

# Moving to New York City: Insight about demographics makeup and housing in NYC

Ruyu Liu

ruyul@andrew.cmu.edu

## Introduction:

In recent decades, New York City has welcomed a large number of foreign immigrants. People move to New York City from all over the world, attracted by various factors such as jobs, educational resources, and Wall Street. The massive increase in population has made the housing prices in this city, where the land is expensive, continue to rise. This article will mainly study [1] What kind of people is moving into NYC (race, time they moved to NYC and their education level); [2] What are their income and what affect their income; [3] Where is the most ideal place to live to help us better understand the demographics makeup of New York City and help those new immigrants to NYC find out an ideal place to settle down.

## Data:

The data contains the sample of 4,000 New York City residents as respondents in The New York City Housing and Vacancy Survey.

For each single individual, we assigned them special ID to make sure all the information is presented anonymously. We collected respondent's **total household income** (in US dollars), **gender** (Male/Female), **age** (19-90 so that all the study objects are adults), **self-reported race** (African-American/ Asian/ Caucasian/ Hispanic/ Other), **categorical self-assessment of health status** (rank from 1 to 6 while the higher is better), **highest education level** (1-10), **the number of heating equipment breakdowns since 2002** (1-5), **presence of mice/rats in the last 90 days** (yes/no), **presence of cracks or holes in interior walls**(yes/no), **presence of broken plaster on ceiling/interior walls** (yes/no), **presence of water leakage inside apartment**(yes/no), **number of maintenance deficiencies between 2002 and 2005** (0-8, could be zero if never maintenance deficiency), **the year the respondent moved to New York City** (1900-2005), **NYC borough location** (Bronx, Brooklyn, Manhattan, Queens, Staten Island), **subdivision of each borough** (numerical number). There are no missing values in any of the variables in the dataset.

Of the primary focus is the **average income** for 4,000 respondents, a quantitative variable to measure how many money a single household get (measured in US dollars); the mean household income is 66142.393 dollars with a standard deviation of 87077.057 dollars. We also include the education level and race, two categorical data to see what kind of people are moving into NYC.

The **highest education level**, a numerical variable to evaluate the respondent went to how many years of school. (1: No school completed; 2: Up to the 6th grade; 3: 7th or 8th grade; 4: 9th, 10th, 11th or 12th grade but without H.S Diploma; 5: H.S Diploma; 6: Some college but no degree; 7: Associate Degree; 8: College or graduate; 9: Some graduate/ professional training; 10: Graduate/ professional degree)

The **number of heating equipment breakdowns** since 2002 (1-5), a numerical variable to understand the quality of heating equipment .

We also study the following **categorical variables**.

a) Presence of mice/rats in the last 90 days (yes/no): 2974 of respondents claim that there are no mice/ rats appear in their house, compromising 74.35% of the 4000 respondent;

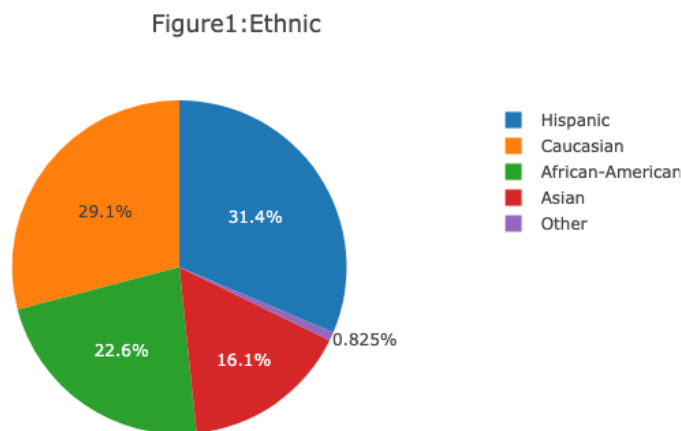
- b) Presence of cracks or holes in interior walls(yes/no): 3473 respondents claims that there is no presence of cracks or holes in interior walls, compromising 86.825% of the 4000 respondent ;
- c) Presence of broken plaster on ceiling/interior walls(yes/no) : 3398 of respondents claim that presence of broken plaster on ceiling/interior walls, compromising 84.95% of the 4000 respondent ;
- d) Presence of water leakage inside apartment(yes/no): 3257 of respondents claim that there is no presence of water leakage inside apartment, compromising 81.425% of the 4000 respondent;
- e) NYC borough location (Bronx, Brooklyn, Manhattan, Queens, Staten Island)

## Research scenarios:

### a) The characteristics of respondents

What kind of people is moving into New York City? When did they move in? What are respondents' races? Do they all have considerable income? Had they gone to top universities? Where they prefer to live? Can they afford a good house?

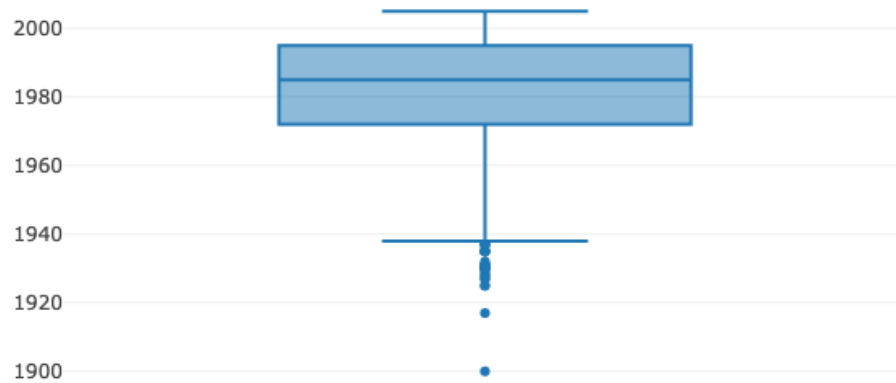
Figure1 is the pie chart that shows the **ethnic component** of these 4,000 respondents. 31.4% of them are Hispanic, 29.1% of them are Caucasian, 22.6% of them are African-American, 16.1% of them are Asian and the rest 0.825% belong to other races.



variable: Ethnic  
plotId: HuBQgW

Figure2 is a box plot shows the **year** when these respondents **moved in NYC**. About 50% of the respondents moved in NYC between around 1920-1995, while the first one moved in NYC is a Hispanic who moved in in 1900. While the other 50% moved in NYC from 1995-2005, which shows that in recent 10 years, NYC is being yearning by more people and experience the intense increase in population.

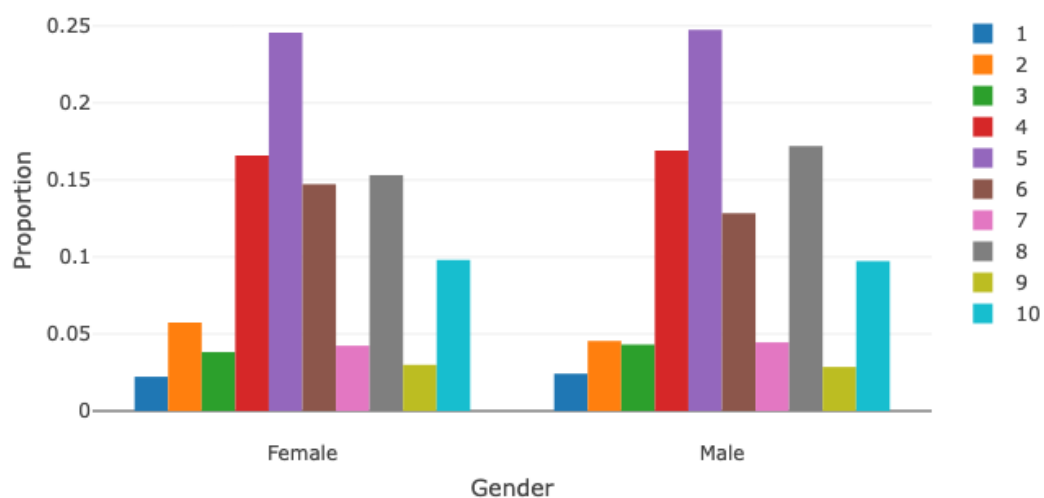
Figure2: NYCMove



```
variable:
- NYCMove
group: []
plotId: WNJBG6
```

Figure 3 is the histogram shows the **education level and gender** of the respondents. The figure shows that for both male and female, the histogram shows a normal unimodal distribution with a peak at highest education level of 5. And the two graph show the proportion of each education level are about the same for male and female, which means the education level during 1900-2005 nearly not associate with gender.

Figure3: Education given Gender



```
variable: Education
group: Gender
relative: true
totalPercent: false
direction: ascending
```

**stackBars: false**  
**plotId: fRaZkz**

## **b) Factors have potential effect on household income**

Income is a key factor that whether an individual has solid financial foundation living in such a gorgeous city with high living cost. Studying the factor that may affect one's income level can help us learn what barriers a person may have in his/her carer path.

### **The association between income and race**

Table 1 shows the income data for people with different races. For people with different ethnicity, the African-American has an mean household income of 65198.145 dollars with an standard deviation of 74893.063 dollars; the Asian has an mean household income of 67743.961 dollars with an standard deviation of 103147.341 dollars; the Caucasian has an mean household income of 66262.079 dollars with an standard deviation of 91943.076 dollars; the Hispanic has an mean household income of 65707.425dollars with an standard deviation of 80890.055 dollars; others who do not declare has an mean household income of 72981.939 dollars with an standard deviation of 107413.473 dollars. The median and mean income are about the same for people of different races.

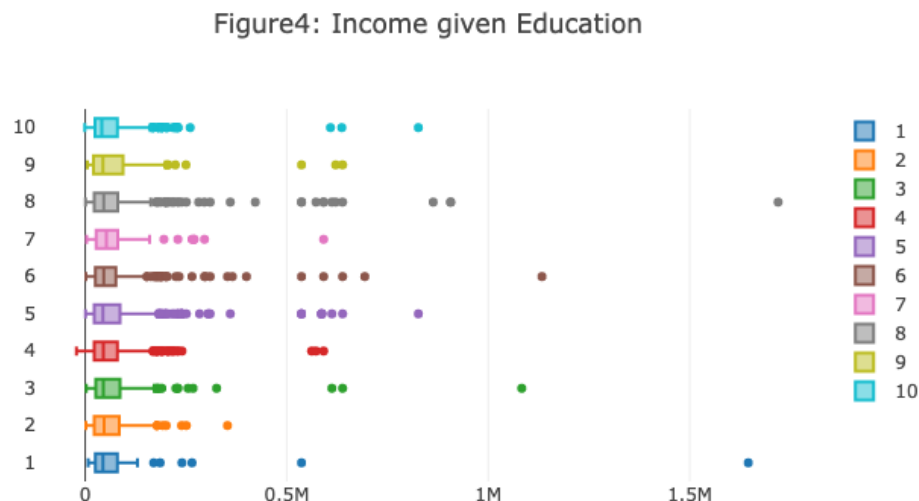
However, when focusing on the lowest and highest income of different ethnic, African-American has a really low lowest income which count as -220,000 dollars and a maximum income that far way lower that other ethnic, even lower than a half of maximum income of Caucasian. This means that although some African-American can find an average-paid job, some of them are experience extremely hard time having no disposable income. And it is really hard for them to become wealthy or be the member of management layer of a company, maybe due to the existing problem of bias. So ethnic can be a potential factor that associate with an individual's income.

Table 1 : Income given ethnic

<b>Ethnic</b>	<b>Mean</b>	<b>Median</b>	<b>Standard Deviation</b>	<b>Min</b>	<b>Max</b>	<b>N</b>
African-American	65198.145	45000.000	74893.063	-22000.000	826640.000	902
Asian	67743.961	45200.000	103147.341	1440.000	1645211.000	645
Caucasian	66262.079	45000.000	91943.076	-800.000	1719211.000	1164
Hispanic	65707.425	45000.000	80890.055	1000.000	1083071.000	1256
Other	72981.939	47040.000	107413.473	6000.000	608640.000	33

### **The association between income and highest education level**

Figure 4 is the box plot shows the relation between income and highest education level. For respondents with different education level, the median of their income are approximately the same. What's more, there are respondent who received different level of education have extremely high income that show as outliers in the figure. For example, there is one respondent with level 1 education has a household income for 1.645211M, which ranks the second. This means that NYC is a city full of opportunities and employees would not define one's ability based on his/her education level.



**variable:**  
**- Income**  
**group:**  
**- Education**  
**plotId: Cljb23**

### The association between income and where the respondents brought

Table2 shows the income data for respondents brought in five different boroughs. Among them, Manhattan has the highest mean income of 71,162.024 dollars, and the highest lowest income among 4,000 respondents. Bronx has the second highest mean of 66172.663 dollars. The rest three boroughs: Brooklyn, Queens and Staten Island have about the same level of mean income over 64,000, with the rank of Brooklyn (64687.568 dollars), Queens (64426.587 dollars) and Staten Island (64095.255 dollars). It is noticed that Bronx has the lowest household income with an income of -22,000 dollars, which means households has no fixed income and even has a heavy burden of debt. A respondent brought in Brooklyn responses the highest household income while Brooklyn is the area with the greatest wealthy gap. Manhattan is a gathering place for financial giants in New York. Most of the practitioners have been exposed to the fields of finance and technology since childhood, or their parents are practitioners in high-paying industries. As an area close to Manhattan, Brooklyn is more suitable for living without the hustle and bustle of the city. Therefore, many families who pay attention to the quality of life and the prosperity of the city will buy real estate there.

Table2: Income given where respondent Borough

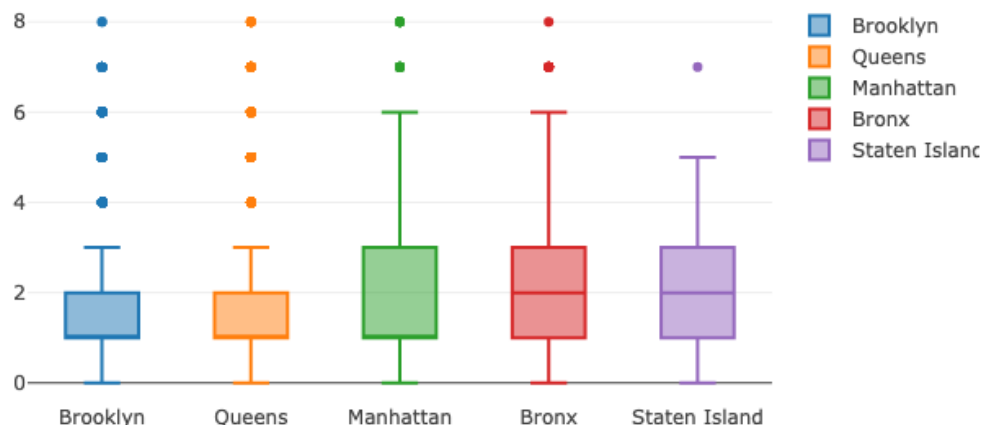
Borough	Mean	Min	Max	Standard Deviation	Range	N
Bronx	66172.663	-22000.000	1133280.000	93699.638	1155280.000	584
Brooklyn	64687.568	1000.000	1719211.000	86704.533	1718211.000	1156
Manhattan	71162.024	2280.000	1645211.000	106305.930	1642931.000	828
Queens	64426.587	-800.000	693640.000	70774.915	694440.000	1326
Staten Island	64095.255	2000.000	536640.000	69696.678	534640.000	106

### c) The ideal place to live in New York City

With a certain understanding of the background and income of new immigrants in New York, does high income mean that the houses or apartments they live in are more comfortable or modern? Are they facing an aging or maintenance problem with their home? By collecting the following numerical and categorical data, we can find out the most ideal place to live.

Figure5 is the box plot show the number of maintenance deficiencies for houses in five different districts. Bronx and Staten Island have a comparative higher times of maintenance with a median of 2 times. Most residents in Manhattan also maintain their houses frequently that over 50% of them do maintenance more than 1 time to 6 times. However, people in Brooklyn and Queens have a smaller range of maintenance time from 0-4 times with potential outliers. This show that the heating equipments have a better quality in Brooklyn and Queens. The reason can be that most office buildings are in Manhattan, Bronx and Staten Island that the wastage and wear down can be serious due to long-time usage everyday.

Figure5: MaintenanceDef given Borough



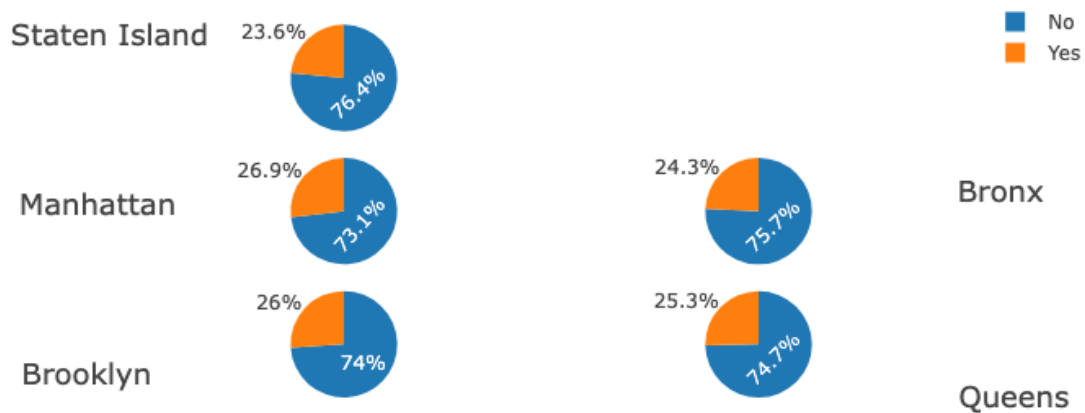
```

variable:
- MaintenanceDef
group:
- Borough
plotId: SvLU0t

```

Figure6 - 9 show the pie charts of showing the response of four Yes/No questions. And the percentage of answering no is about the same for five different areas. Staten Island has the lowest possibility of seeing mice/rats at home(76.4% response No); Manhattan has the least chance of observing cracks or holes (88% response No); In Brooklyn, you have the lowest chance of facing broken plaster (86% response No); Respondents from Staten Island have the least possibility of experiencing water leakage.

Figure6: MiceRats given Borough

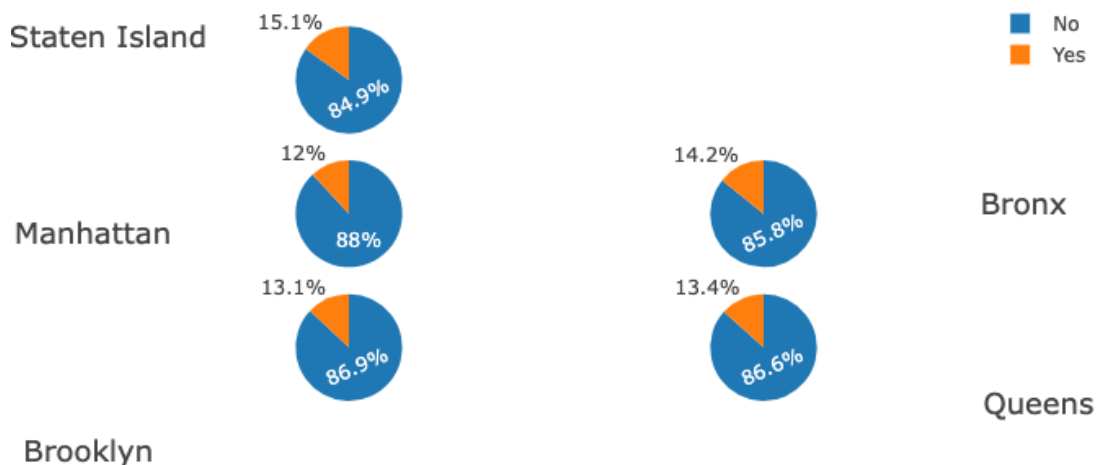


```

variable: MiceRats
group: Borough
plotId: q8Eag7

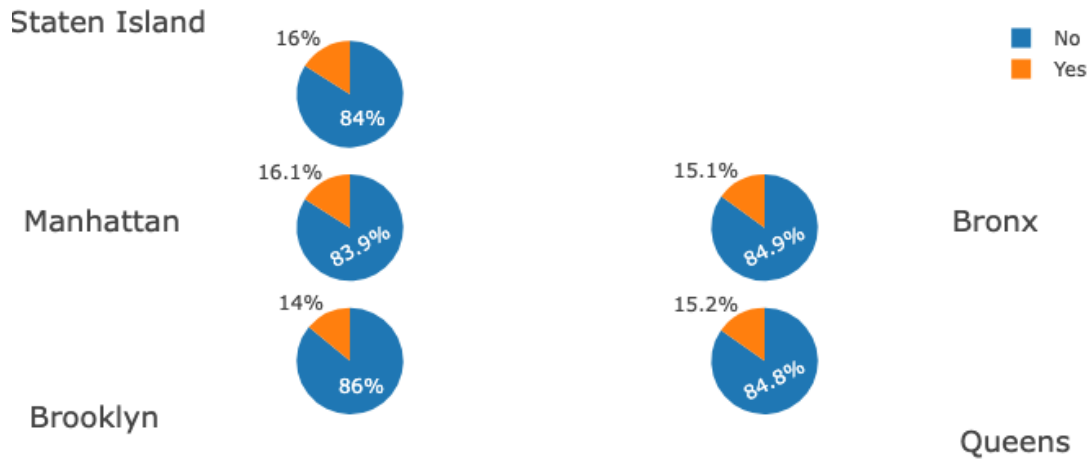
```

Figure7: CracksHoles given Borough



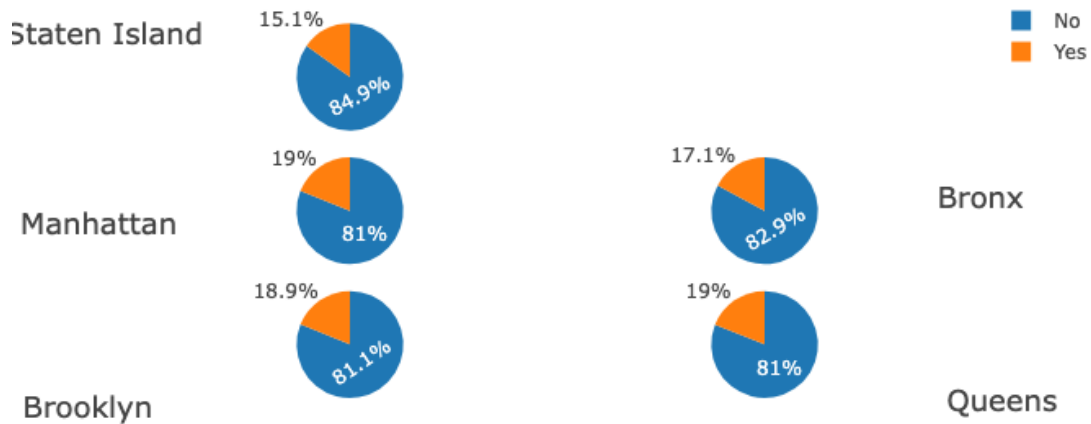
variable: CracksHoles  
group: Borough  
plotId: f8dmmW

Figure8: BrokenPlaster given Borough



variable: BrokenPlaster  
group: Borough  
plotId: SVAWSf

Figure9 :WaterLeakage given Borough



variable: WaterLeakage  
group: Borough  
plotId: BKCnz7

#### Discussion:

New York City is a place full of opportunity. One can have a considerable income, at least 66142.393 dollars per household when you are paid above the average. Although highest education level may not limit respondents' carer-development and some people with lower education levels can get extremely high salaries, there are still



people who face unemployment and poverty. As people flock to New York City for development opportunities, there are also concerns about renting and buying assets. Manhattan, as the most prime location in New York, will become the first choice for high-paying talents. But when it comes to housing quality, housing in the five regions have similar rate of appearance for rats, water leakage and holes. Where to rent a house requires consideration of each person's own commuting needs and rental budget.

Statistics of the data enable us have some insight into New York's salary landscape and demographics. what's more, people can better avoid the problems they are most afraid of when renting or buying real estate, such as choosing the area with the least probability of mouse infestation.

Reference:

[1] The New York City Housing and Vacancy Survey