Analysis on Clean Water and Sanitation of Telegana

Completed by: Sanjana NB, Ishwarya M, Vivek

Introduction

"South of North and North of South" - Located on the uplands of the Deccan plateau, Telangana boasts in its location a culture of pluralism and inclusiveness. According to studies, the pompous and rampantly developing city Hyderabad had polluted and lost several of its water bodies due to rash and spontaneous urbanization.

According to the data available from the Telangana State Pollution Control Board, it is evident how sanitation is being a critical determinant of the quality of human life there. Ensuring proper disposal, management of waste and associated hygiene-related practices would largely impact the outcomes of public health.

In this study, we look at the comprehensive range of services to be established inorder to achieve an urban Telangana that is totally safe.

Prompt

By performing visualizations on the following attributes from the dataset; toilet types i.e Public, Community, She. Vehicle types i.e tractor, autos, tricycles, rickshaws, pushcarts. Worker types regular, outsources. Hospital types private, government, urban health centers and garbage generation and or lifted per day, we have identified holistic approaches to address certain issues that have implications on the overall management of sanitation in the state of Telangana.

Methodology

Data Description

The dataset contains sanitation information of 72 ULBs of Telangana.
Categorical data - 2 columns, Numerical data - 18 columns

Data Cleaning
- Identified 8.8% missing data in toilet types. We determined the total no.of toilets to resolve this.
- Considering the interquartile range, skewness and kurtosis of the data it is concluded free of outliers although there could be a small variance.
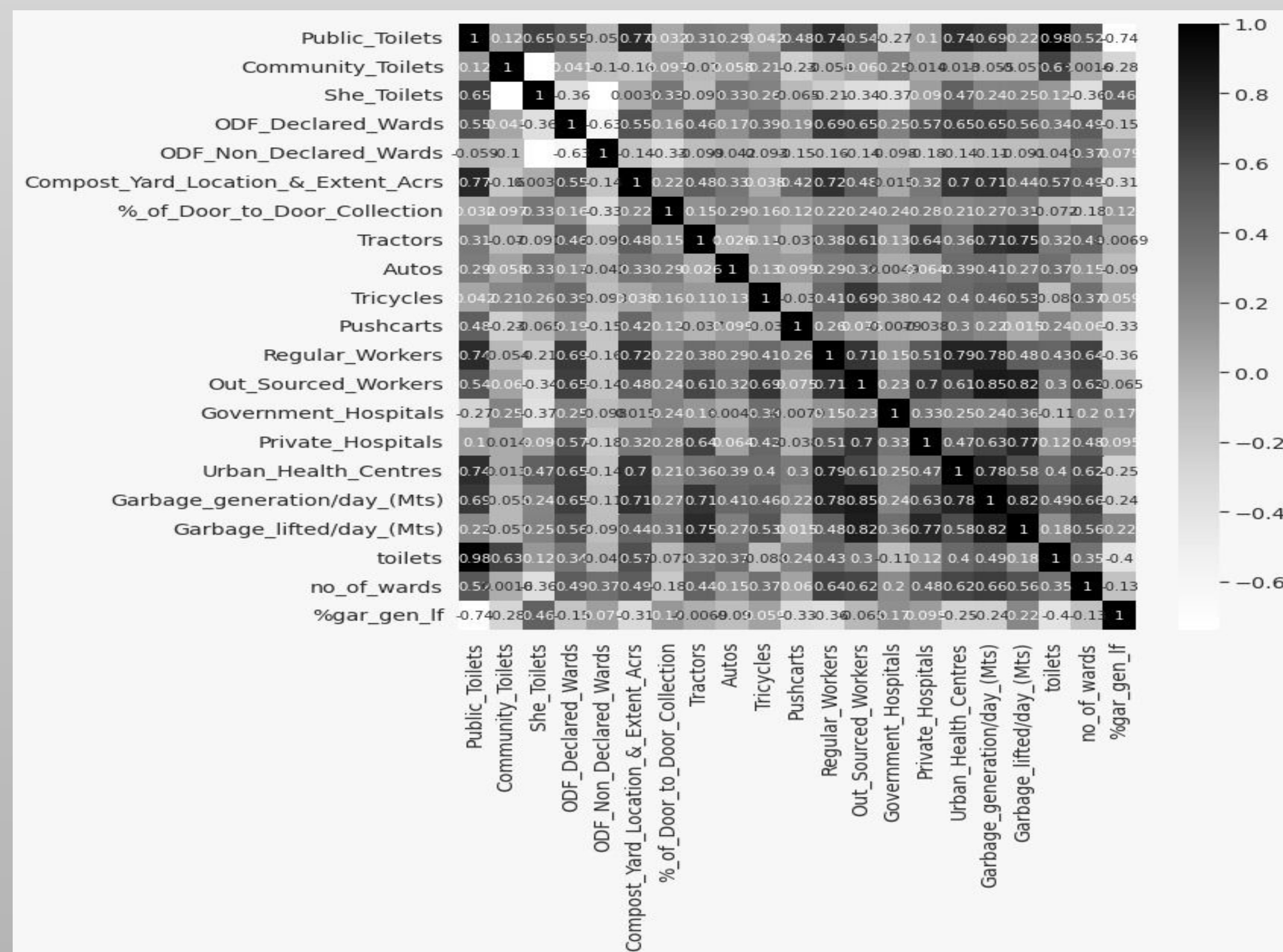
Data Collection
Missing data regarding Dry resource collection centers have been filled in with values after proper research.

Data Pre Profiling
Histograms for each attribute helped us to study and understand the data.

Exploratory Data Analysis

1. Out of 72 ULBs, 55 have been declared as 100% ODF in spite of the lack of any kind of toilet facilities in 36 ULBs. Raising awareness among the masses or increase in number of toilets in the remaining 17 ULBs can help.

2. % Door to door collection vs Garbage disposal - Places with no proper dry resource collection centers have low disposal rate as distinguished by a hue. Extra centers to be set up in order to improve the rate of disposal.

3. More private hospitals available as compared to government hospitals and urban health centers. We see that the state should work towards establishing government hospitals so as to provide health care facilities to the needy people as well.

4. The rate of garbage disposal per day is 100% in 10 Urban Local Bodies even though they lack dry resource collection centers.
   % Disposal = (Garbage Lifted / Garbage Generated) * 100

5. Garbage generated vs Garbage lifted with hue based on 100% disposal gives a linear graph showing the dependance of one variable on the other.
   y = ax+b

6. 26 ULBs lack dry resource collection centers but 10 of them maintain 100% garbage disposal per day.

7. Among the 12 ULBs with no tractor, autos, tricycles, rickshaws, pushcarts only Kothagudem has high garbage generation. Other ULBs generate 0 mts of garbage.
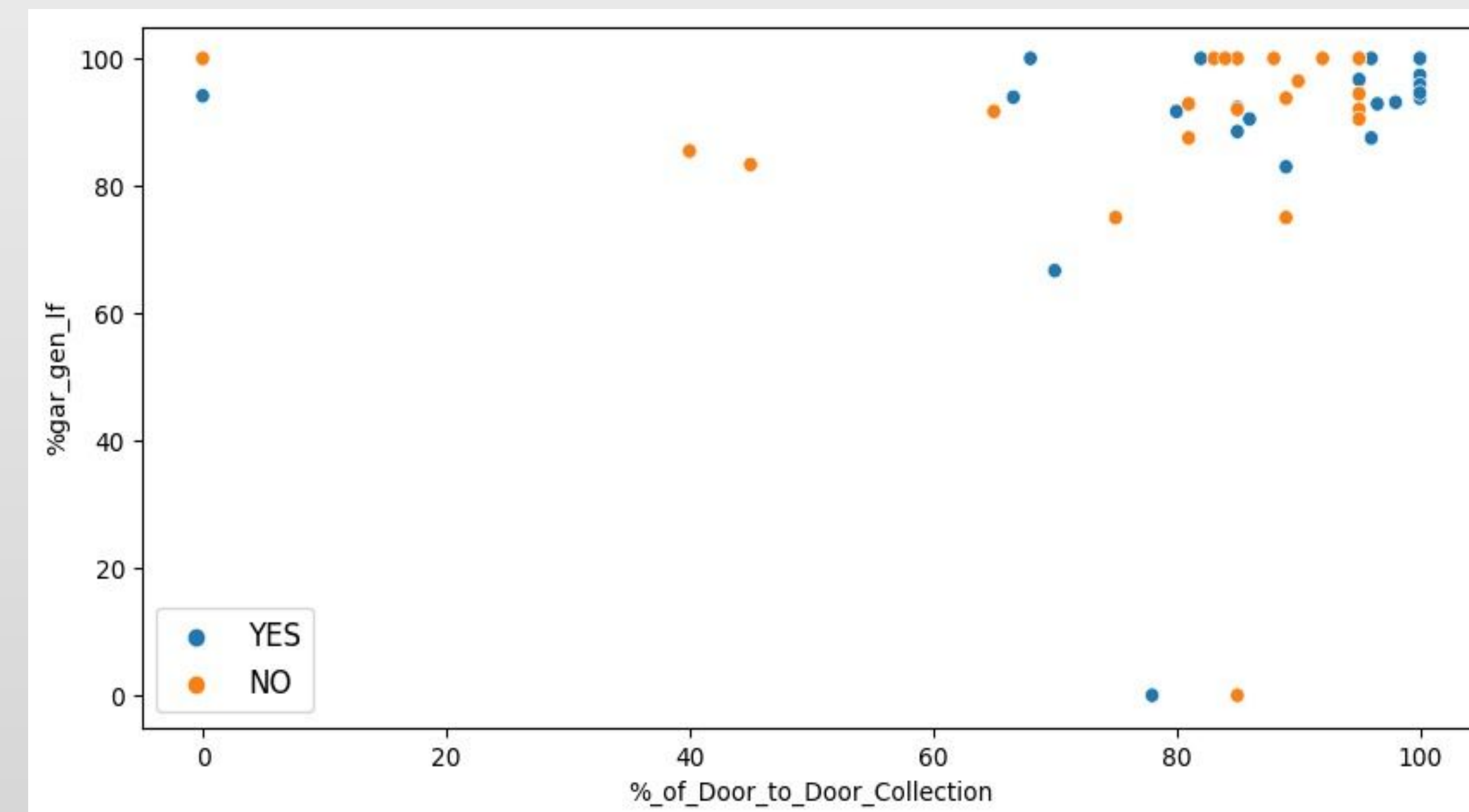

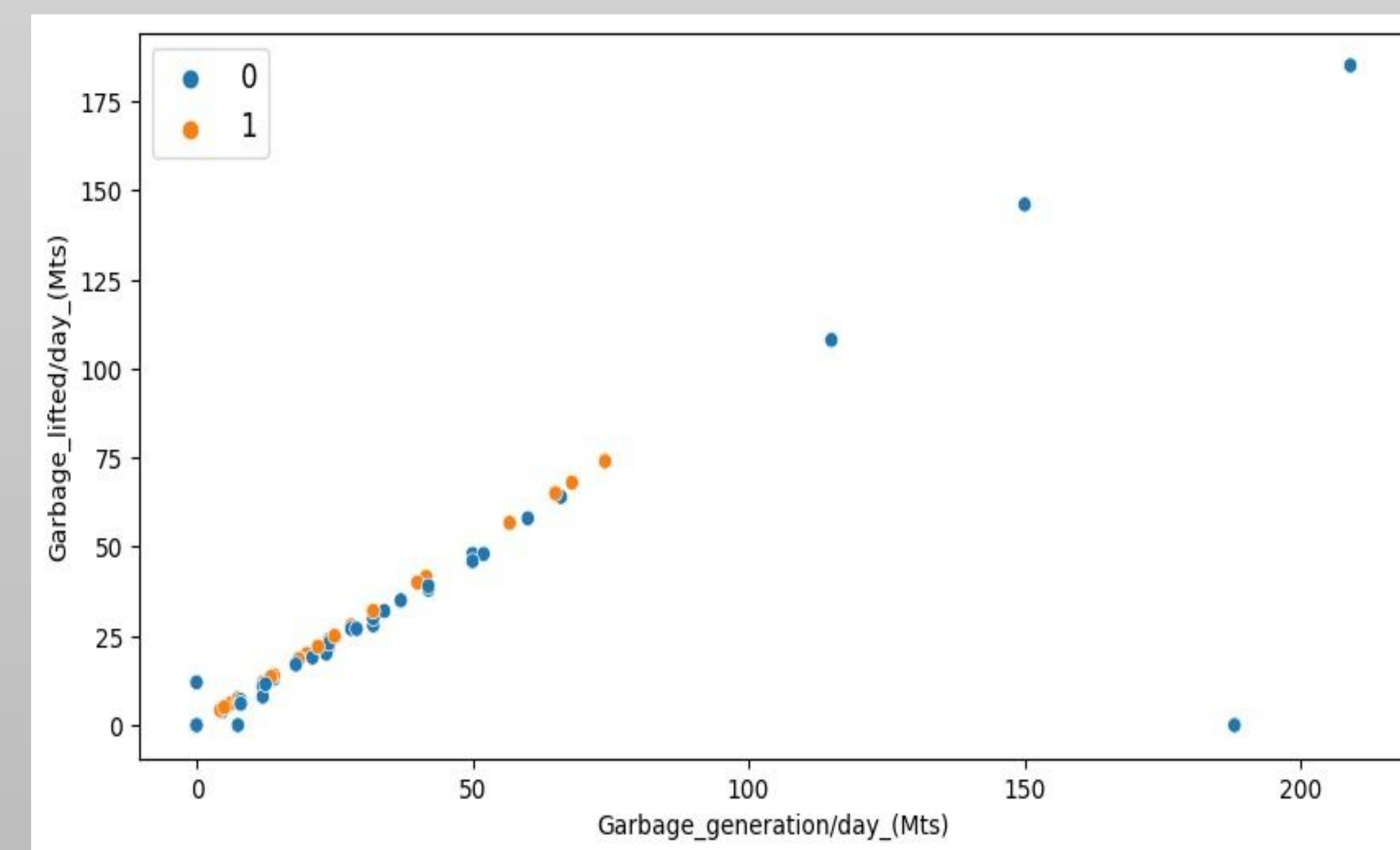
Result

Fig 1. % Door to Door Collection vs % Disposal

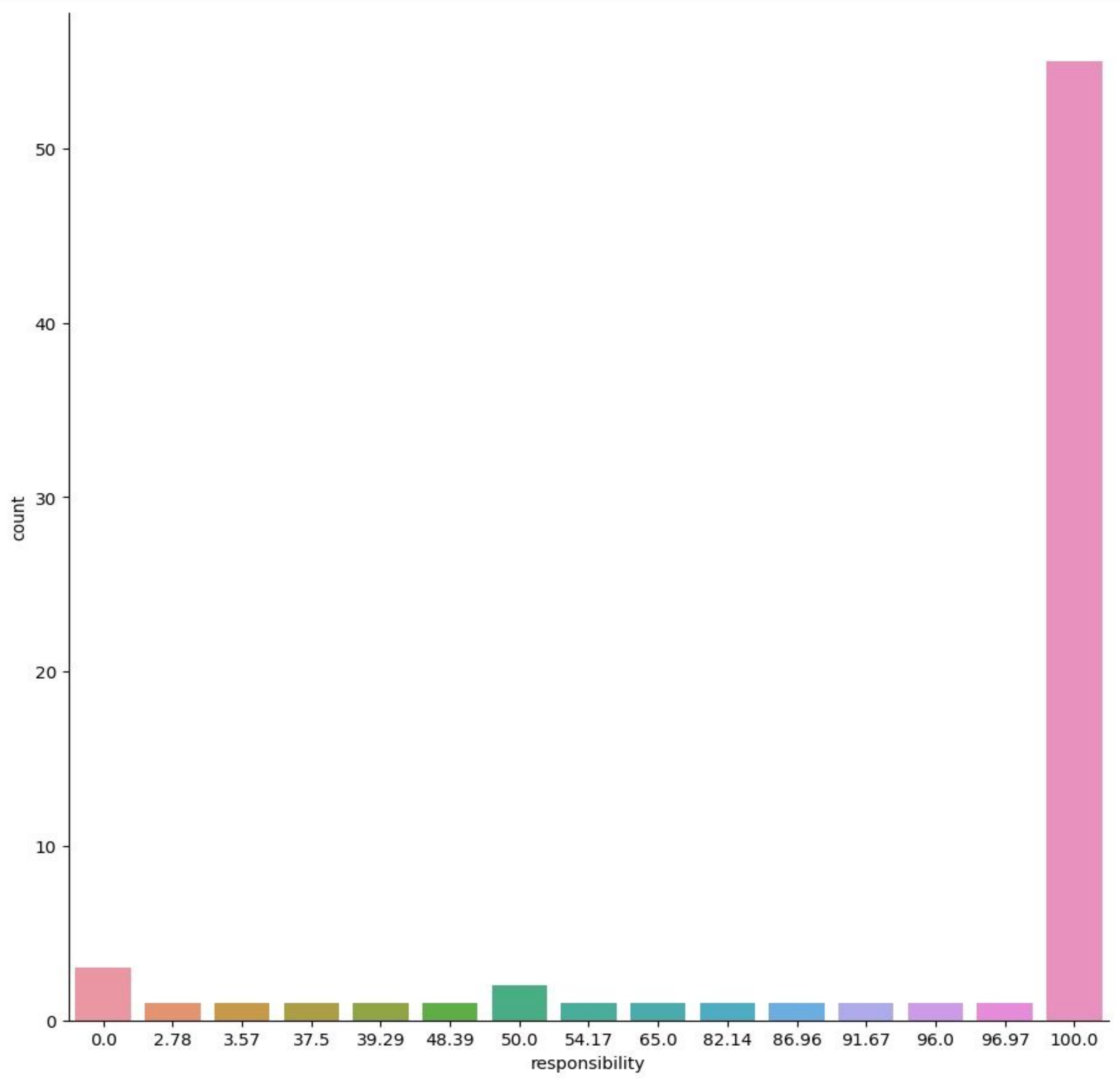Fig 2. Garbage Generation / day (mts) vs Garbage Lifted / day (mts)

ULB_Name	responsibility
Andol-Jogipet	50
Ieeja	0
Jammikunta	65
Jangoan	82.14
Kagaznagar	3.57
Kamareddy	0
Karimnagar	96
Kothagudem	96.97
Mahabubabad	39.29
Manuguru	86.96
Nalgonda	37.5
Nirmal	2.78
Palwancha	54.17
Tandur	48.39
Wanaparthy	50
Warangal	0
Yellandu	91.67

Fig 3. 55 ULBs out of 72 ULBs have 100 % ODF declared wards

Fig 4. less than 100% indicates requirement of toilets and awareness in respective ULBs
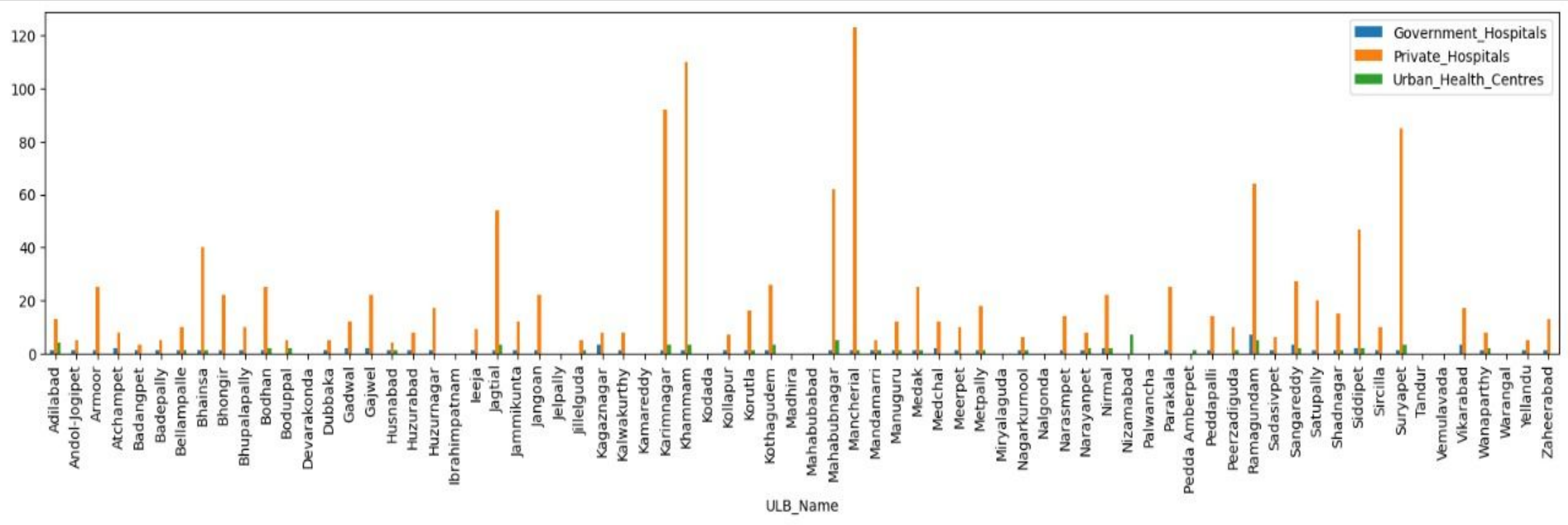

Fig 5. The count of different types of health care centers available in each ULBs

Conclusion & Recommendation

Model 1

There are some zeros in the garbage collected columns. Corresponding to these however the vehicles operating in the area is not 0. Secondly there is a obvious correlation between vehicle count and garbage collected (the more vehicles the more garbage collected). The 4 dimensional plane model $ax_1 + bx_2 + cx_3 + dx_4 = y$ (x_i is vehicle counts and y is garbage lifted) is used to find a model that can predict garbage collected based on vehicle counts.

We can see that the model has fared pretty well (obtaining a score of 86). The coefficients of the model provide useful information to compare how each vehicle contributes in collecting waste. There is scope for further analysis here where we can include vehicle size, fuel type, road size and mileage to determine which type of vehicle is optimum for a certain environment. We see that garbage generated to garbage collected ratio is almost always one. So we shall proceed to fill zeros in generated and collected with the values from the linear model based on vehicle counts.

```
[ ] model.score(X, y)

    0.8610930811911462
```

Model 2

Now hospital data is analysed. It is assumed that the ratio of garbage contributed by hospitals/health centres collectively is constant across all districts. Underlying this principle, there is a motivation to find how each type of hospital contributes to garbage generated. Again a linear 3d model is fit on the 3 hospital counts to predict garbage generated. This model also fares pretty well (a score around 70).

The coefficients of this model are pretty interesting. Firstly the large value for UHCs is maybe because of the grand capacity they operate at as compared to hospitals. However we see that government hospitals contribute lower garbage than urban hospitals. There are numerous other advantages from financial to job generation aspects of government hospitals. From this analysis, promoting development of government hospitals over private hospitals has a positive impact on the sanitation of a district - over countless other benefits.

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[62] hosp_line.score(v, w)

     0.7027731214664057
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