

# Violence and local business in the city of Tijuana

Final project of the Professional Certificate  
IBM Data Science

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## 1 Introduction

### 1.1 Background

Tijuana is one of Mexico's largest and fastest-growing cities and it is the home of 3.4 million people in 2014 [1], making the largest Mexican city on the U.S.-Mexico border. The city is home to roughly 49 % of Baja California's population while comprising only around 2 % of the state's territory [6]. Tijuana reportedly grows at an annual rate of 35,000 people per year, or nearly 96 new inhabitants per day, drawing large numbers of immigrants from elsewhere in Mexico to join the city's robust economy [3]. Today, nearly 190,000 people cross the border between Tijuana and neighboring San Diego daily for work and other recreational pursuits[6]. The city's proximity to Southern California and its large, skilled, diverse, and relatively inexpensive workforce make it an attractive city for foreign companies looking to establish extensive industrial parks composed of assembly plants that are called "maquiladoras", even more so than other cities in the US-Mexican border zone, taking advantage of the North American Free Trade Agreement (NAFTA) to export products [12]. In the past decade alone, Tijuana became the medical device manufacture capital of the North American continent, surpassing previous leader Minneapolis - Saint Paul and one study estimates that this region is responsible for roughly 40 % of all audio-visual manufacturing in North America [21]. But the abundance of jobs does not go hand in hand with a better quality of life. According to a recent study in 2018 by the National Council for the Evaluation of Social Development Policy (CONEVAL, for his name in Spanish), almost 70 % of the population lives in conditions of poverty [5], there are lots of jobs but very low wages and poor conditions for Social mobility.

Given the geographic point of the city, a rise of violence related to drug trafficking and organized crime groups has been seen in the past decades [7]. The city also has high levels of drug use that are shaped by its proximity to the United States, but still, there is not an analysis or even data of the real problem [15]. Drug violence continues to dominate in Tijuana, wherein 2017 had more homicides than any other city in Mexico, in a record year for national homicide figures, in 2017 one out of twenty murders in Mexico took place in Tijuana. There is not a concise analysis of the violence in the city from the government. This work is the start of what I hope becomes that concise analysis, starting with a focus on the effect of the violence on the local business.

### 1.2 Personal motivation

I grew up in Tijuana, and lived there for 18 years of my life. Since I have memory violence has been part of the city, and living in one of the most violent neighborhoods ("Sanchez Taboada") helped me realize that from a young age. From my personal experience, after a while you get used to it, violence becomes normal, expected, the fear of getting mugged, shot or, for women, being raped, is something that is not always in the front seat of your mind but its always there, in the back, on stand by. Being in the street in the night means danger, if you hear a gunshot near your house you don't call the police because they are, sometimes, more dangerous than the criminals [8]. Fear of walking on the streets of other cities in Mexico is a constant in my life, I got used to that, I can go on with my life, but every time I visit my parents in Tijuana, I get scared, the fear grows exponentially every time I come back, the same as the violence and poverty. Just as an example, a year ago taxis and apps services like Uber started to refuse to go to my old neighborhood after 7:00 pm, because of the fear of getting mugged or killed [13].

I don't want to be afraid of the city where I grew up, of Mexico, and a need to understand the problems that affect it has been growing in me. Perhaps, if I understand the intricacies of the city my fear will start to work as a fuel to help in a small way, and in time, give the tools to make real changes.

So, what are the causes of the rise in violence?, why the place I grew up is one of the more violent ones in the city? perhaps living in poverty is the cause of the violence, or is the lack of a good justice system, is

it the Carteles fault? or is it a much deep problem in the foundations of our society?. These questions must be answered by the people in charge of the city, the government, but in the research that I have done in these past months, I have not found a clear investigation of the causes of violence in Tijuana from the government of Mexico, the only clear investigation I found was of Justice for Mexico a U.S.-based initiative with some interesting analysis but with much space to grow. The answers of the Mexican government are always the same, the "bad guys" need to be put in jail and the violence will go away, but this has not worked in decades and it will never work [11, 4].



Figure 1: National guard in the Camino Verde neighborhood in Tijuana [23], a response of the new government the past year to the increase in violence and the crisis of migration. A response that many have taken as the first intent of militarization of the country [22, 24].

### 1.3 Problem

The big picture of this project is to analyze the available data of Tijuana, the crime, education, migration, and economics search for the story behind the violence; where are the correlations?; why there are rises of violence in certain neighborhoods?. This is an ambitious project and I'm aware of that, I'm still learning data science and this type of analysis is new to me but with so much personal motivation behind, I can learn faster and at the same time find interesting results. The project will be divided into the necessary parts, the first one that I will present as a final project in the specialization in Coursera "IBM Data Science" is about the relation between violence and local business in the most violent neighborhoods of Tijuana. The question is, **What are the common business in the more violent neighborhoods in the city of Tijuana?**

### 1.4 Target Audience

What type of clients or a groups of people would be interested in this project?

- The entrepreneurs that want to invest in violent neighborhoods could identify types of business that are missing in the community.
- The authorities in charge of the neighborhood could see windows of opportunity to help the more common type of business to prosper, offering credits or orientation on management.
- The residents could understand better the data of their community

## 2 Data acquisition and cleaning

*The program used in this section is in my Github following this link*

## 2.1 Crime

The data about Tijuana online is poor but thanks to new policies in the government a couple of years ago, more data is becoming available. In the case of crime, there is only one place I could find available information, the official website of State Security and Investigation Guard of the state ("Guardia Estatal de Seguridad e Investigación") [16], but 519016286 this information was highly incomplete. Let's start reviewing the dataset, quoting the website, "The databases contained in this section only breaks down a selection of crimes considered to be of the high and medium impact that threaten the life and integrity of people and their heritage", so the data is incomplete and it could not find a more complete dataset. The translation of the data from Spanish to English in the crimes was done the best I could but, in legal terms there may be some difference in the definition of each crime. The classification of the crimes is as follows:

- Vehicle theft with and without violence
- Residential burglary with and without violence
- Business theft with and without violence
- Robbery with violence on public roads
- Simple robbery on public areas
- Other robberies without violence
- Other robberies with violence
- Malicious wounding
- Unlawful wounding
- Homicide (Violent)
- Kidnapping.

As you can see, the classification left out some very important crimes, such as extortion, Femicide and sexual assault, very common crimes in Tijuana [9, 18, 14]. For some reason, the state attorney doesn't consider rape in the category of "crimes considered to be of the high and medium impact that threatens the life and integrity of people". Now, to understand the fields included in the databases, a little explanation is needed. First, Mexican states are divided into municipalities, rather than counties as in the United States. Tijuana is a municipality of Baja California state. The municipality of Tijuana is divided into administrative boroughs (Districts) or "Delegaciones". The boroughs are in turn divided into "Colonias", the best translation of "Colonias" is Neighborhood. I will focus my analysis on the "Colonias" so I will use that translation.

- CRIME: Refers to the registered crime
- CRIME CLASSIFICATION: Refers to the crime classification cited above.
- NEIGHBORHOOD OF THE CRIME: Refers to the neighborhood where the crime was committed.
- DATE OF RECORD OF THE CRIME: Date in which the report of the crime began. This date is the one used for the statistical count according to month, day and year.
- DATE OF THE CRIME: Date on which the crime was committed (sometimes it is not the same as the Date of Registration of the Crime), since the crime could be reported on one date and committed on another.
- TIME OF THE CRIME: Hour in which the crime was committed.
- MUNICIPALITY: Municipality where the crime was registered.

The sources of this data are the State Attorney General and were processed by the State Intelligence Center-Statistics Coordination.

## 2.2 Local businesses

Given the information about crime in certain neighborhoods, I want to explore the local businesses in those neighborhoods. I used **Foursquare API** to get the venues of a given neighborhood, but to do that I needed the coordinates. This was more difficult than expected. My first thought was to use the 12 Districts ("Delegaciones") of the city and base the analysis on crime in each district. The big problem I faced with this idea is that I couldn't find a list of the neighborhoods ("Colonias") that each district has. In the official website of the Metropolitan Planning Institute of Tijuana (IMPLAN) there is an interactive map where you can select the district and the territory appears in the map[10], but in Tijuana there are more than 3000 neighborhoods and looking for each neighborhood that is part of each district this way is too complicated; as surprising that this sounds, on any official website of the government of Tijuana I couldn't find more information about the districts. So, the next best analysis I could do is to focus on the more violent neighborhoods.

Now, understanding what type of local businesses are expected is tricky as well. For example, the wave of so-called "medical tourism" has been so great in recent years that the city received around 1.2 million patients

in 2018 who came seeking health treatment from the United States. The low costs of consultations, procedures, drugs, and surgeries - prices between 30 % and 70 % less compared to the US - make the city prosper as a great health center [2].



Figure 2: Multiple pharmacies offer discounts on medications. Their English signs are focused on attracting Americans.

So, many pharmacies are expected but also there is a lot of informal commerce, its estimated that more than 30 % of businesses in Tijuana are informal, so the information that Foursquare API can provide will not be capable to provide a clear picture of local businesses in the city.



Figure 3: The so called "Sobreruedas" (flea markets), very common all over the city [20, 17]

## 2.3 Coordinates of neighborhoods

To get the coordinates of each neighborhood I used geopy, a Python 2 and 3 client for several popular geocoding web services, geopy makes it easy for Python developers to locate the coordinates of addresses, cities, countries, and landmarks across the globe using third-party geocoders and other data sources [19]. The problem was that many neighborhoods of Tijuana didn't appear to have coordinates in geopy, the results were NaN. The solution for the moment was to put the rest of the coordinates manually, the problem is that there is more than 3000 neighborhoods, so I choose to focus on the 100 more violent. Some considerations were done in this part:

- The Mariano Matamoras Centro neighborhood has not coordinates available in google or other online, so I renamed it as the closest neighborhood, in this case, Mariano Matamoras.
- I couldn't find the coordinates of the Tres de Octubre neighborhood, the problem was the "Tres", so I changed it to the number 3.
- The Obrera Seccion 1 and Fraccionamiento Natura neighborhoods had the same problem as Mariano Matamoras Centro, the same process was done, in this case, the closest neighborhood is Obrera and Fraccionamiento Hacienda las Delicias.

- The division between Sanchez Taboada Produsta and Sanchez Taboada neighborhoods is non-existent these 2 are always taken as one, so I did the same.
- The Foranea and Hacienda Las Fuentes neighborhoods had the same problem as Mariano Matamoros Centro but this time I couldn't find in any map online their locations. I decided to eliminate both of them from the data.

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