

# Determining the Areas of NYC with the Most Need for Early Childhood Education and Care Services

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## **Introduction**

### **Background**

It can be agreed that education and development is an important part of human life. Education can be a determinant of many things in life from job outlook to overall quality of life, but education is not equal. Education and the quality of that education can vary depending on where you live and how much you are able to spend. One aspect of education that often is overlooked is early childhood education servicing children under five years old. In many areas of the United States it is clear that there is a lack of child care services in proportion to the amount of children. In this study we will be looking at a dense area such as NYC and see the areas within NYC that are in the most need for child care services. In order to do this we will be looking at how each community district within NYC services it's children. Early childcare services helps the children, but it also helps the parents of these children as they are able to bring their child to a place where they should be taken care of while mom or dad is able to earn a living and pursue their dreams. This in turn creates a cycle where because the children are taken care of and the parents can earn a living which then makes it easier for the family to afford things, both tangible and intangible, which they might not have been able to afford before.

### **Audience**

## **Methodology**

### **Data**

In our report we got the community districts within the five boroughs of New York City. We also used the foursquare location data to gather the amount of preschools(which we define as any nursery, daycare, or preschool servicing children five and younger) within each community district. We also used the child count dataset to get the number of children in each community district. We then cleaned, transformed and combined the data to be able to further analyze it.

First we gathered the neighborhoods within NYC using the dataset provided by NYU and extracted the borough, neighborhood name, latitude, and longitude of each neighborhood and formed a data frame with those specific features as columns. In order to get the community districts and the neighborhoods within those districts I had to do a little bit of excel work where I created data frame of the neighborhoods their boroughs and corresponding community district. I then merged these two data frame to create one data frame expressing the neighborhoods, community districts, boroughs, latitude, and longitude. There are 59 community districts in NYC and 306 neighborhoods make up these community districts. The Child Count Data is then uploaded which is the file containing the data of child demographics in NYC community districts. We are mainly interested in population of children under 5. The next step for us is to then combine the community districts, population of children under 5 in each districts and the number of preschools in each district. To do this we needed the number of preschools in each community district.

In order to get the amount of preschools in each community district we used the longitude and latitude of the neighborhoods within each borough to get a count of the number of preschools in each borough and then we further break it down by community district. After doing so we had a data frame that looked like the one below.

	Community District	Population of Children Under 5	Number of Preschools (within 1000 meters)
0	Bronx CB 1	5962	6
1	Bronx CB 2	3404	4
2	Bronx CB 3	7414	8
3	Bronx CB 4	12191	11
4	Bronx CB 5	11080	7

We then added a column for average number child per preschool in order to get an idea of how well serviced each community district was. This column was our main column of interest in terms of determining the child care service level of each district.

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	Community District	Population of Children Under 5	Number of Preschools (within 1000 meters)	Child Per Preschool
0	Bronx CB 1	5982	8	993.667
1	Bronx CB 2	3404	4	851.000
2	Bronx CB 3	7414	8	926.750
3	Bronx CB 4	12191	11	1108.273
4	Bronx CB 5	11080	7	1582.857
5	Bronx CB 6	7739	8	967.375
6	Bronx CB 7	10725	8	1340.625
7	Bronx CB 8	8729	8	1121.500
8	Bronx CB 9	10738	5	2147.600
9	Bronx CB 10	4437	8	554.625
10	Bronx CB 11	8285	8	1035.625
11	Bronx CB 12	11343	5	2268.600
12	Brooklyn CB 1	11519	15	787.933
13	Brooklyn CB 2	9979	35	285.114
14	Brooklyn CB 3	10799	15	719.933
15	Brooklyn CB 4	4781	5	952.200
16	Brooklyn CB 5	14818	5	2923.600
17	Brooklyn CB 6	8595	24	358.125
18	Brooklyn CB 7	8152	17	479.529
19	Brooklyn CB 8	8014	24	333.917
20	Brooklyn CB 9	8534	5	1306.800
21	Brooklyn CB 10	8686	3	2188.667
22	Brooklyn CB 11	13299	8	1662.375
23	Brooklyn CB 12	19138	8	2392.000
24	Brooklyn CB 13	7051	3	2350.333
25	Brooklyn CB 14	13081	8	1632.625
26	Brooklyn CB 15	10908	2	5453.000
27	Brooklyn CB 16	10733	5	2146.600
28	Brooklyn CB 17	7830	10	783.000
29	Brooklyn CB 18	11234	1	11234.000
30	Manhattan CB 1	3293	22	149.682
31	Manhattan CB 2	4882	31	156.839
32	Manhattan CB 3	4987	31	160.226
33	Manhattan CB 4	3533	21	168.238
34	Manhattan CB 5	1788	31	57.032
35	Manhattan CB 6	5101	34	150.029
36	Manhattan CB 7	9310	29	321.034
37	Manhattan CB 8	13426	34	394.882
38	Manhattan CB 9	5743	16	358.938
39	Manhattan CB 10	9117	4	2279.250
40	Manhattan CB 11	5789	13	445.308
41	Manhattan CB 12	9222	5	1844.400
42	Queens CB 1	9237	13	710.538
43	Queens CB 2	8603	9	955.889
44	Queens CB 3	9450	4	2362.500
45	Queens CB 4	10551	9	1172.333
46	Queens CB 5	10857	5	2171.400
47	Queens CB 6	7293	9	810.333
48	Queens CB 7	13718	7	1959.714
49	Queens CB 8	13337	9	1481.889
50	Queens CB 9	9414	7	1344.857
51	Queens CB 10	5893	1	5893.000
52	Queens CB 11	4265	7	609.286
53	Queens CB 12	15071	4	3767.750
54	Queens CB 13	8525	3	2841.667
55	Queens CB 14	10844	0	inf
56	Staten Island CB 1	9129	4	2282.250
57	Staten Island CB 2	7523	7	1074.714
58	Staten Island CB 3	8780	4	2195.000

Data Frame 1 Showing Average Child Per Preschool In each Community

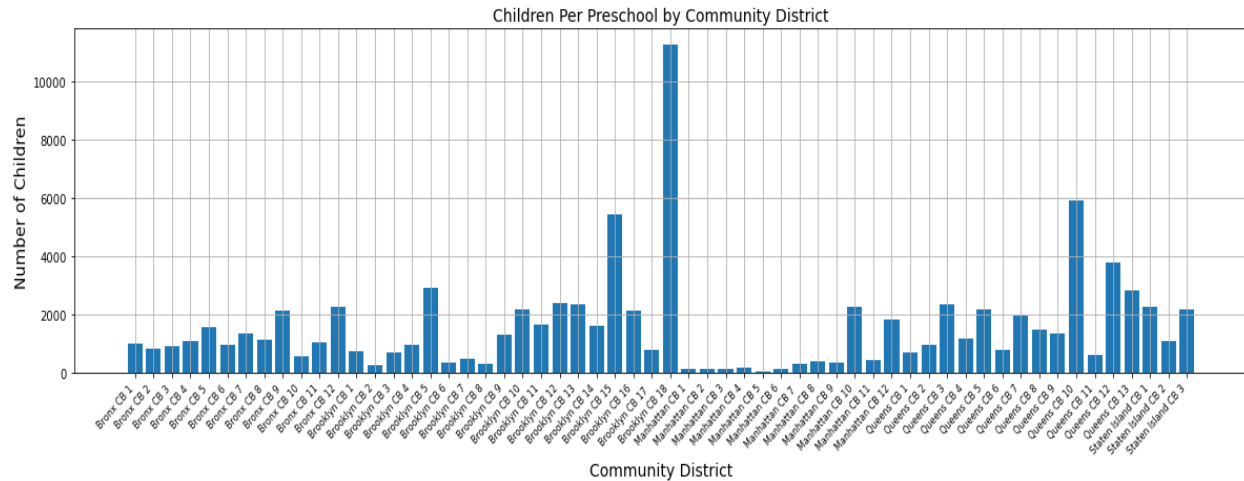
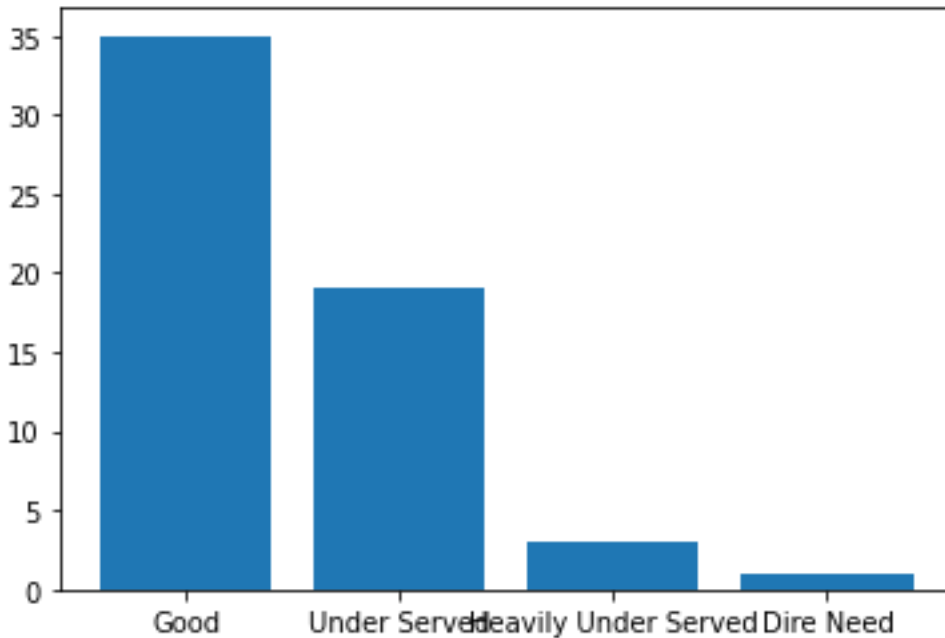


Figure 1 Bar Graph Of Data Frame 1

## Data Analysis

In order to get which communities were in the most need for early child care services we had to calculate which communities were well served and underserved. In order to do this we have to first calculate the number of children per preschool within a community by dividing the number of children in each community district by the number of preschools servicing an area. I then used the Jenks natural breaks algorithm in order to bin these community districts into categories based on how well they service the children and families in their communities in regards to early childcare services. Which resulted in the data frame below.

	Community District	Population of Children Under 5	Number of Preschools (within 1000 meters)	Child Per Preschool	Area Service Level
0	Bronx CB 1	5962	8	993.667	Good
1	Bronx CB 2	3404	4	851.000	Good
2	Bronx CB 3	7414	8	926.750	Good
3	Bronx CB 4	12191	11	1108.273	Good
4	Bronx CB 5	11080	7	1582.857	Under Served
5	Bronx CB 6	7739	8	967.375	Good
6	Bronx CB 7	10725	8	1340.625	Good
7	Bronx CB 8	6729	6	1121.500	Good
8	Bronx CB 9	10738	5	2147.600	Under Served
9	Bronx CB 10	4437	8	554.625	Good
10	Bronx CB 11	8285	8	1035.625	Good
11	Bronx CB 12	11343	5	2268.600	Under Served
12	Brooklyn CB 1	11519	15	767.933	Good
13	Brooklyn CB 2	9979	35	285.114	Good
14	Brooklyn CB 3	10799	15	719.933	Good
15	Brooklyn CB 4	4761	5	952.200	Good
16	Brooklyn CB 5	14618	5	2923.600	Under Served
17	Brooklyn CB 6	8595	24	358.125	Good
18	Brooklyn CB 7	8152	17	479.529	Good
19	Brooklyn CB 8	8014	24	333.917	Good
20	Brooklyn CB 9	6534	5	1306.800	Good
21	Brooklyn CB 10	6566	3	2188.667	Under Served
22	Brooklyn CB 11	13299	8	1662.375	Under Served
23	Brooklyn CB 12	19136	8	2392.000	Under Served
24	Brooklyn CB 13	7051	3	2350.333	Under Served
25	Brooklyn CB 14	13061	8	1632.625	Under Served
26	Brooklyn CB 15	10906	2	5453.000	Heavily Under Served
27	Brooklyn CB 16	10733	5	2146.600	Under Served
28	Brooklyn CB 17	7830	10	783.000	Good
29	Brooklyn CB 18	11234	1	11234.000	Dire Need
30	Manhattan CB 1	3293	22	149.682	Good
31	Manhattan CB 2	4862	31	156.839	Good
32	Manhattan CB 3	4967	31	160.226	Good
33	Manhattan CB 4	3533	21	168.238	Good
34	Manhattan CB 5	1768	31	57.032	Good
35	Manhattan CB 6	5101	34	150.029	Good
36	Manhattan CB 7	9310	29	321.034	Good
37	Manhattan CB 8	13426	34	394.882	Good
38	Manhattan CB 9	5743	16	358.938	Good
39	Manhattan CB 10	9117	4	2279.250	Under Served
40	Manhattan CB 11	5789	13	445.308	Good
41	Manhattan CB 12	9222	5	1844.400	Under Served
42	Queens CB 1	9237	13	710.538	Good
43	Queens CB 2	8603	9	955.889	Good
44	Queens CB 3	9450	4	2362.500	Under Served
45	Queens CB 4	10551	9	1172.333	Good
46	Queens CB 5	10857	5	2171.400	Under Served
47	Queens CB 6	7293	9	810.333	Good
48	Queens CB 7	13718	7	1959.714	Under Served
49	Queens CB 8	13337	9	1481.889	Under Served
50	Queens CB 9	9414	7	1344.857	Good
51	Queens CB 10	5893	1	5893.000	Heavily Under Served
52	Queens CB 11	4265	7	609.286	Good
53	Queens CB 12	15071	4	3767.750	Heavily Under Served
54	Queens CB 13	8525	3	2841.667	Under Served
56	Staten Island CB 1	9129	4	2282.250	Under Served
57	Staten Island CB 2	7523	7	1074.714	Good
58	Staten Island CB 3	8780	4	2195.000	Under Served



## **Results**

As we can see from our data frame there is one place that is not serviced at all by any licensed preschools and that is Queens CB 14 or community district 14. They have more than 10,000 children, but no preschools. After some further research into this district it was found that it is a beach zone and thus it may be difficult to find space enough for a preschool, however, I do believe that it is an anomaly for a place to have so many children, but with no preschools. Due to the anomalous nature of this piece of data we decided to exclude it from our data frame and visualization as it might have skewed it in a way, but this data point is still important.

When looking at the rest of the data we can see that the places that are well served are binned together under the 'Good' category. Most of the places that are well serviced are in the Manhattan borough and that is for various reasons one of which include the small size of the borough allowing for more preschools to cover more neighborhoods as they overlap. Under served communities are marked as such and these are the communities that while they may have a good amount of preschools, they still have many children who are in need of child care services. As we can see here in there are 19 under served communities spanning

across the five boroughs with Brooklyn and Queens having the most under served communities followed by the Bronx, Staten Island and then Manhattan. In the Heavily Under Served and Dire need categories we see the community districts with most need for preschools as the amount of children are just way more than the current amount of preschools in the area can accommodate.

## **Discussion**

The heavily under served and dire need areas are the places in which I would recommend building a preschool or early child care service as they are the places with the most need. We can see from our chart that there are three districts that are heavily under served (Brooklyn CB 15, Queens CB 10, and Queens CB 12) and one in dire need, Brooklyn CB 18. If we remember before Queens CB 12 was dropped from the data frame, but also belongs in the dire need category as there are over 10,000 children and not a single licensed preschool in the area.

While looking at the results of our report it is evident that there were some limitations to what we could do. The main limitation on this report was our lack of information on the zoning and building codes of the areas, this is important as zoning laws may prevent preschools and early child care services from opening in some spots. Another limitation is that we are only gathering preschools and early child care services that register on foursquare's location data, but there may be other services and preschools that may not have been accounted for. It is recommended that in the future data from the NYC department of health and hygiene be used as they would have information on every registered preschool in NYC.

In future endeavors when trying to find the ideal places to put a preschool in NYC it is recommended that research is done on the zoning ordinances of the neighborhoods. It is also recommended that research be done on the parks, public transportation, emergency services, etc. in the areas as these are all important factors when choosing a location for a business, especially a preschool.

## **Conclusion**

The goal of this report was to find the areas in NYC with the most need for early child care services. This was done through the use of various forms of data from



different sources which was analyzed using python and different python libraries. In this report we were able to categorize community districts into four separate groups based on their need for early child care services. In order to categorize the districts we used the average number of children per preschool and clustered/binning those numbers based on the Jenks natural breaks algorithm. This report is meant as a base for those in the child care business or those who are looking to get into the child care business, it can also help new or moving families. It is recommended that more research be done on these areas before one is certain about building a preschool in a specific space.

### **Data Sources**

#### 1. NYU NYC Neighborhoods data

([https://geo.nyu.edu/catalog/nyu\\_2451\\_34572?cm\\_mmc=Email\\_Newsletter\\_-\\_Developer\\_Ed%2BTech\\_-\\_WW\\_WW\\_-\\_SkillsNetwork-Courses-IBMDeveloperSkillsNetwork-DS0701EN-SkillsNetwork-21253531&cm\\_mmca1=000026UJ&cm\\_mmca2=10006555&cm\\_mmca3=M12345678&cvsorc=email.Newsletter.M12345678&cvo\\_campaign=000026UJ&cm\\_mmc=Email\\_Newsletter\\_-\\_Developer\\_Ed%2BTech\\_-\\_WW\\_WW\\_-\\_SkillsNetwork-Courses-IBMDeveloperSkillsNetwork-DS0701EN-SkillsNetwork-21253531&cm\\_mmca1=000026UJ&cm\\_mmca2=10006555&cm\\_mmca3=M12345678&cvsorc=email.Newsletter.M12345678&cvo\\_campaign=000026UJ](https://geo.nyu.edu/catalog/nyu_2451_34572?cm_mmc=Email_Newsletter_-_Developer_Ed%2BTech_-_WW_WW_-_SkillsNetwork-Courses-IBMDeveloperSkillsNetwork-DS0701EN-SkillsNetwork-21253531&cm_mmca1=000026UJ&cm_mmca2=10006555&cm_mmca3=M12345678&cvsorc=email.Newsletter.M12345678&cvo_campaign=000026UJ&cm_mmc=Email_Newsletter_-_Developer_Ed%2BTech_-_WW_WW_-_SkillsNetwork-Courses-IBMDeveloperSkillsNetwork-DS0701EN-SkillsNetwork-21253531&cm_mmca1=000026UJ&cm_mmca2=10006555&cm_mmca3=M12345678&cvsorc=email.Newsletter.M12345678&cvo_campaign=000026UJ))

2. Keeping Track Online – Citizen’s Committee for Children of New York Child Count (<https://data.cccnewyork.org/data/table/98/child-population#10/16/62/a/a>)

3. Four Square Location Data (Used to Find Preschool Venues)

4. Wikipedia of Community Districts and Neighborhoods in NYC  
([https://en.wikipedia.org/wiki/Neighborhoods\\_in\\_New\\_York\\_City](https://en.wikipedia.org/wiki/Neighborhoods_in_New_York_City))