DH 150: Introduction to Network Analysis

The Impact of Mexican Cartels

Casey O'Brien | cjobrien@g.ucla.edu

About

Sources

In my investigation into Mexican Cartels, I was drawn to a dataset from a study conducted by Rafel Prieto-Curiel and Gian Maria Campedelli entitled "Mexican Cartels Form a Network of Alliances and Rivalries" (2023). This dataset reflects data on alliances and rivalries between Mexican cartels in the year 2020 and is part of a larger study centered around the reduction of violence in Mexico through limiting recruitment to cartels (Prieto-Curiel & Campedelli, 2023). This dataset was created by the researchers through compiling information from various open-source, national websites documenting statistics on cartel activity (*Sala de prensa*, n.d.; *Censo Nacional de Sistema Penitenciario Federal 2021, n.d.*; *Versión Estadística RNPDNO - Dashboard CNB*, n.d.). With the dataset specifically illuminating relationships between cartels, I narrowed my focus into identification of the most prominent social agents amongst the cartel groups.

With this foundation, I expanded my research to include an additional focus on identifying factors that may influence the prominence of these cartels. Through the completion of the literature review, it became apparent that the drug trade is a prominent factor influencing the violence perpetrated by these groups (Gutiérrez-Romero, 2016; Dickenson, 2014). Additional context into the war on drugs illuminated failed attempts to dismantle these criminal groups, instead leading to further expansion and an increased spread of violence (Gutiérrez-Romero, 2016). Inspired by this, I aimed to examine the drug trade more closely as a means of potentially identifying an additional tactic that may be helpful in minimizing the strength of cartels while not inviting additional violence. In doing so, I compiled a supplementary dataset outlining the most commonly traded drugs by prominent cartels in the network. As no pre-existing dataset for this information exists, I utilized online articles and reports on cartels to identify which drug trades they are involved in.

Process

In regards to processing the information from the data from my sources, I began by exploring my selected data set. Through downloading the data folder from datadryad.org, I was able to begin the process of cleaning the data. The information was separated into multiple .csv files outlining alliances, nodes, and rivals, respectively. In order to streamline the visualization process and allow for the network to illuminate the most connected cartels overall (thus combining data pertaining to alliances and rivalries), I combined the two .csv files for alliances and rivalries into one. Within this combined dataset, I added a column for "type", in which I identified if the relationship between the two cartels was an alliance or a rivalry. This allowed me to color code the edges when creating the network visualization in Gephi. When examining the nodes .csv file, I initially attempted to gather geographic data to make a geospatial visualization of the cartels. However, I discovered that the lack of specific geographic data led this to be an inaccurate visualization, as well as that the data did not illuminate any networks or relationships between cartels. Therefore, I did not continue to create this visualization as I did not want to include inaccurate data. Throughout this process, I combed through all .csv files to remove and correct inaccurate spellings, as well as redundant data. I further clearly labeled my nodes with the names of the cartels in order to make sure that the visualizations would be clear and easy to understand.

Creating the second network required a manual compilation of data. Using network analysis of the dataset by Prieto-Curiel and Campedelli, I identified the most prominent cartels based on the weight of their connections. More specifically, I selected all cartels that have interactions with other cartels in at least 10 states, as this is approximately one third of the total number of states in the country. Resulting in 17 of the most prominently connected cartels, I used these as the framework for researching the most popular drugs dealt in Mexico. I utilized online articles and reports on each cartel individually in order to identify which drugs they deal with, and compiled this information into a dataset based on cartel name and type of drug. I selected a smaller number of cartels due to their prominence in the network as it is more likely that there will be information published about these cartels online, thus making it possible to collect data. Furthermore, researching these influential cartels may illuminate a pattern, and if one can be identified (such as a drug that is dealt by a majority of the largest cartels), it may illuminate a potential area for governments to target as a means of undermining the cartel structure.

To create this supplemental dataset, I organized my .csv file in a very similar manner to that of the primary dataset. In doing so, I established uniquely numbered edges and nodes outlined as "Node" for the cartels and "RNode" for the drug. I then labeled my "source" with the name of the cartel and the "target" with the name of the drug that they deal with. I outlined each drug dealt by a particular group as a distinct edge, which allowed for multiple connections to be made (ie. allowing the visualization to display that one cartel can deal many drugs, and subsequently that one drug can be dealt by many cartels).

Presentation

To explore both datasets through network analysis, I utilized Gephi to create visualizations. For the first visualization, pertaining to alliances and rivalries, I uploaded the new combined .csv file for the edges and the .csv file for nodes to Gephi, where I utilized ForceAtlas2 to create my visualization. I utilized pink to represent rivalries and blue to represent an alliance in order to create a clear visual distinction between the two. I utilized these two colors in particular due to the contrast and likelihood that this contrast will be able to be seen by the majority of people, regardless of whether or not they are colorblind. Similarly, I utilized ForceAtlas2 for the second visualization to illustrate the most popular drugs dealt by cartels. Instead of using the pink and blue contrast for the edges, I utilized this color difference to distinguish between nodes, as some nodes represent the cartels and some nodes represent the drugs they deal with. Utilizing network analysis allows for clear exploration and examination of data, and illuminates connections that would have otherwise been much more difficult to identify. In an attempt to make these visualizations interactive and more accessible, I published them online through exporting the files to GitHub.

About

This project was created by a Digital Humanities 150 student at UCLA during a six week summer course. Utilizing publicly available data and the visualization software Gephi, the intent of this project is to become familiar with elements of network analysis and apply these skills and techniques to a data set with the intention of creating a digestible narrative with a social justice lens.

Acknowledgements

I would like to thank Dr. Horne for all of his input and guidance throughout this project, as well as for fostering an open and engaging learning environment. His guidance and genuine care for his students has made this process incredibly enjoyable while teaching me applicable skills. I extend additional thanks to the students in DH 150 for their open discussions throughout the course.

Narrative

Introduction

The long term presence of cartels in Mexico has greatly altered the societal structure of the nation. With 125,000-150,000 cartel-related homicides occurring between 2006-2018, it is clear that organized crime is a powerful and deadly force within Mexico (Prieto-Curiel et al., 2023). With connections to the drug trade as well as violent crime and a steady increase in the

number of cartels present, the Mexican cartel network has been continuing to grow in spite of efforts to reduce this expansion.

This project aims to examine the societal impact of alliances and rivalries between Mexican cartels. In particular, the research investigates the factors that permit such rapid and steady growth amongst the most powerful cartels in the nation. Furthermore, it aims to provide insight into the detrimental effects of cartel violence on surrounding communities.

This examination of Mexican cartels stems from the dataset "Mexican Cartels Form a Network of Alliances and Rivalries," as compiled by Rafel Prieto-Curiel from Complexity Science Hub Vienna and Gian Maria Campedelli from the University of Trento (2023). Funded by the Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology, as well as the Austrian Federal Ministry of the Interior, this dataset examines the various relationships between Mexican cartels in an attempt to further extrapolate an approximate population size of the cartels. Drawing upon information gathered by national organizations such as the National Institute of Geography and Statistics in Mexico as well as the Mexican prison census, the data in this report provides detailed information pertaining to the number of alliances and rivalries held by each known Mexican cartel, as well as the number of states that are affected by this relationship. This dataset is relevant to the research as it provides insights into which cartels are the most connected, thus acting as central nodes within the cartel network. In turn, identifying the most connected nodes allows for further exploration and analysis of these key agents, as higher levels of connectivity correlate with a stronger impact on the network as a whole due to the ability to influence the spread of information.

Place in the Literature

Current literature outlines the prominent violence attributed to Mexican cartels and their continuous growth, thus establishing cartels as a dominant societal force within the country. Scholars generally agree that the Cártel de Jalisco Nueva Generación (CJNG) is one of the most prominent and powerful cartel organizations throughout Mexico, having recently surpassed that of the Sinaloa Cartel (Jones, 2018; Sampó et al., 2023). Established in 2010, CJNG has quickly grown to be a steadfast presence in Mexico (Jones, 2018). The resilience and rapid growth of this cartel can largely be attributed to members building off of previous knowledge from other cartels, as well as by taking control over smaller cartel groups which resulted from fragmentation brought by the "war on drugs" (Gutiérrez-Romero, 2016). Implemented in 2006 by the Mexican government, the war on drugs aimed to combat cartels with military presence and direct targeting of cartel leadership (known as the "kingpin strategy") (Gutiérrez-Romero, 2016; Jones, 2018). In doing so, the cartels had to reorganize their systems and expand to additional territories, in turn creating a stronger cartel network than had been previously seen in Mexico (Gutiérrez-Romero, 2016).

Studies show that the kingpin strategy has been largely unsuccessful, and in fact has increased rates of drug-related violence (Dickenson, 2014). Utilizing a cross-sectional model of data of murders in Mexico over a 49 month period, Dickenson revealed that due to the fracturing of cartel groups as a reaction to the attempted removal of leadership amongst cartels spearheaded by the Calderón administration, these attempts to minimize violence led to an increase of 415 deaths more in a four year time period than was projected based on data from

previous years (Dickenson, 2014). This illustrates a clear correlation between the removal of cartel leadership and an increase in violence, which is further stated to be particularly prominent in the state in which the leader was removed. (Dickenson, 2014). While the factors behind this stark increase in violence are still being explored by researchers, it has been found that this increase in violence is further exacerbated in areas that are central to transportation due to the ease of use within the drug trade itself (Calderón et al., 2015). Further examination of the kingpin strategy seen under the Calderón administration has illuminated that while removal of cartel leadership was intended to minimize violence, it instead led to an exacerbatory effect, thus increasing drug-trafficking related violence, as well as increasing general violence in surrounding areas (Calderón et al., 2015). This is in part due to an increase in both in-fighting and conflicts between cartel groups as a result of the subsequent fracturing due to changing leadership (Calderón et al., 2015).

Furthermore, cartels have begun to utilize technology and social media to support narratives that best benefit themselves by spreading disinformation (Linderman, 2023). This acts as retaliation for the war on drugs, as cartels are thus able to depict the Mexican government and militia as a negative, harmful force. Turning the Mexican population against the government and law enforcement undermines the credibility of any claims they make against the cartels (Linderman, 2023). This directly undermines the efforts of the government to control cartel growth and violence. Furthermore, by cementing cartels (and their crimes/habits, such as drug use) as a facet of society, it becomes harder for non-cartel related residents to separate cartel presence from society as a whole.

Utilizing media allows powerful cartels, such as the CJNG, to influence the majority of the Mexican cartel system. This disinformation is spread by affiliates of the cartels who have earned positions of power, news outlets (which have been corrupted by cartel members or simply report on misinformation provided to them), and social media accounts (*Fear, Lies and Lucre*, 2024; Linderman, 2023). Cartel activity has made much of Mexico unsafe for journalists to directly report, thus leading to social media to act as a strong channel for communication and to spread information due to the ability for users to access social media from any location. Cartels have been shown to utilize sites such as YouTube, Messenger, and Facebook for this purpose (*Fear, Lies and Lucre*, 2024). As technology has continued to develop and become increasingly prevalent in daily life, this issue has become more pertinent to the continued growth of cartels.

Specific information about the inner workings of cartels is limited due to the inherent illegality of the cartel and the subsequent attempt to limit the spread of information that could be used to undermine their structure. Furthermore, any previously gathered data has generally pertained to the cartels themselves, and thus has led to a gap in information about the impacted communities. Within the cartel network itself, information flow is largely determined by the cartels themselves, as the type of connection (ie. alliance or rivalry) influences the impact of the relationship on the surrounding community based on the resulting peace or rising conflict. Determining how these relationships contribute to the influence and success of a cartel allows for potential insight into how to mitigate the widespread effects of information sharing and alliance formation in hopes of destabilizing the network.

Significance

   The growth and resilience of Mexican cartels is a critical issue with social repercussions that have been largely overlooked. Through this research, I aspire to gain an understanding of how cartels have managed to maintain their relationships and social influence, particularly in light of more specific attacks on their leadership. Through the examination of systemic and social factors in relation to the prevalence of cartels, this project further aims to highlight how additional external influences perpetuate cartel violence. In gaining a deeper understanding of how these systems have allowed cartels to sustain and develop for so long, it may be easier to develop new approaches as to how to dismantle these systems of violence. By amplifying the voices of those who are most directly affected by cartel violence, such as those living in local communities, this project aims to increase awareness about the prevalence of cartels across Mexico. As cartels continue to grow and become cemented as a pivotal source of power within Mexico, it becomes increasingly important that marginalized communities who are directly impacted by this abuse of power are able to stay protected and safe from the subsequent violence attributed to cartel presence. While previous research has examined the sociopolitical impact of cartels, there has been a significant underrepresentation of the impact this has on local communities. With a better understanding of those who are both supported and harmed by the current structure of the Mexican cartel network, systems can be executed and modified to better support surrounding communities. Ultimately, the goal of this project is to foster a greater understanding of the significant impact of Mexican cartels on the surrounding communities, as well as to identify previously overlooked methods to further control cartel growth.

Network Exploration

Network 1: Alliances and Rivalries
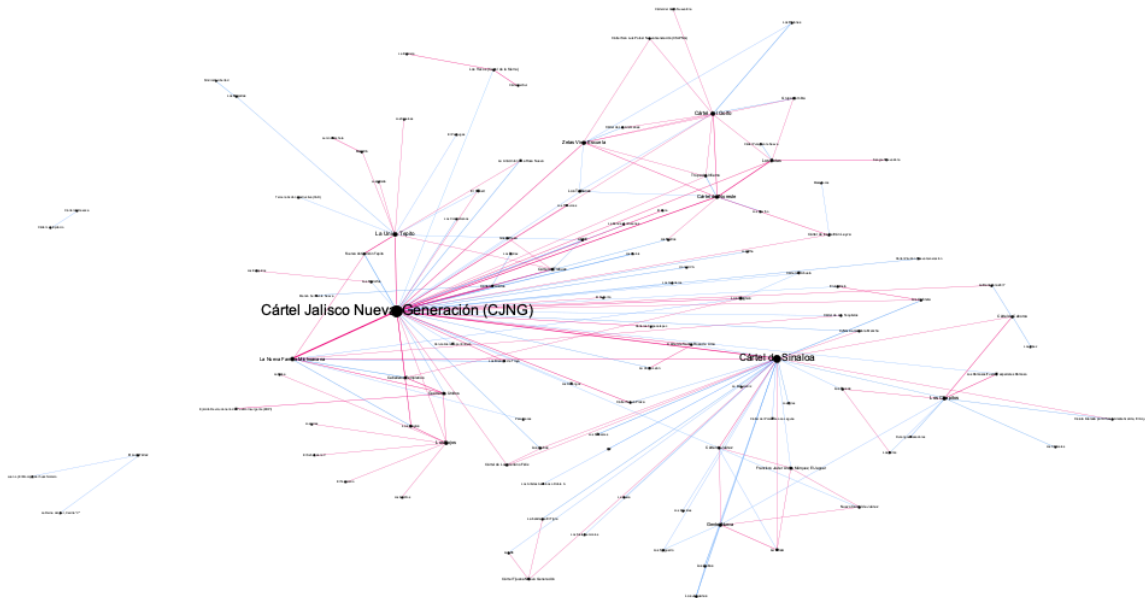
In order to gain a more full understanding of the social network of Mexican cartels, it is essential to understand the dynamics between the various cartel groups. Utilizing data from Prieto-Curiel and Campedelli's dataset "Mexican Cartels Form a Network of Alliances and Rivalries," I utilized network analysis to identify which cartels are the most interconnected. This dataset contains information pertaining to alliances and rivalries present between the cartels.

Pertaining to network analysis, each node represents a cartel, and each edge represents the relationship between the connected cartels: either an alliance or rivalry respectively. In order to clearly delineate between the two, I utilized color-coding, with pink representing a rivalry and blue representing an alliance. The edge weight correlates to the number of states in which the relationship (alliance or rivalries) is active in. For instance, the edge between the Cártel de de Sinaloa and the Cártel Jalisco Nueva Generación (CJNG) has a weight of 14, meaning that the rivalry between these two groups has led to prominent activity (such as violence or other negative interactions) within 14 Mexican states. The intent of this analysis is to identify which cartels have the largest impact on the network in terms of having the most connections, thus identifying these cartels as key nodes. The most connected cartels, and therefore the cartels with the highest edge weight, are subsequently the most influential on Mexican society as a whole due to the number of states in which they have territorial presence. A state with more

rivalries than another may be more dangerous to live in than a state that has high cartel presence but less evidence of cartel rivalries, due to the potential for reduced combat between groups.

This is an undirected, socio-centric network, as this outlines the relationships between cartels throughout Mexico. There are three components in this network, with one primary component containing 109 of the total 114 nodes present. This means that the majority of Mexican cartels can be somehow connected to one another, while five cartels in total do not have relationships with this larger social web. Modularity of a network measures the strength of groups or cliques within the network, and therefore how tightly-knit these smaller communities are. The modularity of this graph is 0.521, thus indicating a moderately strong community structure, with some cartels in the larger cluster being more densely connected than others, likely being connected to the same cartels. With a network density of 0.028, or approximately 2.8%, this network is not very dense. Such a low density means that while many nodes can reach others, they are not directly connected to many nodes. In the context of this project, it means that most cartels do not have direct relationships with many other cartels, and primarily interact with a small number of other groups.

This visualization clearly indicates that the CJNG and Sinaloa cartels are the most prominent nodes with the highest amount of relationships with other cartels, whether those be alliances or rivalries. Subsequently, these cartels are currently the most powerful cartel groups in Mexico (Jones, 2018; Sampó et al., 2023). The size of the node in the visualization correlates to the number of connections the cartels have with other nodes. It is important to note that despite originating after the Sinaloa cartel had been established as a force in Mexico, the CJNG has become more connected with other groups. Having so many connections and interactions in many states means that the CJNG (and violence caused by them) directly influences and impacts the majority of Mexico due to being active in so many territories.

Network 2: Drug Trafficking
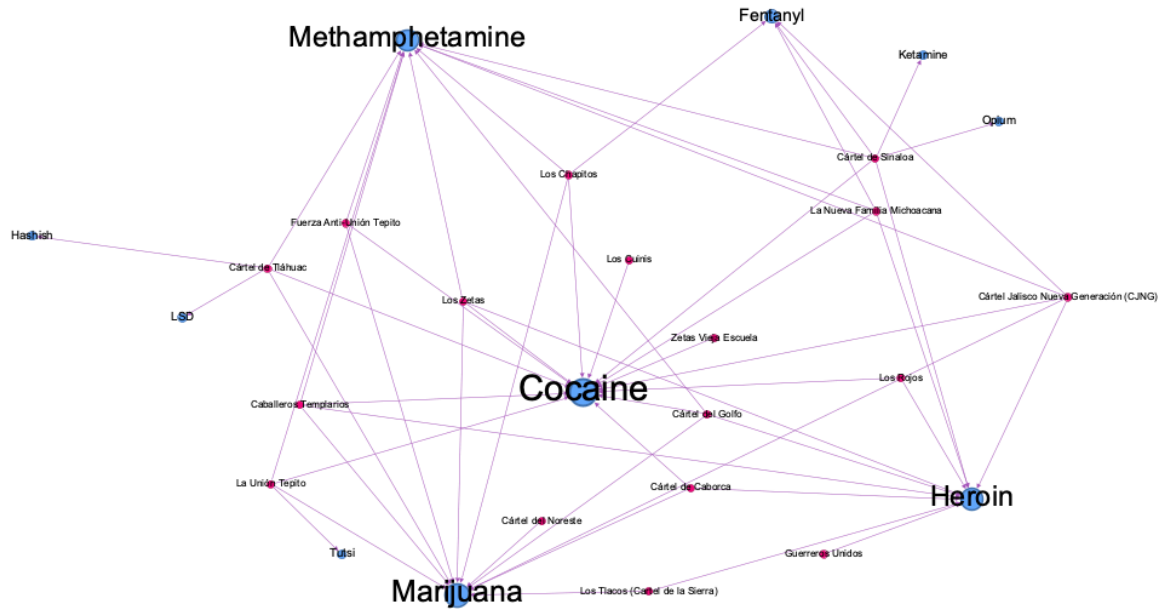
With the given data set providing clear insight into the most socially influential cartels, it primes further research into what contributes to the strength of these groups. Within the fight against cartels in an attempt to minimize and ultimately eradicate cartel violence as a whole, identifying the most well-connected and prominent cartels is essential as dismantling those groups will have a more significant impact on the social network of cartels as a whole than it would to dismantle a less centralized node, such as the Cártel de Oaxaca, which holds no rivalries (at least according to the collected data) and only holds an alliance with the Cártel Los Epitacio. While disbanding either of these two smaller cartels is still beneficial as it is a step towards the full eradication of cartels, it is not very impactful on the cartel system as a whole due to the lack of connections these groups have with other cartels.

My initial attempt was to examine the leadership structure of the most well-established and well-connected groups, such as the CJNG, to see how variations in these structures may have led to their resilience and ability to grow to be a steadfast, powerful social force. However, due to the illegal nature of the majority of cartel action, this information is widely unavailable and incredibly limited. This secrecy is key for the cartels to be able to maintain operation despite military and police attempts to interfere.

In light of these limitations, I instead examined the factor of the drug trade, as this was explicitly stated to be a primary motivating factor for the Mexican government to dismantle cartels (Gutiérrez-Romero, 2016). With the over 60,000 drug-related murders committed in Mexico between 2006 and 2015, it is clear that the drug trade has detrimental impacts in terms of both drug usage as well as subsequent violence that arises due to the nature of the drug trade (Calderón et al., 2015). Through examination of which drugs are dealt by the most prominent cartels (as identified through network analysis of Prieto-Curiel's dataset), it is possible to illuminate the most widely-trafficked drugs, thus outlining potential infrastructures to target as a means of dismantling the cartel system from another approach.

In order to create this dataset, I more closely examined the data from the previous network and identified the cartels with interactions in at least 10 states, which is roughly a third of the states in the country. This resulted in identifying 17 of the most prominent cartel groups in Mexico as the target demographic to research. Pertaining to network analysis, each node represents either a cartel (as illustrated in pink) or a type of drug (as illustrated in blue, for contrast). As there are two different types of nodes, this can be identified as a multipartite network. Further constructed as a directed network, the edge represents that a cartel is dealing that particular drug. The size of the nodes representing drug type correlates to the number of connections that node has. For instance, the node for cocaine is larger than that of fentanyl, as 14 cartels deal cocaine while only 4 cartels deal fentanyl. The largest nodes represent the drugs that are dealt by the highest number of influential cartels. Subsequently, this means that they are the most prominent drugs to be found within the cartel system. This network has one large connected component. With a network density of 0.077, or 7.7%, this network is not very dense but is more dense than the network representing relationships between cartels. This indicates that some nodes have a lot of connections, but a majority of nodes are not directly connected to other nodes. This can be partially explained by the two types of nodes, as this network is not meant to display interactions between the cartels, thus leaving those nodes unconnected. The visualization indicates that amongst the most prominent Mexican cartels, the most commonly dealt drugs are cocaine, methamphetamine, marijuana, and heroin.

I argue that specific dismantling of the drug trade (ie. focusing on targeting cocaine imports, exports, and transportation) may lead to destabilization to the highest number of the most prominent cartel groups. In targeting the drug network rather than directly targeting cartel leadership, it may help undermine the nationwide cartel structure as a whole. This acts as an alternative to the previously enacted government tactics which focused on cartel leaders during the war on drugs, which only led to an escalation in violence (Gutiérrez-Romero, 2016). By indirectly targeting the cartels rather than spearheading direct attacks, it is possible that this may be a more effective strategy due to taking a less direct approach.

General Significance and Overview

Increasing violence due to currently failing attempts to dismantle cartel systems and mitigate the violence caused by these organizations is unsustainable and a life-threatening issue. Through the use of network analysis, I am able to determine the key agents in the cartel network, thus outlining which cartels have the most significant impact on the network as a whole. By closely examining these key agents, particularly in regards to the drugs they are involved in dealing, it illuminates an additional structure to target as a means of bringing down

cartel operations. In directly targeting the drug trade and supply, it may allow for cartels to fall without necessarily inciting excess violence (as less fracturing should occur since leadership is not being directly attacked), thus minimizing the death of innocent civilians.

Data Critique

During my exploration of Mexican cartels, I identified a related data set titled "Mexican Cartels Form a Network of Alliances and Rivalries", led by Rafael Prieto-Curiel from Complexity Science Hub Vienna and Gian Maria Campedelli from the University of Trento (Prieto-Curiel & Campedelli, 2023). This dataset reflects data on 150 cartels active in Mexico during 2020, including group name and the central states in which they operate. The dataset additionally identifies alliances and rivalries between the respective cartels, with supplemental information pertaining to the number of homicides, missing persons, and arrests between 2012 and 2021.

This dataset was created as part of a larger research study in which Prieto-Curiel and Campedelli attempt to identify an estimate for population size of cartels in Mexico, as well as to simulate potential policies to be enacted with the intent to identify possible methods of reducing cartel power and associated violence (Prieto-Curiel et al., 2023).

The methodology of data collection and generation is not outlined in the dataset itself, but is instead detailed throughout the accompanying paper. The authors compiled data from four public, open source data sources in order to determine the size and behaviors of active Mexican cartels. Specific data for cartels in 2020, on which the dataset is primarily focused, was created by CentroGeo, GeoInt, and DataLab under the Consejo Nacional de Ciencia y Tecnología and is synthesized by Política de Drogas México, an open source website (Prieto-Curiel et al., 2023, *Plataforma de Proyección de Datos Abiertos (PPData)*, n.d.). Data pertaining to the rates of homicide, missing persons cases, and arrests was compiled from the National Institute of Geography and Statistics in Mexico, the Registro Nacional de Personas Desaparecidas y No Localizadas (National Registry of Missing and Non-Disappeared Persons), and the Mexican prison census (*Sala de prensa*, n.d.; *Censo Nacional de Sistema Penitenciario Federal 2021, n.d.*; *Versión Estadística RNPDNO - Dashboard CNB*, n.d.).

This dataset can illuminate the social power and expansive impact of 150 cartels active in Mexico in 2020, as well as the states in which they operate. This can provide insight into which states are faced with the most amount of cartel presence due to the number of cartels in the state, as well as how connected those cartels are. The identification of the number of alliances and rivalries associated with each cartel provides additional information as to the strength of the cartels, as cartels with more connections (either positive or negative) have more social influence on the network of cartels than a cartel with fewer connections. Additional data provides insight into the rates of homicide, missing persons, and arrests, which identify a general increase in all three rates during the ten-year period from 2012 to 2021. This overall increase reflects that an increase in police force against cartels has been unable to reduce or mitigate the violence perpetrated by these groups. In turn, this means that the current efforts are largely ineffective at controlling the cartels, thus identifying a need for reformed policies and procedures in order to minimize cartel-induced violence.

The dataset cannot reveal the size of each cartel, as further does not attribute the number of homicides, missing persons, and arrests that are associated with each cartel. Without the size of the cartels' respective populations, it becomes more challenging to identify which cartels are most prominent in terms of number of associated members. The rates of homicide, missing persons, and arrests are compiled as a yearly total, rather than being segmented to reflect the influence of each individual cartel. Furthermore, the dataset does not identify the intensity of the alliances or rivalries. It is further possible that this dataset does not reflect all cartels present in Mexico, as some may not be documented due to a lack of appearances in news sources which were analyzed to compile the initial data. While geographic information is generally addressed in terms of the number of states which are directly impacted by the alliances and rivalries between cartels, no specific geographic information is present, which prevents specific analysis of territories as these states are not identified.

Furthermore, specific labels are not present with the dataset, and are instead illuminated through the accompanying paper. For instance, the dataset itself does not identify that the number of cartels and their alliances were compiled based on data from 2020. Additionally, the dataset does not explicitly identify the significance of the weight of the edges. The paper outlines the weight as representing the number of states in which the dispute or alliance between cartels occurs. The total weight indicates the number of times that two cartels were allies or rivals in a different state in Mexico. Without the supplementary source, it would be difficult to identify the significance of the listed weight. The accompanying paper further outlines additional methodologies used in the completed study, in which the authors utilize differential equations to model specific data pertaining to population growth for each cartel, such as recruitment rates in relationship to influence from state authorities. Further calculations are completed to predict future trends regarding growth of cartels and a general increase in corresponding homicide and missing persons cases. The dataset itself identifies the number of connections between cartels in Mexico, while the accompanying paper expands on this information in an attempt to identify potential changes that need to be made to policing efforts in order to reduce the presence of cartels in Mexico. Without the supplementary information (specifically the mathematical calculations), the dataset provides insight into the power and strength of each cartel, which may in turn highlight potential cartels to focus policing efforts on in an attempt to destabilize the cartel network as a whole.

To expand on the exploration of Mexican cartels, I aimed to examine the specifics of the drug trade amongst the most embedded (ie. most prominently connected) cartels in the network. While information about which drugs are being traded is not present in the original data set, network analysis of the data set does illuminate which cartels have the most connections, both in terms of alliances and rivalries. To examine the specifics of the drug trade more closely, I selected the cartels that are noted to have interactions in at least 10 states in Mexico (as established by the weight of connections they have) to utilize as my sample, as the larger territorial influence leads to an increase in potential to have a more significant on the population of Mexico. There is not a data set explicitly containing this information, so I utilized online articles and reports to manually search for data pertaining to which drugs are dealt by these specific cartels. Upon cleaning and organizing this information, the compilation of data revealed that the specifics of the drug trade for certain groups are not publicly documented, thus resulting in a final corpus of information for 17 cartels.

Resources

Annotated Bibliography

Calderón, G., Robles, G., Díaz-Cayeros, A., & Magaloni, B. (2015). The Beheading of

    Criminal Organizations and the Dynamics of Violence in Mexico. *Journal of Conflict*

    Resolution, *59*(8), 1455–1485. https://doi.org/10.1177/0022002715587053

This article argues that getting rid of the leaders of drug trafficking organizations in Mexico increases violence both pertaining to the organization as well as the surrounding community. It further argues that this is particularly true in areas that are central to transportation due to the ease of access for drug trafficking. The authors highlight multiple factors on the increase in violence, including inter- and intra-cartel fighting and motivating direct attacks on the state. This article is important because it highlights the multiple repercussions of centering government resources on capturing or killing leaders of Mexican cartels, which thus indicates a need for a change in tactic to minimize potential casualties and associated damages. In relation to my research, this article provides additional insight into the connection between arrests and homicides related to Mexican cartels, and further illustrates the intense impact that cartel presence has on the communities in the areas that they are active in. This source can be further examined to visualize relationships between state-led attacks on cartels and areas featuring increased levels of violence. This may help provide insight into the effectiveness of these endeavors as well as visualizing the communities who directly face repercussions from these actions.

Dickenson, M. (2014). The Impact of Leadership Removal on Mexican Drug Trafficking

    Organizations. *Journal of Quantitative Criminology*, *30*(4), 651–676.

    https://doi.org/10.1007/s10940-014-9218-5

This article argues that the removal of leaders of Mexican drug trafficking organizations directly leads to an increase in violence, particularly around the area where the cartel is based. Utilizing an empirical approach and examining quantitative data, the authors claim that the current strategies of the Mexican government have produced counteractive results, as the rate of murder and violence has increased rather than decreased with the attempted dismantling of the organizational structure. This article is important because it highlights a direct factor on the steady increase of killings shown in the past decade as well as how cartel leadership and structure can influence life for people living in Mexico who are not

affiliated with cartels. In relation to my research, this article provides important insight into the internal structure of cartel leadership, as well as that violence seems to be more intense if the leader is killed instead of captured. By examining the influence on local communities (ie. how violence is increased in the home territory rather than the territory of capture) and the potential for a smaller increase in violence when the leader is arrested rather than killed, I can work to explore the impact of cartels with more powerful leadership in comparison to cartels with less cemented leadership systems, and attempt to explore how this influences the lives of the community members in areas with cartel presences. This article can be used to supplement visualizations pertaining to identifying which communities are most affected by cartel violence.

Gutiérrez-Romero, R. (2016). Estimating the impact of Mexican drug cartels and

drug-related homicides on crime and perceptions of safety. *Journal of Economic*

Geography, *16*(4), 941–973.

This article argues that the presence of crimes and violence committed by drug cartels in Mexico in a community increases feelings of being unsafe. It further argues that the election of Calderón as president of Mexico, and the subsequent institution of new policies (such as the war on drugs), greatly increased the rate of killings and cartel-related violence. The authors utilize surveys and statistics to examine the sentiments of people impacted by drug related crimes as well as the rates of drug related homicides in relation to cartels. Additionally, the literature review outlines that rates of unemployment and poverty have increased in areas with homicides related to drug organizations, which further provides insight into the impact of cartels on the surrounding communities. This article is important because it emphasizes the impact of cartels on people who do not choose to be associated with them. In relation to my research, decreased feelings of safety in areas where there are high levels of cartel related homicides indicates that places with more cartel rivalries likely feel less safe and are more stressful environments to live in for members of the community who are not involved with cartels. I can also utilize the survey data pertaining to self-reported sentiments about cartel violence to gain a more thorough understanding of the emotional and social environment created as a result of the cartel violence. This data can be utilized to create visualizations reflecting patterns amongst people of varying sentiments towards cartel violence.

Jones, N. P. (2018). The Strategic Implications of the Cártel de Jalisco Nueva Generación.

Journal of Strategic Security, *11*(1), 19–42.

This article examines the structure of the Cártel de Jalisco Nueva Generación (CJNG), including geographic distribution and the acquisition of additional cartel groups, thus establishing the CJNG as one of the most powerful forces in the Mexican cartel system. The authors further indicate that the CJNG stems from the death of the Sinaloa cartel

leader in 2010, thus leading to the expansion into this new cartel. Building on information from cartels formed before them, the CJNG utilizes this knowledge to maintain their position of power as a leading figure in the cartel system. This article is important because it provides insight into the growth of a powerful cartel network, and outlines how this growth allowed them to gain and maintain control over Mexican cartels. In regards to my research, the CJNG is one of the most central and prominent nodes in my network for both alliances and rivalries. Examining the structure of the CJNG allows me to better understand what allowed them to become such a strongly connected cartel. It is additionally notable that many of the members of the CJNG studied under other cartels, such as the Sinaloa cartel, which provides further insight into the strength of the connection between these cartels. This article can be used as a supplemental resource to try to construct a potential framework for the leadership structure of the CJNG.

Prieto-Curiel, R., & Campedelli, G. M. (2023). Mexican cartels form a network of alliances

and rivalries [Dataset]. Dryad. https://doi.org/10.5061/dryad.zw3r228d7

This is the primary data set to be utilized throughout this project. Outlining alliances and rivalries between Mexican cartels, this allows for analyses of the dynamics of the cartel network as a whole as well as ego-centric networks of specific cartels for more thorough and detailed analysis to be conducted. Furthermore, outlining information about each node may be used as a framework for establishing geographic visualizations, although this may require supplemental information.

Prieto-Curiel, R., Campedelli, G. M., & Hope, A. (2023). *Reducing cartel recruitment is the*

only way to lower violence in Mexico (arXiv:2307.06302). arXiv.

https://doi.org/10.48550/arXiv.2307.06302

This article accompanies the dataset utilized to examine the alliances and rivalries between Mexican cartels. Intended as an accompaniment to the dataset, this article attempts to explore ways to reduce violence caused by cartels in Mexico. This can be incredibly beneficial as it provides possibilities of conducting visualizations based off of recruitment rates. Identifying which cartels have the highest recruitment rates may establish a framework for further analysis of what leads for that to be possible, thus providing further insight into how continuous cartel growth can be combated.

Sampó, C., Jenne, N., Ferreira, M. A., Sampó, C., Jenne, N., & Ferreira, M. A. (2023).

Ruling Violently: The exercise of criminal governance by the Mexican Cartel Jalisco

Nueva Generación (CJNG). *Revista Científica General José María Córdova*, *21*(43),

647–665. https://doi.org/10.21830/19006586.1172

This article argues that the Cartel Jalisco Nueva Generación (CJNG) utilizes control over territories as a means of maintaining their rate of growth and expansion in the Mexican cartel system. The rapid expansion of this cartel indicates that it will continue to be a powerful force. Specifically focusing on criminal governance (ie. both formal and informal rules and means of operation that members of the cartel must follow), the authors utilize qualitative research to claim that the CJNG has governmental control both over the state and more informally through less-formal organizations as a means to maintain control over desired territories. This article is important because it outlines the significance of geographic location of cartels, as well as how the CJNG utilizes tactics such as threats to utilize the location and surrounding organizations for their own gain. In regards to my research, this article further outlines the historical alliances of the CJNG and the outcomes that this had on the formation and maintenance of the cartel. This allows me to further explore the network of this cartel in particular. It also provides insight into why geography is so significant for cartels, which may illuminate why some Mexican states have higher rates of cartel presence than others. This article can be utilized to create networks outlining the historical alliances of the CJNG as an attempt to determine how it became established as such a powerful force.

Bibliography

These sources were utilized in the construction of the primary dataset (created by Prieto-Curiel and Campedelli).

Censo Nacional de Sistema Penitenciario Federal 2021. (n.d.). Retrieved July 11, 2024,

from https://www.inegi.org.mx/programas/cnspef/2021/

Plataforma de Proyección de Datos Abiertos (PPData). (n.d.). Plataforma de Proyección de

Datos Abiertos (PPData). Retrieved July 11, 2024, from

https://ppdata.politicadedrogas.org/index.php

Sala de prensa. (n.d.). Instituto Nacional de Estadística y Geografía. INEGI. Retrieved July

11, 2024, from https://en.www.inegi.org.mx/app/saladeprensa/noticia.html?id=8317

Versión Estadística RNPDNO - Dashboard CNB. (n.d.). Retrieved July 11, 2024, from

https://versionpublicarnpdno.segob.gob.mx/Dashboard/Index

These sources were utilized in the construction of the secondary dataset pertaining to the specifics of drug trafficking amongst the 17 most prominent cartels in Mexico.

Asmann, P. (2018, April 6). *Mexico's Zetas: From Criminal Powerhouse to Fragmented Remnants*. InSight Crime.

http://insightcrime.org/news/interview/mexico-zetas-criminal-powerhouse-fragmented-remnants/

Chapitos. (n.d.). Retrieved August 8, 2024, from

https://insightcrime.org/mexico-organized-crime-news/los-chapitos/

Coup to the Tláhuac Cartel: Two operators and one narco-nudist fell—Infobae. (n.d.).

Retrieved August 8, 2024, from

https://www.infobae.com/en/2022/04/13/coup-to-the-tlahuac-cartel-two-operators-and-one-narco-nudist-fell/

Crime, I. (2020, November 13). *Fuerza Anti-Unión*. InSight Crime.

http://insightcrime.org/mexico-organized-crime-news/fuerza-anti-union/

Crime, I. (2021, August 13). *Guerreros Unidos*. InSight Crime.

http://insightcrime.org/mexico-organized-crime-news/guerreros-unidos-mexico/

Crime, I. (2023, March 10). *Gulf Cartel*. InSight Crime.

http://insightcrime.org/mexico-organized-crime-news/gulf-cartel-profile/

Dalby, C. (2019, October 31). *La Unión Tepito Inner Workings Revealed in Mexico City Raid*. InSight Crime.

http://insightcrime.org/news/analysis/mexico-city-raid-la-union-tepito/

Drug Dealers Operate Freely at Mexico's Largest University: Video. (n.d.). Retrieved August 8, 2024, from

https://insightcrime.org/news/brief/drug-dealers-operate-freely-mexico-largest-university-video/

Familia Michoacana. (n.d.). Retrieved August 8, 2024, from

https://insightcrime.org/mexico-organized-crime-news/familia-michoacana-mexico-profi

le/

Ford, A. (2022, April 25). *Arrest of Leader Shows Mexico's Rojos May Be Increasing*

Presence in Michoacán. InSight Crime.

http://insightcrime.org/news/leader-mexico-los-rojos-arrested-michoacan-group-evolve

s/

La Unión Tepito, the Mexico City cartel that refuses to die | International | EL PAÍS English.

(n.d.). Retrieved August 8, 2024, from

https://english.elpais.com/international/2024-03-29/la-union-tepito-the-mexico-city-cart

el-that-refuses-to-die.html

Massacre in Mexico as cartel violence spirals out of control leads to truce between rival

drug gangs: Horrifying videos show drug gangs slaughter rivals, burn piles of bodies

and shoot corpses "so they don't come back to life" | Daily Mail Online. (n.d.).

Retrieved August 8, 2024, from

https://www.dailymail.co.uk/news/mexico/article-13114055/mexico-gang-cartel-drugs-pi

les-bodies-guerrero.html

Mexico captures infamous drug lord Rafael Caro Quintero | AP News. (n.d.). Retrieved

August 8, 2024, from

https://apnews.com/article/drug-lord-rafael-caro-quintero-captured-mexico-dea-7ff3005

d4c848697458d73c669a72e6f

Mexico's Vigilante Militias Rout the Knights Templar Drug Cartel – Combating Terrorism

Center at West Point. (n.d.). Retrieved August 8, 2024, from

https://ctc.westpoint.edu/mexicos-vigilante-militias-rout-the-knights-templar-drug-cartel/

Office of Public Affairs | Leader of International Drug-Trafficking Organization Sentenced for

Cocaine Distribution | United States Department of Justice. (2023, July 21).

https://www.justice.gov/opa/pr/leader-international-drug-trafficking-organization-sentenced-cocaine-distribution

Secretary Yellen Announces Sanctions Against Top Leaders of Mexico's La Nueva Familia Michoacana Drug Cartel, New Fentanyl Advisory. (2024, August 7). U.S. Department of the Treasury. https://home.treasury.gov/news/press-releases/jy2418

Southern District of Texas | Several convicted in $16 million cartel drug conspiracy | United States Department of Justice. (2023, July 26). https://www.justice.gov/usao-sdtx/pr/several-convicted-16-million-cartel-drug-conspiracy

The Business—The Place Mexico's Drug Kingpins Call Home | Drug Wars | FRONTLINE | PBS. (n.d.). Retrieved August 8, 2024, from https://www.pbs.org/wgbh/pages/frontline/shows/drugs/business/place.html