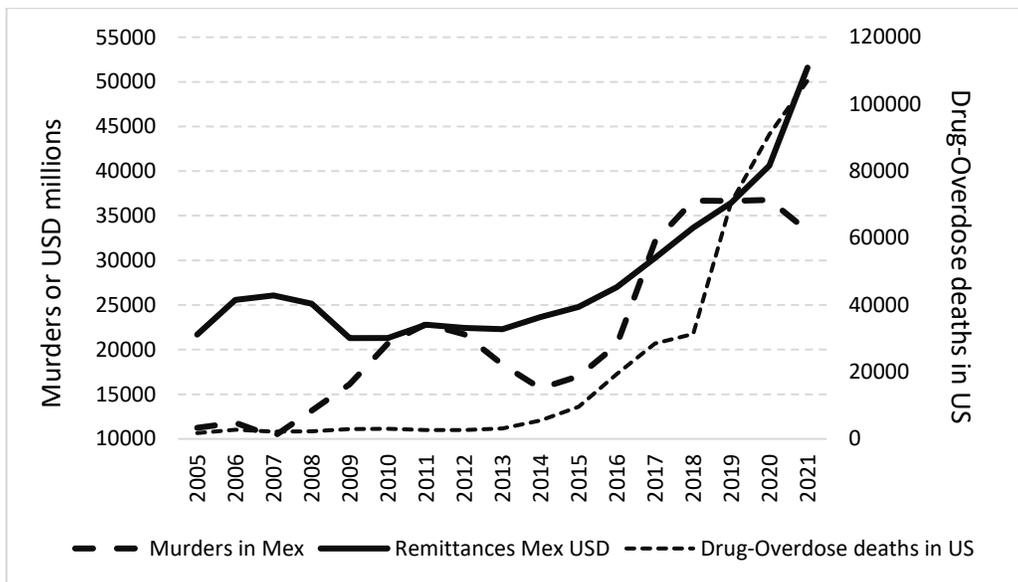
The same DEA report (Drug Enforcement Administration (DEA), 2021) has identified large flows of drug trafficking coming from Mexico into the USA. They have spotted Cartel de Sinaloa and Cartel Jalisco Nueva Generacion (CJNG) as the most important suppliers of drugs in the USA, which includes, heroin, fentanyl, and methamphetamines in all forms. Heroin is produced in white powder and black tar with 47% and 45% purity respectably. According to DEA, Mexican TCO have established sophisticated clandestine laboratories in Mexico to also produce derivatives a like pills, oxycodone pill (known as “Mexican Oxy” or “M30s”) and a combination of heroin-fentanyl, methamphetamine-fentanyl, using precursors imported from China and India. In this regard, fentanyl-laced counterfeit pills have been introduced into the US market from 2019 on. This is attributable to Mexican TCO seeking to distribute and reach prescription opioid users.

In fact, poppy cultivation areas to produce heroin in Mexico fell from 41,800 hectares in 2018 to 30,400 hectares in 2019, but with no decline in the flows of heroin in the USA. This was a consequence of the higher demand of fentanyl instead of heroin. It is believed that Mexican TCO will dominate the fentanyl market in the future because they have proved to be highly adaptable and innovative. Regarding precursors to produce methamphetamines for instance, they have changed from ephedrine and pseudoephedrine to phenyl-2-propanone (P2P), a reductive animation method, to produce highly pure and potent, but less expensive methamphetamines. Thus, they have displaced actual and potential internal US competitors. Following the DEA report, the number of domestic Methamphetamine Laboratory incidents in the US went from 23,703 in 2003 to 890 in 2019. This downtrend is a consequence of Mexican imports substituting domestic production, since methamphetamine seizures in the south border, increased from 10,960 kilograms in 2013 to 68,355 kilograms in 2019 or at a yearly annual rate of 29.8%. Clandestine Labs are ubiquitous since they can be set up everywhere, e.g., hotels, apartments, mobile homes, apartments, campgrounds, and commercial establishments. Mexican TCO control wholesale while the distribution is shared with domestic criminal groups along the US territory.

This innovative skill from Mexican TCO has also been detected in tricks used to smuggle drugs. They dissolve methamphetamines in a variety of liquids, including vehicle fluids, fuels, water, and alcoholic beverages, which are harder to detect. They are responsible for trafficking these drugs across the southwest border. They use airlines, buses, trains, and shuttle service as well as body carriers and parcel deliver services. Heroin continues to have a high presence in the Great Lakes, Midwest, and northeast regions and is highly intertwined with fentanyl. Fentanyl reports to the National Forensic Laboratory System-Drug increased 18 times from 5,541 in 2014 to 100,378 in 2019. DEA sized 6,951 kilograms of heroin in 2019, 30% more than in 2018. The same states with most fentanyl reports are also those with most heroin reports: New Jersey, New York, Ohio, and Pennsylvania. Heroin reports are also alarming in California, Texas, and Florida. Fentanyl seizures in 2019 took place mainly in California, Arizona, Texas, but also in Illinois, Ohio, Pennsylvania, New Jersey, and New York. California, Texas, and Arizona are the main entry points from heroine coming from Mexico. New York is regarded as the most significant heroin market

and distribution hub in the United States (Drug Enforcement Administration (DEA), 2021). The DEA-report points out that Covid-19 pandemic triggered prices of both heroin and fentanyl due to the restrictions imposed in the Mexican-US border. Furthermore, the drug market has been changing so that fentanyl and mixture of drugs including fentanyl have been replacing other drugs which use to be sold in a single form like heroin, methamphetamines, and cocaine. Deaths resulting from overdose implicate the consumption of these new mixtures that bring Mexican TCO a high margin of profit but turn to be lethal for their clients. 38 states reported deaths attributed to fentanyl-laced counterfeit pill through January 2020. For instance, overdose deaths involving synthetic opioids other than methadone increased at 24.8% per annum in average going from 1,742 in 2005 to 31,335 in 2018.

**Figure 1: Murders, Remittances and Drug-Overdose deaths in US**



Source: Compiled by Gerardo Reyes based on (Instituto Nacional de Geografía e Informática, 2022) and (Drug Enforcement Administration (DEA), 2021)

Figure 1 plots the trajectory of murders related to organized crime in Mexico, remittances, and drug overdose deaths in the USA. We can notice that the three variables seem to move harmoniously taking off very quickly up 2015. Drug overdose deaths seemed to be stable until 2013, and although synthetic drugs have been in the market since the 90's, the boom in fentanyl

consumption took place after 2015. Drug overdose deaths and remittances behave similarly, whereas violent murders in Mexico have also augmented but more irregularly and with an important backlash in 2021; they have stabilized at around 35,000 murders a year on average.

**Table 3 Murders & Remittances: 2003-2020**

<b>Murders</b>	<b>Share</b>	<b>Cumulative</b>	<b>Remittances</b>	<b>Share</b>	<b>Cumulative</b>
MEXICO	11.04%	11.04%	MICHOACAN	9.69%	9.69%
GUERRERO	7.60%	18.64%	GUANAJUATO	8.67%	18.36%
OAXACA	4.82%	23.47%	JALISCO	8.18%	26.54%
JALISCO	4.74%	28.21%	MEXICO	6.64%	33.18%
MICHOACAN	4.51%	32.72%	OAXACA	5.16%	38.35%
GUANAJUATO	4.48%	37.20%	GUERRERO	5.11%	43.45%
CIUDAD DE MEXICO	4.44%	41.64%	CIUDAD DE MEXICO	4.83%	48.28%

Source: Compiled by Gerardo Reyes based on (Instituto Nacional de Geografía e Informática, 2022)

Table 3 displays the top seven states in violent murders and their share in remittances from 2003 to 2020. The high level of violence in terms of murders by the seven states have a strong presence of Cartel Jalisco Nueva Generación (CJNG) and harbor clandestine labs to produce synthetic drugs (Ravelo, 2016). The leader of this CJNG, Nemesio Ocegüera Cervantes, was arrested in Sacramento California when he was 25 years old (Ravelo, 2016). Thus, there could be relevant linkages between these groups and migrants living in borderlands. CJNG, La Familia Michoacana, Guerreros Unidos, Los Caballeros Templarios and La Familia are managing organized crime in Mexico (El Estado de Mexico) (Animal Político, 2020); Guerrero is a well known place for opium plantations controlled by criminal groups, like Los Rojos and Guerreros Unidos. Four criminal groups have settled down in Oaxaca: Cartel Pacífico-Sinaloa (CDP), CJNG, Cartel del Golfo (CDG) and Organización Criminal de los Beltrán Leyva (OCBL) (Pineda, 2021); La Familia Michoacana, Los Viagras and Las Autodefensas are operating in Michoacan (Maria, 2022) and the CJNG and Cartel Santa Rosa de Lima among others are dominating criminal activities in Guanajuato. CJNG and Cartel de Sinaloa, as well as local groups like Union de Tepito, operate in CDMX. The fact that these states accounted for 41.46% of violent murders between 2003 and 2020 and at the same time they also received 48.28% of remittances in the same period, awake the suspicion that this foreign currency could be camouflaging revenues from drug trafficking.

## Exploratory Data Analysis: Drug Overdose Deaths, Unemployment and Remittances

For this analysis, we will consider New Jersey and New York, two states located in the Northeast region of the US, where the drug overdose death crisis has struck at most and where Mexican migrants are also living. However, as we saw from Douglas S Massey, J. S., most of the Mexican migration is concentrated in the borderlands.

We took quarterly data published by Data Center for Disease Control (Centers for Disease Control and Prevention, 2022) from QI-2015 to QIII-2021 and found significant correlations between drug overdose deaths vs remittances

**Table 4 Drug Overdose Deaths in the US vs Mexico's Remittances: QI2015-QIII2021**

( $\beta_2$  and  $R^2$ )

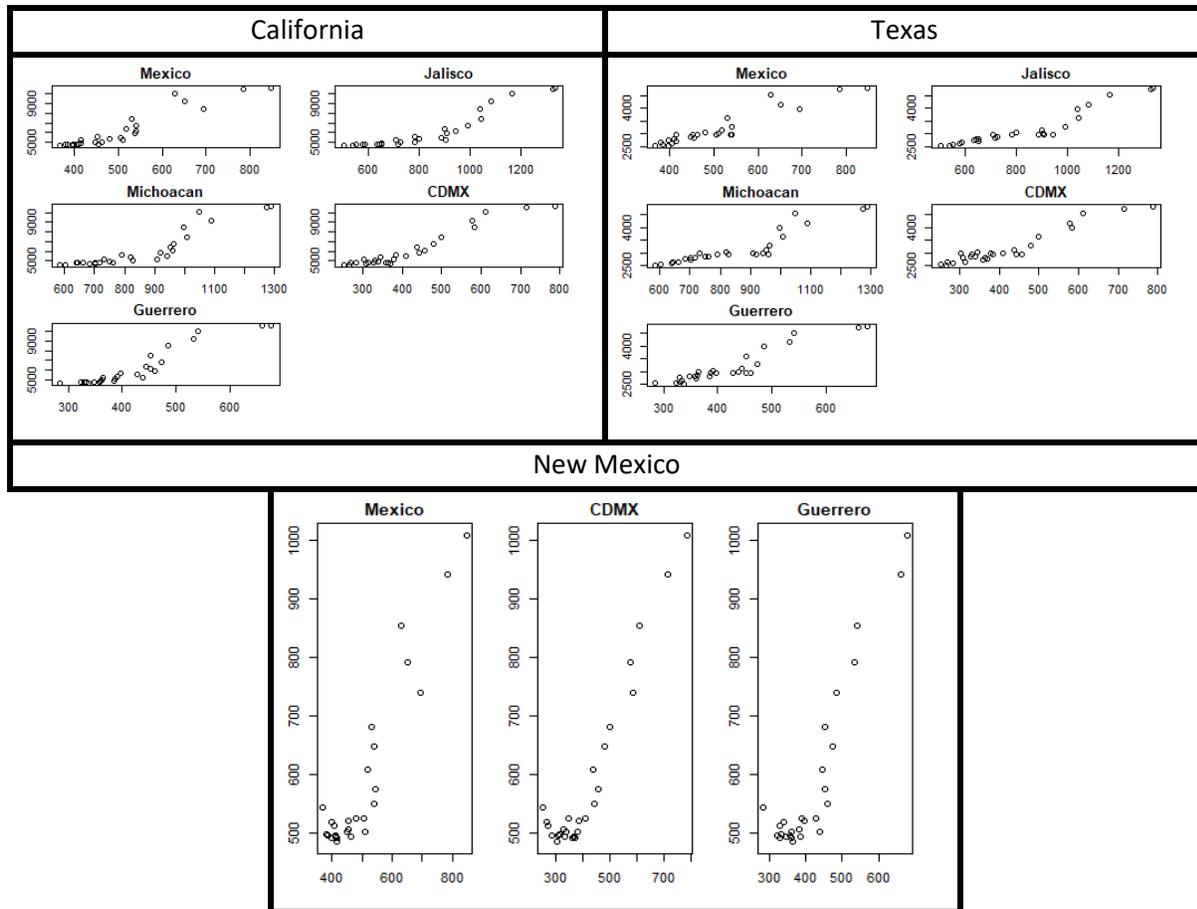
		CA	AR	NM	TX	NJ	NY
Mexico	$\beta_2$	<b>14.84</b>	0.42	<b>1.12</b>	<b>5.10</b>	3.28	2.42
	$R^2$	<b>0.88</b>	0.71	<b>0.86</b>	<b>0.87</b>	0.46	0.62
Jalisco	$\beta_2$	<b>7.77</b>	0.21	0.56	<b>2.68</b>	2.08	1.35
	$R^2$	<b>0.85</b>	0.63	0.78	<b>0.86</b>	0.65	0.67
Guanajuato	$\beta_2$	9.87	0.26	0.72	3.41	2.94	1.71
	$R^2$	0.69	0.50	0.64	0.69	0.65	0.54
Michoacan	$\beta_2$	<b>9.21</b>	0.25	0.67	<b>3.17</b>	2.48	1.58
	$R^2$	<b>0.82</b>	0.60	0.75	<b>0.82</b>	0.63	0.62
Oaxaca	$\beta_2$	19.40	0.54	1.42	6.72	2.94	1.71
	$R^2$	0.71	0.54	0.66	0.72	0.60	0.55
CDMX	$\beta_2$	<b>13.56</b>	0.36	<b>1.01</b>	<b>4.64</b>	2.83	2.22
	$R^2$	<b>0.92</b>	0.65	<b>0.89</b>	<b>0.91</b>	0.42	0.65
Guerrero	$\beta_2$	<b>18.80</b>	0.52	<b>1.40</b>	<b>6.46</b>	4.35	3.10
	$R^2$	<b>0.87</b>	0.67	<b>0.84</b>	<b>0.87</b>	0.50	0.62

Source: (Centers for Disease Control and Prevention, 2022) and (Banxico, 2022)

As can be seen from table 4, the seven Mexican States receiving 2/5 of remittances show a positive significant correlation with drug overdose deaths in borderlands, as well a with New Jersey and New York. Based on  $R^2$  and  $\beta_2$  (the coefficient's slope of simple linear regression model), not all correlations are significantly over 0.8 in terms of  $R^2$ . For instance, we read the first

correlation of table 4 as, for ever unit of remittances received in Mexico, there are on average 14.84 drug overdose deaths in California. Whether New Jersey (NJ) nor New York (NY) show  $R^2$  over 80%, so we can put them aside and concentrate the analysis in those states where  $R^2$  surpassing 80% (bold an italic in table 4).

**Figure 2 Drugs Overdose vs Remittances with a  $R^2$  over 0.80**



Source: Compiled by Gerardo Reyes based on (Instituto Nacional de Geografía e Informática, 2022)

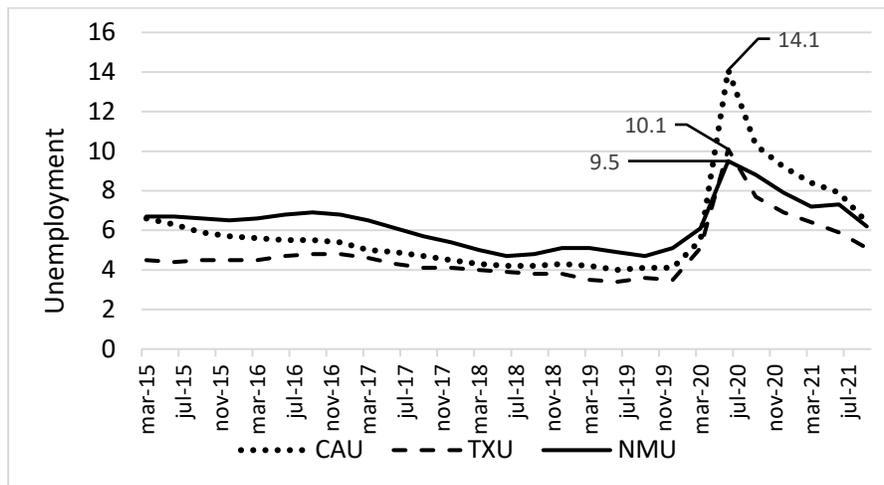
By looking at Figure 2, we observe in the x-axis remittances and y-axis drug overdose deaths. For example, if we read the first graph at the top left corner, we see that remittances in Mexico spiked from 369.50 USD monthly average to more than 846.70 USD monthly average, while drug overdose deaths in California increased from 4,608 to 10635. Running a simple linear

regression, we obtain the equation<sup>1</sup>  $CA = -1332.35 + 14.81(\text{Mexico})$ ;  $R^2: 0.8899$ . Thus, California's drug overdose deaths showed a significant correlation with remittances sent to Mexico (0.8899), Jalisco (0.8574), Michoacan (0.8217), CDMX (0.9254) and Guerrero (0.8798). Texas had also an important correlation with the same states; Mexico (0.8798), Jalisco (0.8632), Michoacan (0.8216), CDMX (0.9132) and Guerrero (0.8759). New Mexico's drug overdose deaths presented a significant correlation with remittances in Mexico (0.8684), CDMX (0.8936) and Guerrero (0.8467).

A typical source of remittances is the economic activity in the USA, reflected in rates of unemployment, so the higher the unemployment rate, the less the working opportunities for Mexicans and the less the number of remittances sent to Mexico. This was typically the case during the Great Recession of 2008 when remittances fell from 25.5 billion in 2008 to 21.9 billion USD in 2009.

As we can see from Figure 3, there was spike in unemployment rate during the Covid-19 pandemic up March 2020 and reached its highest in point in June 2020 at 14.1% in California, 10.1% in Texas and 9.5% in New Mexico. If we correlate unemployment rates with overdose deaths in those states, we find a mild significant but positive correlation in terms of p-value and  $R^2$  in California (p-value: 0.00261;  $R^2: 0.309$ ), Texas (0.00253;  $R^2: 0.3106$ ) and New Mexico (0.0284;  $R^2: 0.1779$ ).

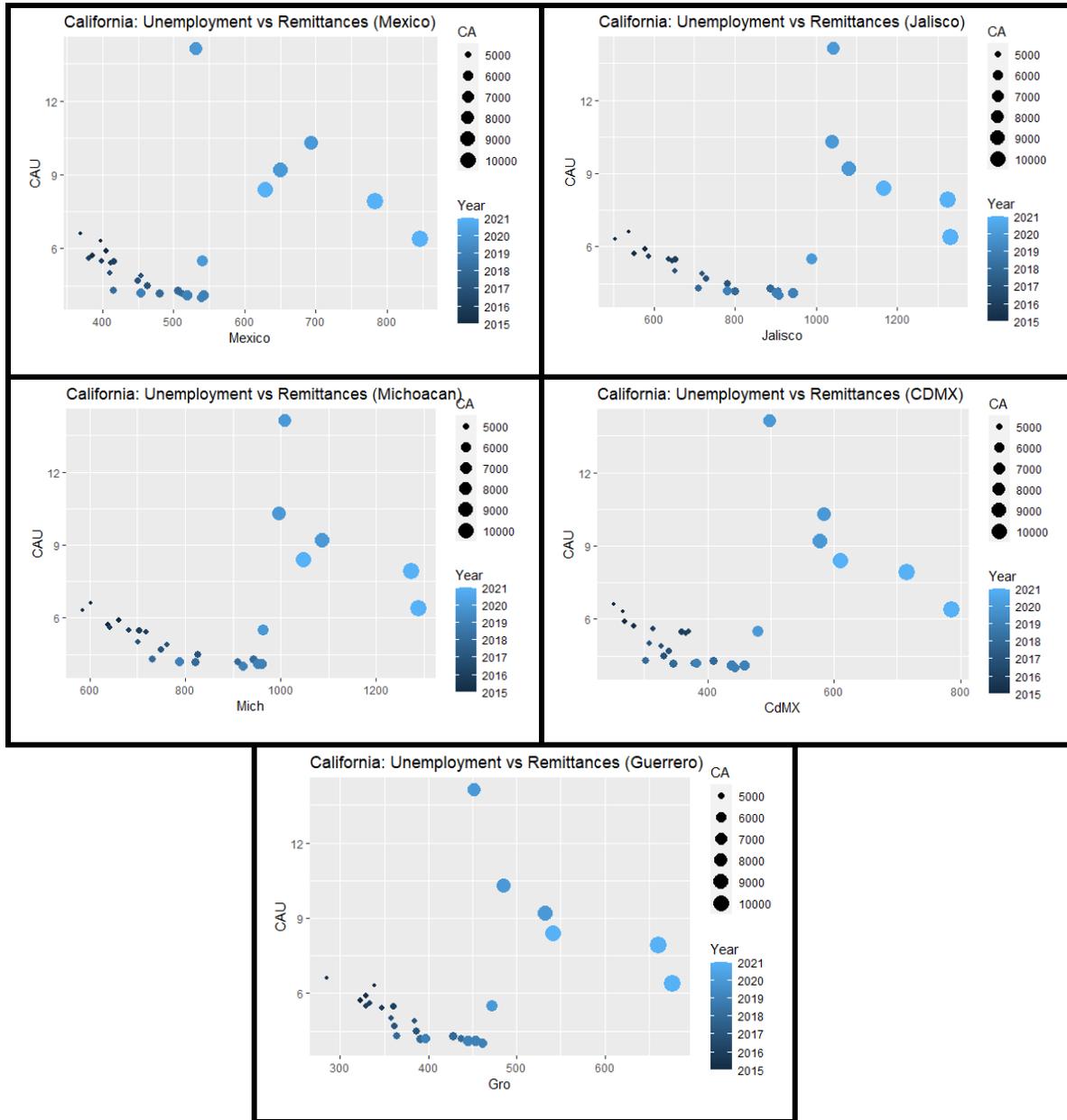
**Figure 3 Unemployment rate in California, Texas and New Mexico**



Source: Compiled by Gerardo Reyes based on (US Bureau of Labor Statistics, 2022)

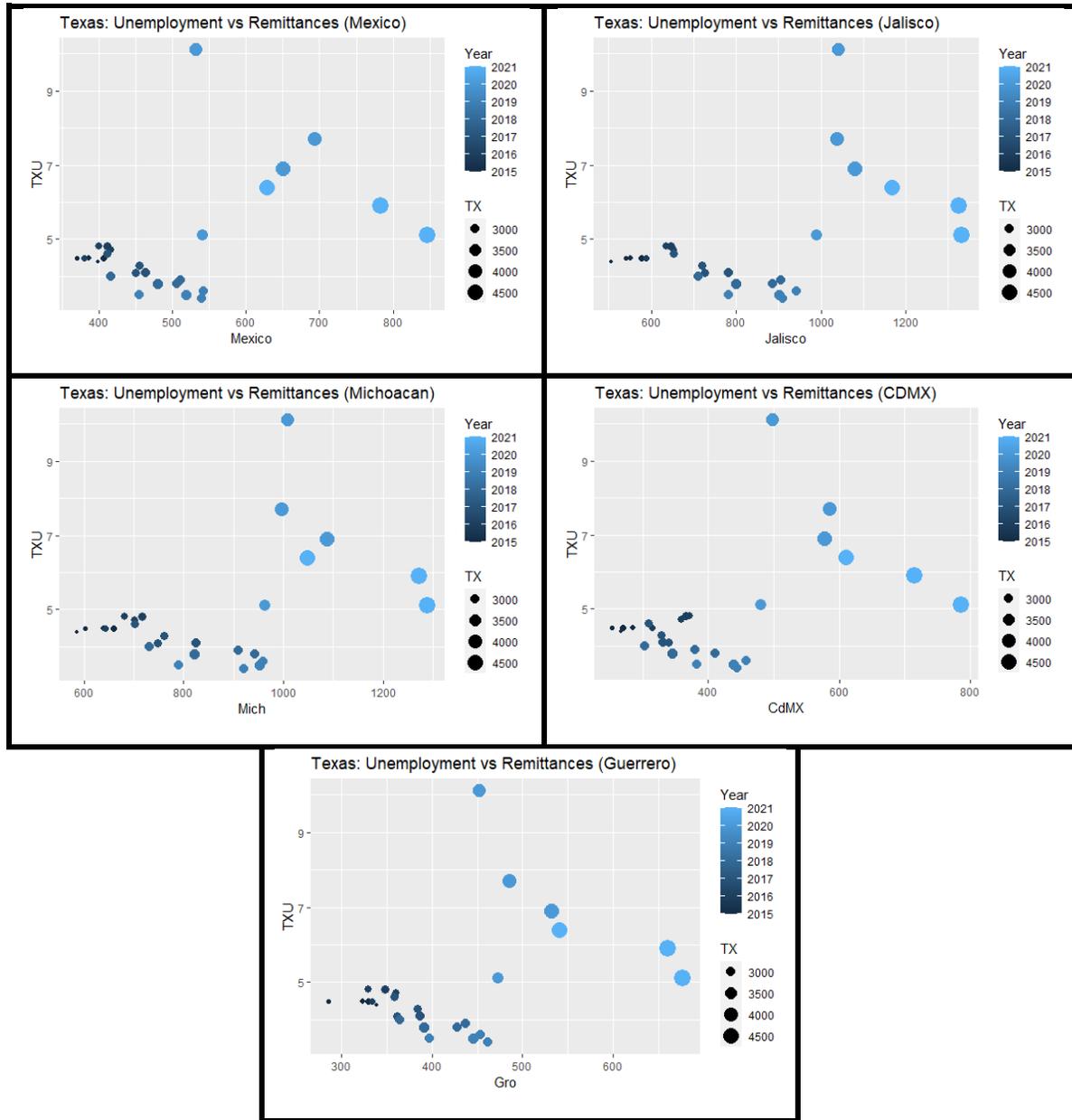
<sup>1</sup> The model used is a simple regression of the form:  $y = \beta_1 + \beta_2 x$

**Figure 4 California: Unemployment vs Remittances and Overdose Deaths per year**



Source: Compiled by Gerardo Reyes based on (Instituto Nacional de Geografía e Informática, 2022) and (US Bureau of Labor Statistics, 2022)

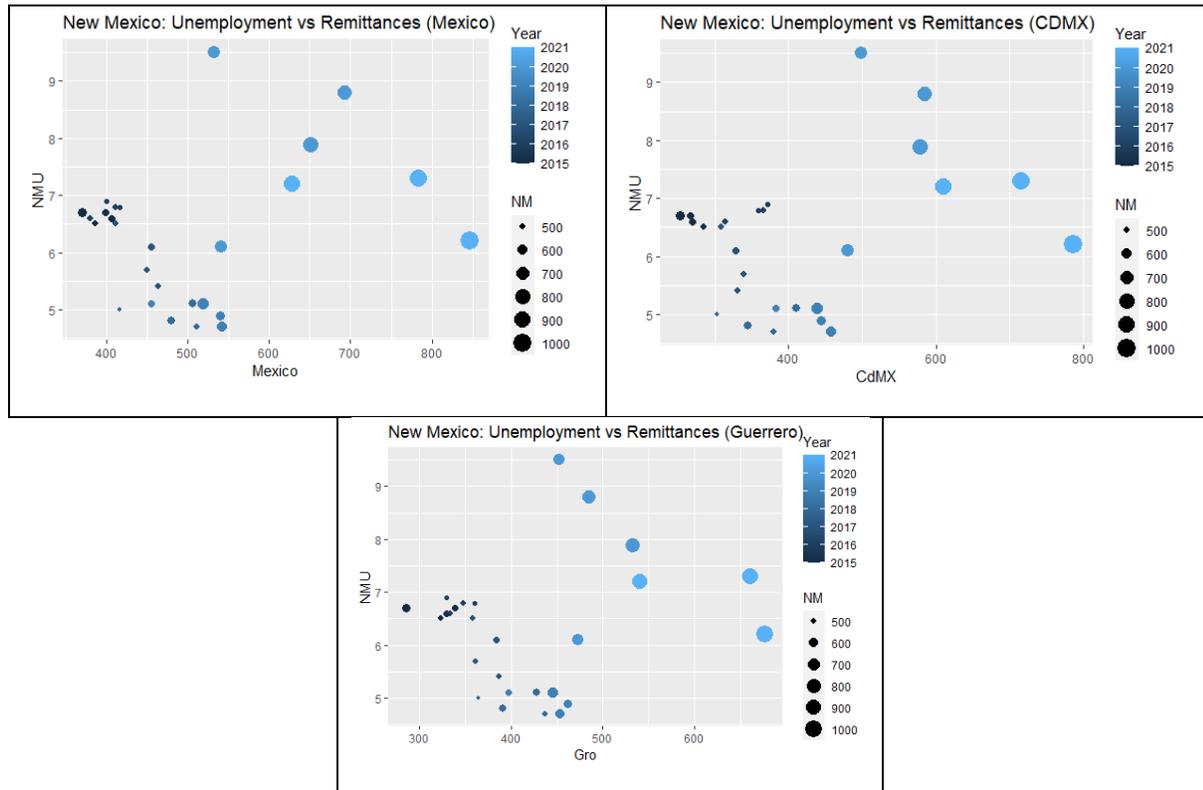
**Figure 5 Texas: Unemployment vs Remittances and Overdose Deaths per year**



Source: Compiled by Gerardo Reyes based on (Instituto Nacional de Geografía e Informática, 2022) and (US Bureau of Labor Statistics, 2022)

**Figure 6 New Mexico: Unemployment vs Remittances and Overdose Deaths per year**

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Source: Compiled by Gerardo Reyes based on on (Instituto Nacional de Geografía e Informática, 2022) and (US Bureau of Labor Statistics, 2022)

In figure 4 we can see first a correlation between unemployment in California and remittances in Mexico; California vs Jalisco; California vs Michoacan; California vs CDMX and California vs. Guerrero. The size of the spheres represents California’s number of drug overdose deaths in thousands and the blue color the year in which they occurred. Smaller spheres colored in deep blue represent numbers taking place between 2015 and 2019 and indicate a normal correlation between lower rates of unemployment and larger number of remittances by the five states. However, as spheres turn bigger and lighter blue (in all five cases occurring between 2020 and 2021), to a larger the number of drug overdose deaths, corresponds a larger number of remittances and a higher rate of unemployment. As a matter of fact, Covid-19 pandemic created a different game since bigger spheres appear in the upper right area of the graph. The correlation between unemployment and remittances is still negative but reflect higher levels of unemployment and larger number of overdose deaths; all taking place between 2020 and 2021

as the lighter blue color spheres indicates. The same pattern can be observed between unemployment in California and remittances in Jalisco, Michoacan, CDMX and Guerrero. Therefore, the Covid-19 pandemic affected the correlation unemployment-remittances by creating two episodes: in the first one 2015-2019, the correlation is negative with smaller and deep blue spheres, portraying a sinking unemployment rate with increasing number of the remittances; in the second, higher unemployment rates are correlated with much larger average of remittances per month. Thus, we can sustain the hypothesis that Mexico's spike in remittances is not correlated with historical low rates of unemployment and this boom in remittances coincides with higher prices of synthetic drugs and larger numbers of drug overdose deaths. The same pattern with slight differences can be observed by Texas (figure 5) and New Mexico (figure 6) respectively.

## Conclusions

Based on the analysis made from public available data, we found answers to the questions posed at the beginning of this paper. First, there had been structural changes in Mexican migrations since 1970. The Mexicans continued to migrate to the borderlands but as the migration policy became stricter, they began to split around the different regions of the USA. There was an important contraction in migration flow in the first decade of the XXI Century, especially during the Great Recession in 2009 and the Obama Administration, but up 2017 Mexican migration rebounded and increased sharply during the Covid-19 pandemic. Secondly, the presence of Mexican migrants in the northeast region of the USA, where the opioid crisis has been striking, proves to be meaningless. That means that the drug supply there must have been eased by US domestic criminal networks. However, the share of Mexican migrants living in borderlands turned to be highly significant whereas the opioid crisis there was also an issue. Mexican TCO are responsible for the production and export of heroine, methamphetamines, and modern synthetic drugs (fentanyl). They seemed to be wired with migrant nets and routes, since their presence in seven states that registered 41.44% of violent murders were also those that received 48.28% of remittances between 2003 and 2020. Thirdly, a first moment using EDA showed a significant positive correlation between Drug overdose deaths and remittances by these seven states and

borderlands as well as New Jersey and New York. However, the highest significant correlations were found between California and Texas versus Mexico, Jalisco, Michoacan, CDMX and Guerrero respectively, and between New Mexico versus Mexico, CDMX and Guerrero. In a second moment, a correlation was run between unemployment rates in the borderlands and remittances received in the seven Mexican states, indicating at the same time, the number of drug overdose deaths and the year in which they took place. In all three US borderland states, the graphs made evident that Covid-19 made a dent in this matter. From 2015-2019 the correlation between unemployment and remittances was negative, so to a smaller the unemployment rate, corresponds a higher level of remittances. That result follows the fundamentals of economic theory. However, from 2020 to 2021, the correlation was also negative but at higher levels of unemployment and larger amounts of remittances, both matching with larger number of drug overdose deaths. This could either be the result of more migrants working in the USA or of higher revenues obtained by Mexican TCO at higher prices of their drugs derived from the lockdowns and freezing of economic activity during the Covid-19 pandemic. This conclusion represents only an approach to a complex and dynamic phenomenon, and it is based on public data.

## References

- Animal Político. (25 de Junio de 2020). *Estos son los 4 grupos delictivos que operan en el Estado de México*. Obtenido de La Sedena tiene identificados a cuatro cárteles en el Edomex. Dos operan a través de su alianzas para cerrar el paso a otro.: <https://www.animalpolitico.com/2020/06/grupos-delictivos-operan-edomex-cdmx-carteles/>
- Banxico. (30 de enero de 2022). *Remesas por Entidad Federativa*. Obtenido de Sistema de Información Económica: <https://www.banxico.org.mx/SielInternet/consultarDirectorioInternetAction.do?accion=consultarCuadroAnalitico&idCuadro=CA79>
- Barrera, A. G. (2020, July). Before Covid-19, more Mexicans came to the US than left for Mexico for the first time in years. *Pew Research Center*, <https://www.pewresearch.org/fact->

tank/2021/07/09/before-covid-19-more-mexicans-came-to-the-u-s-than-left-for-mexico-for-the-first-time-in-years/#:~:text=The%20main%20change%20in%20net,The%20number%20of%20Mexican%20immigrants.

Batalova, E. I. (5 de November de 2020). *Mexican Immigrants in the United States*. Obtenido de Migration Policy Institute: <https://www.migrationpolicy.org/>

Brotherton, P. K. (2018). *Immigration Policy in the Age of Punishment*. New York Chichester, West Sussex: Columbia University Press,.

Centers for Disease Control and Prevention. (20 de May de 2022). *National Center for Health Statistics*. Obtenido de NSHC: [https://data.cdc.gov/browse?category=NCHS&sortBy=last\\_modified](https://data.cdc.gov/browse?category=NCHS&sortBy=last_modified)

Douglas S Massey, J. R. (2010). The Geography of Undocumented Mexican Migration. *HHS Public Access*, WINTER; 26(1): 129–152.

Drug Enforcement Administration (DEA). (2021). *National Drug Threat Assesment*. Washington DC: US Department of Justice.

Instituto Nacional de Geografía e Informática. (30 de abril de 2022). *Defunciones por homicidios*. Obtenido de Mortalidad: <https://www.inegi.org.mx/sistemas/olap/proyectos/bd/continuas/mortalidad/defuncioneshom.asp>

Kamp, J. (11 de May de 2022). Drug-Overdose Deaths Reached a Record in 2021, Fueled by Fentanyl. *The Wall Street Journal*, págs. <https://www.wsj.com/articles/drug-overdose-deaths-reached-a-record-in-2021-fueled-by-fentanyl-11652277600>.

Maria, A.-H. (4 de mayo de 2022). El conflicto de nunca acabar’: residentes de Michoacán están atrapados en la guerra de los cárteles. *The New York Times*, págs. <https://www.nytimes.com/es/2022/05/04/espanol/mexico-cartel-michoacan.html>.

Martin, M. O. (29 de Marcch de 2022). Family Remittances in 2021: Is Double-Digit Growth the New Normal? *The Dialog*, págs. <https://www.thedialogue.org/analysis/family-remittances-in-2021-is-double-digit-growth-the-new-normal/>.

- Migration Policy Institute. (5 de November de 2020). *Migration Information Source*. Obtenido de Mexican Migrants in the United States: [https://www.migrationpolicy.org/article/mexican-immigrants-united-states-2019?gclid=Cj0KCQjwspKUBhCvARIsAB2IYusujR8j9q65o3Ogb24WNIY4k5zbb\\_R4W9HRhzjWg83s-l9JesGaalEaAuRxEALw\\_wcB](https://www.migrationpolicy.org/article/mexican-immigrants-united-states-2019?gclid=Cj0KCQjwspKUBhCvARIsAB2IYusujR8j9q65o3Ogb24WNIY4k5zbb_R4W9HRhzjWg83s-l9JesGaalEaAuRxEALw_wcB)
- Ng, J. J. (1 de abril de 2022). *México | Empleo de migrantes mexicanos se contrajo 20% en la pandemia, pero ya están 3.2% arriba*. Obtenido de BBVA Research: [file:///C:/Users/ACER/Downloads/20220401\\_Remesas\\_Mexico%20\(1\).pdf](file:///C:/Users/ACER/Downloads/20220401_Remesas_Mexico%20(1).pdf)
- Paarlberg, M. A. (2022). Transnational gangs and criminal remittances: a conceptual framework. *CMS* 10, 24, <https://doi.org/10.1186/s40878-022-00297-x>.
- Pineda, A. C. (11 de agosto de 2021). Operan en Oaxaca al menos . *El imparcial*, págs. <https://imparcialoaxaca.mx/oaxaca/557919/operan-en-oaxaca-al-menos-4-de-carteles-de-la-droga/>.
- Ravelo, R. (2016). *México en manos del Narcotráfico*. CDMX: Peguin.
- Salcedo, D. C. (November 2013). Mexican Migration to the United States: Underlying Economic Factors and Possible Scenarios for Future Flows. *Banco de México: Working papers*, <https://www.banxico.org.mx/publications-and-press/banco-de-mexico-working-papers/%7B277A15D7-3934-82D3-D760-AF02B8BF8037%7D.pdf>.
- State Health Facts. (5 de May de 2022). *Opioid Overdose Death Rates and All Drug Overdose Death Rates per 100,000 Population (Age-Adjusted)*. Obtenido de KFF: <https://www.kff.org/other/state-indicator/opioid-overdose-death-rates/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D>
- Steve Brito, A. C. (2014). Remittances and the impact of crime in Mexico. *IDB Working Paper Series No. IDB-WP-514*, <https://www.econstor.eu/bitstream/10419/115477/1/IDB-WP-514.pdf>.
- US Bureau of Labor Statistics. (25 de February de 2022). *Employment and Unemployment*. Obtenido de Regional and State Unemployment: <https://www.bls.gov/news.release/srgune.toc.htm>

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