

Expand a mental healthcare company: Market penetration strategy in Peru

1. Introduction

Peru is a country located in western South America. The Pacific Ocean borders its coast and borders Ecuador and Colombia to the north, Brazil to the east, and Bolivia and Chile to the southeast, according to the INEI (National Institute of Statistics and Informatics) has a population of 33 million inhabitants in June 2019.

Peru has 24 departments and its capital is the City of Lima. Lima represents 49.8 percent of Internal Gross Product of Peru, which is the reason for majority of companies have their principal offices in Lima.



The ABC clinic specializing in mental and behavioral care has its operations in the departments of Lima where it has 3 clinics in the districts of Carmen de la Legua - Callao, Lince and San Juan de Lurigancho. The company has received a capital injection from its shareholders to open two branches within Peru as part of the 2020-2023 strategic plan.

To choose the department where the new branch of the company would open, it will analyze which department has the same characteristics as the department of Lima, which department has higher population density and analyze through the data of the Ministry of Health in which departments there is less attention on mental health issues by the ministry of health.

2. Data Acquisition

To analyze this opportunity I collected and I used this data from many sources.

- **GEODIR - Ubigeo de Perú (INEI)**

A web page where I found information about, departments, provinces and districts of Peru and their surface in kilometers and their population.

- **Foursquare API**

I have to create an account to use this platform from I got information about venues of departments in Peru.

- **Open data portal of Peru**

Statistics about mental health attention in Peru in 2017. These information is provided by Health Ministry of Peru.

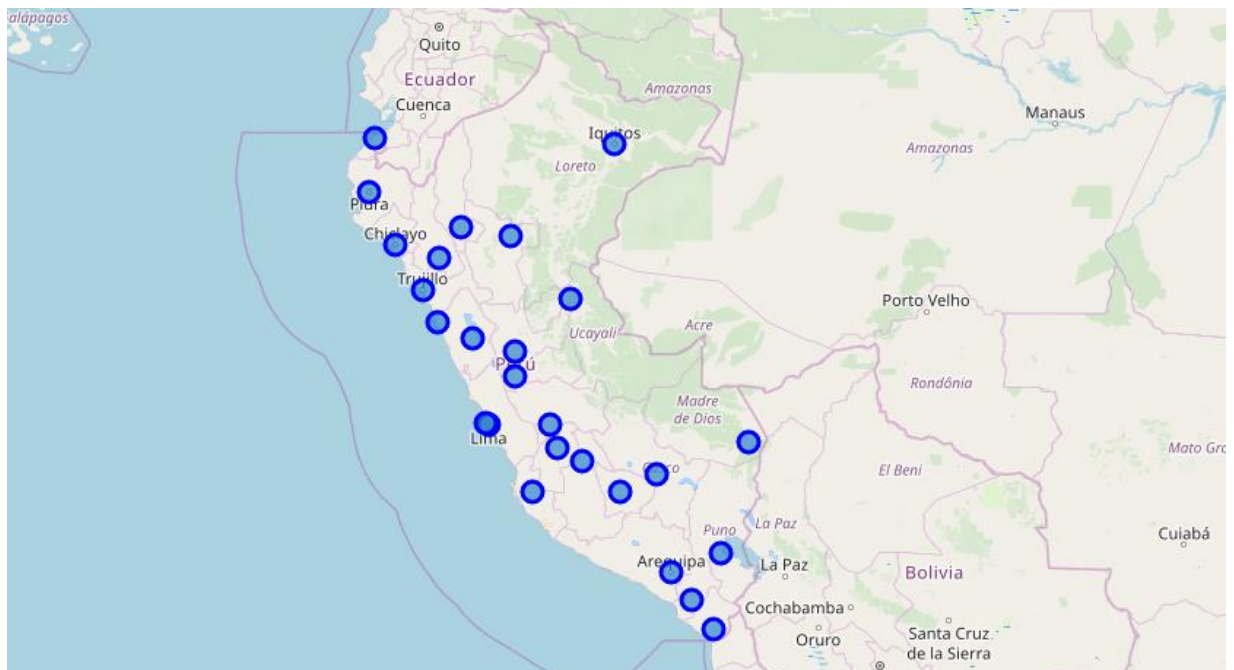
3. Methodology

- Cluster departments of Peru

I used this information as a master data, then I prepared this database geodir-ubigeo-department, I excluded Lima department for my analysis, and I used Google Map, 'Search Nearby' option, to get the latitude and longitude of the each departments

	Borough	Neighborhood	Latitude	Longitude
0	2534	Amazonas	-6.231690	-77.869034
1	2625	Ancash - Huaraz	-9.526000	-77.529000
2	2812	Ancash - Chimbote	-9.063000	-78.589000
3	2900	Apurimac	-14.050000	-73.088000
4	3020	Arequipa	-16.398867	-71.536961
5	3143	Ayacucho	-13.160427	-74.225697

Then, I used folium library for python to visualized geographic details of Peru and its departments.



With Foursquare API I explored all the departments and segment them. I configured to obtain 100 venues in a radius of 1000 meters from the latitude and longitude of each departments.

	name	categories	lat	Ing
0	Club de Tiro de Bellavista	Event Space	-12.060454	-77.126604
1	Francesco	Seafood Restaurant	-12.058225	-77.130595
2	Chifa El Osito	Chinese Restaurant	-12.059813	-77.135372
3	Villa Deportiva Regional del Callao	Baseball Field	-12.062383	-77.121090
4	Plaza de Armas de Bellavista	Plaza	-12.062412	-77.128748
5	Lemons gym	Gym	-12.059705	-77.133716
6	Bembos	Fast Food Restaurant	-12.060472	-77.131681

In this summary we show the top ten venues for each departments.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Amazonas	Café	Park	Peruvian Restaurant	Plaza	Bar	Bed & Breakfast	Restaurant	Donut Shop	Convenience Store	Creperie
1	Ancash - Chimbote	Zoo	Breakfast Spot	Harbor / Marina	Outdoors & Recreation	Seafood Restaurant	Himalayan Restaurant	Bakery	Convenience Store	Dance Studio	Department Store
2	Ancash - Huaraz	Pizza Place	Restaurant	Café	Bar	Hotel	Mountain	Farmers Market	Diner	Bus Station	Peruvian Restaurant
3	Arequipa	Hotel	Peruvian Restaurant	Bed & Breakfast	Sandwich Place	Bar	Italian Restaurant	Latin American Restaurant	Chocolate Shop	Café	Nightclub
4	Ayacucho	Restaurant	Plaza	Shopping Mall	Flea Market	Market	Breakfast Spot	Pizza Place	Peruvian Restaurant	Bar	Hotel

Using K-Means algorithm, an unsupervised learning, we cluster departments using the common venues that departments shared. I will run K-Means to cluster departments into 4 clusters.

	Borough	Neighborhood	Latitude	Longitude	Cluster Labels	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue
0	2534	Amazonas	-6.231690	-77.869034	3	Café	Park	Peruvian Restaurant	Plaza	Bar	Bed & Breakfast	Restaurant
1	2625	Ancash - Huaraz	-9.526000	-77.529000	3	Pizza Place	Restaurant	Café	Bar	Hotel	Mountain	Farmers Market
2	2812	Ancash - Chimbote	-9.063000	-78.589000	3	Zoo	Breakfast Spot	Harbor / Marina	Outdoors & Recreation	Seafood Restaurant	Himalayan Restaurant	Bakery
4	3020	Arequipa	-16.398867	-71.536961	3	Hotel	Peruvian Restaurant	Bed & Breakfast	Sandwich Place	Bar	Italian Restaurant	Latin American Restaurant
5	3143	Ayacucho	-13.160427	-74.225697	3	Restaurant	Plaza	Shopping Mall	Flea Market	Market	Breakfast Spot	Pizza Place
6	3292	Cajamarca	-7.162000	-78.513000	3	Plaza	Coffee Shop	Pizza Place	Fried Chicken Joint	Steakhouse	Japanese Restaurant	Bus Station
7	3414	Cusco	-13.522839	-71.967627	3	Plaza	Hotel	Market	Soccer Stadium	Bed & Breakfast	Pizza Place	Seafood Restaurant
8	3518	Huancavelica	-12.787280	-74.973095	1	Park	Hotel	BBQ Joint	Plaza	Electronics Store	Concert Hall	Convenience Store
9	3606	Huanuco	-9.929325	-76.239485	1	Hotel	Pizza Place	Coffee Shop	Gym	Plaza	Chinese Restaurant	Fish & Chips Shop

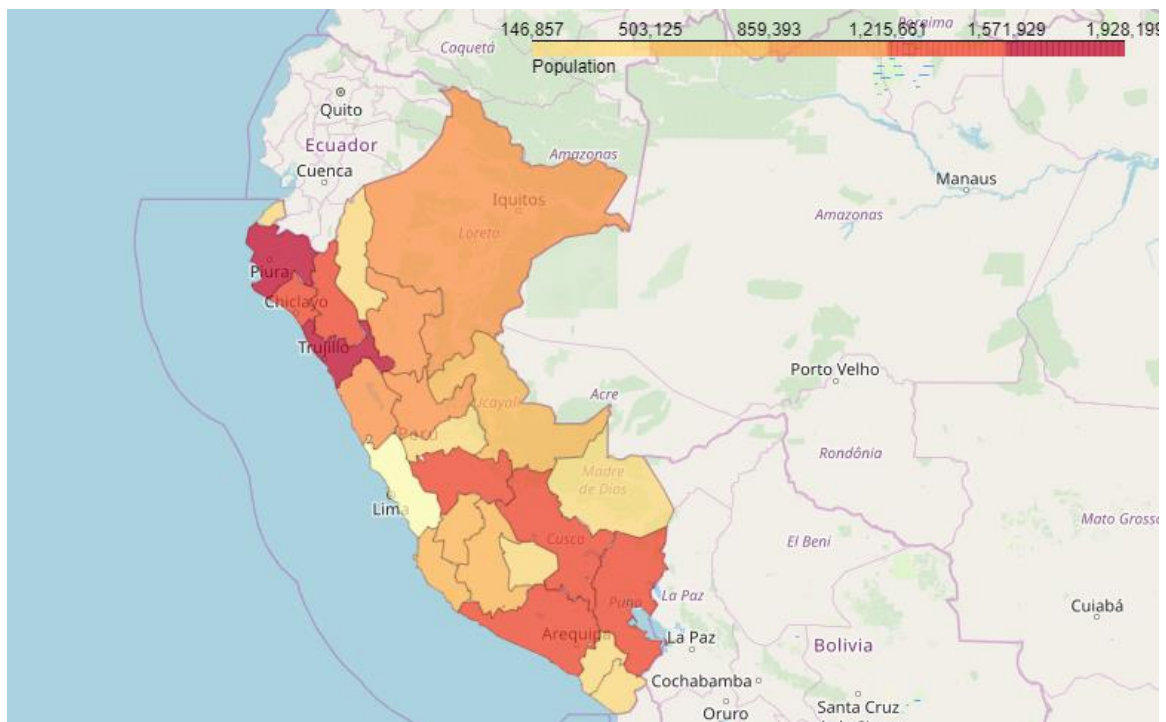


- **Data Analysis of Peru's population**

I imported data from “GEODIR - Ubigeo of Peru” and I loaded data into a data frame, I got data about population and surface in kilometers. I did not consider information of Lima department because I analyzed departments where the company does not operate.

	Departamento	Ubigeo	Poblacion	Superficie	Y	X	PoblacionxKm2
0	AMAZONAS	872418	425832.0	39249.13	-513.09100	-6546.49210	10.849463
1	ANCASH	3500411	1166180.0	35881.30	-1547.78840	-12878.17160	32.501052
2	APURIMAC	2553828	464583.0	21037.99	-1169.15150	-6139.68930	22.083051
3	AREQUIPA	4402800	1329801.0	63343.95	-1740.19090	-7886.44640	20.993339
4	AYACUCHO	6022013	711058.0	44357.00	-1653.16360	-8804.64560	16.030345
5	CAJAMARCA	7705419	1540009.0	33304.32	-840.59490	-9994.51770	46.240518
7	CUSCO	9041166	1338897.0	82694.66	-1535.97104	-8051.65712	16.190852
8	HUANCAVELICA	9042953	505495.0	22159.22	-1286.26270	-7491.87530	22.811949
9	HUANUCO	8446193	878196.0	37867.36	-807.24810	-6417.32250	23.191371
10	ICA	4741337	810214.0	21305.51	-600.35930	-3256.05840	38.028379
11	JUNIN	14932491	1379934.0	44328.80	-1456.73560	-9347.29340	31.129514
12	LA LIBERTAD	10841207	1928198.0	25495.42	-654.32250	-6509.57630	75.629191
13	LAMBAYEQUE	5327109	1290617.0	14461.52	-252.23490	-3029.61160	89.244906
15	LORETO	8502149	1068130.0	368799.48	-243.87230	-3937.19010	2.896235

Then, using folium library I showed the population in a choropleth maps where we can see the density population of departments in Peru.

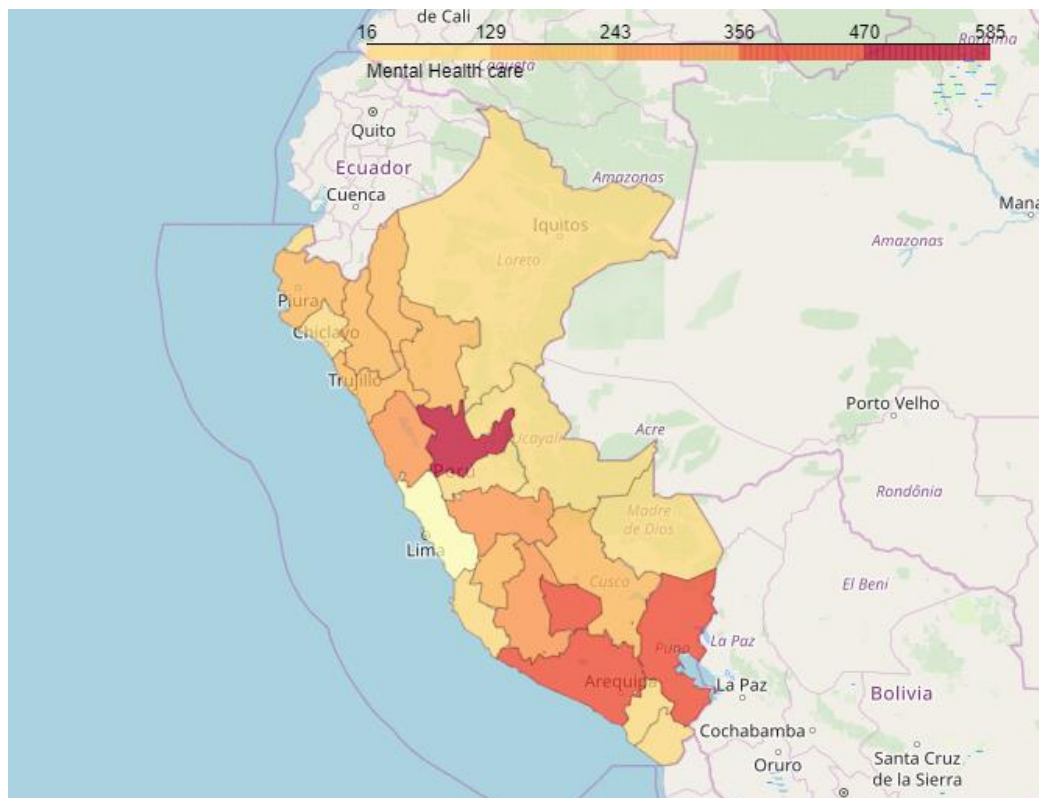


- **Data Analysis of Peru's mental health public attention**

I imported data from statistics about mental health attention in Peru from Peruvian open data portal. This data was delivered by Health ministry of Peru. Then I cleaned and prepared the data adding latitude and longitude of departments.

	Departamento	Atendidos	Atenciones	Poblacion	Superficie	Y	X	PoblacionxKm2	AtencionXPoblacion
0	AMAZONAS	114.0	148.0	425832.0	39249.13	-513.09100	-6546.49210	10.849463	3.475549
1	ANCASH	219.0	283.0	1166180.0	35881.30	-1547.78840	-12878.17160	32.501052	2.426727
2	APURIMAC	322.0	391.0	464583.0	21037.99	-1169.15150	-6139.68930	22.083051	8.416150
3	AREQUIPA	279.0	378.0	1329801.0	63343.95	-1740.19090	-7886.44640	20.993339	2.842531
4	AYACUCHO	206.0	306.0	711058.0	44357.00	-1653.16360	-8804.64560	16.030345	4.303446
5	CAJAMARCA	163.0	220.0	1540009.0	33304.32	-840.59490	-9994.51770	46.240518	1.428563
7	CUSCO	163.0	203.0	1338897.0	82694.66	-1535.97104	-8051.65712	16.190852	1.516173
8	HUANCAVELICA	143.0	192.0	505495.0	22159.22	-1286.26270	-7491.87530	22.811949	3.798257
9	HUANUCO	498.0	584.0	878196.0	37867.36	-807.24810	-6417.32250	23.191371	6.649996

Then, I used folium library to show the departments where Public Health Institution attends mental health patient.



4. Results

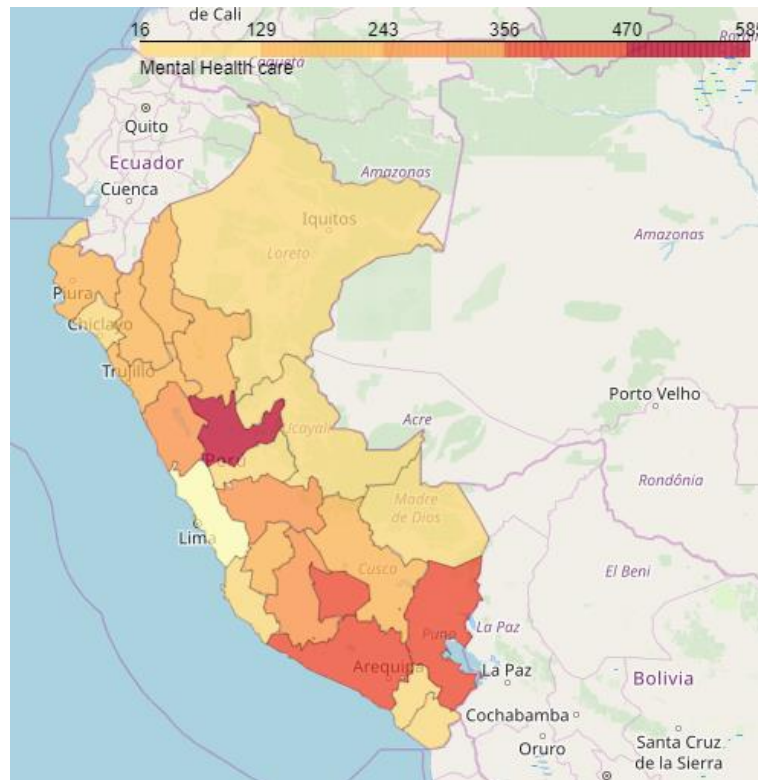
Clustering analysis show departments that share same characteristic according venues they have, Lima is in the cluster number 3 with these departments.

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
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2	Ancash - Chimbote	Zoo	Breakfast Spot	Harbor / Marina	Outdoors & Recreation	Seafood Restaurant	Himalayan Restaurant	Bakery	Convenience Store	Dance Studio	Department Store
4	Arequipa	Hotel	Peruvian Restaurant	Bed & Breakfast	Sandwich Place	Bar	Italian Restaurant	Latin American Restaurant	Chocolate Shop	Café	Nightclub
5	Ayacucho	Restaurant	Plaza	Shopping Mall	Flea Market	Market	Breakfast Spot	Pizza Place	Peruvian Restaurant	Bar	Hotel
6	Cajamarca	Plaza	Coffee Shop	Pizza Place	Fried Chicken Joint	Steakhouse	Japanese Restaurant	Bus Station	Donut Shop	Convenience Store	Creperie
7	Cusco	Plaza	Hotel	Market	Soccer Stadium	Bed & Breakfast	Pizza Place	Seafood Restaurant	Train Station	Dance Studio	Donut Shop
10	Ica	Fast Food Restaurant	Restaurant	Department Store	Hotel	Bookstore	Ice Cream Shop	Liquor Store	Pizza Place	Sandwich Place	Park
12	La Libertad	Peruvian Restaurant	Café	Tea Room	Bar	Breakfast Spot	Hookah Bar	Hotel	Juice Bar	Nightclub	Fried Chicken Joint
13	Lambayeque	Peruvian Restaurant	Restaurant	Hotel	Coffee Shop	Chinese Restaurant	Café	Supermarket	Pizza Place	Plaza	Ice Cream Shop
14	Lima	Seafood Restaurant	Park	Peruvian Restaurant	Art Museum	Plaza	Nightclub	Pizza Place	College Academic Building	Restaurant	Doctor's Office
17	Moquegua	Pizza Place	Plaza	Peruvian Restaurant	Juice Bar	Zoo	Electronics Store	Convenience Store	Creperie	Dance Studio	Department Store
19	Piura	Bus Station	Hotel	Plaza	Pizza Place	Movie Theater	Juice Bar	Peruvian Restaurant	Park	Dessert Shop	Shopping Mall
20	Puno	Hotel	Restaurant	Bar	Peruvian Restaurant	Pizza Place	Bed & Breakfast	Plaza	South American Restaurant	Hostel	French Restaurant
25	Callao	Peruvian Restaurant	Gym / Fitness Center	Furniture / Home Store	Ice Cream Shop	Park	Donut Shop	Concert Hall	Convenience Store	Creperie	Dance Studio

According the population analysis, it does not include Lima, the departments of Piura and Trujillo are the more populate departments in Peru and these two department are in the cluster where is Lima.



Finally, analyzing the mental health care data reported by Health Ministry of Peru, the departments of the north of Peru (Piura, Tumbes, Lambayeque y Trujillo) does not have attention so It show that is a good opportunity to open a branch in these area.



5. Discussion

I analyzed three variables to give a recommendation, Population of departments, the attention of mental health from public institution in Peru and the venues in each departments to cluster them.

From my analysis I recommend to open a new branch of mental health in the northern departments of Peru, to be more precise it could be in Piura. From Piura I can also attend patients from Trujillo, Lambayeque and Tumbes.

6. Conclusion

The north zone of Peru has a good place to install a new business, including the departments of Trujillo, Lambayeque, Piura and Tumbes.

I recommend to collect data about private mental health institution in the north of Peru to better the analysis.

7. References

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