Cost of Living in Metropolitan Cities: Statistical Analysis using R Studio

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Abstract: Be it for the purpose of seeking better education, to make a living or just to live a busy life full of hustle and bustle, people find themselves travelling to huge metropolitan cities. With the numbers increasing with leaps and bounds, the cost of living is drastically affected. The resources are used extensively, but the process of mass production acts as a counter to this in some sectors. It is imperative to be aware of the necessities and their costs in these cities to plan a satisfactory life, without causing a ruckus and ending up broke. Keeping in mind, the necessity of living in these metropolitan cities, a statistical study is aimed to analyse the cost of living in these huge hubs, which would help the people to get a good idea of the financial challenges and aid them to plan their budget for comfort life. The study involves a survey inquiring about the cost of basic amenities required to live in metropolitan cities in India. The average expenditure of people is to determine the deviation across the country. Testing of hypothesis is applied to test the significant difference between average from our observations (which acted as sample) and average from the internet source (as population). The statistical study proves to be an efficient tool in identifying the most cost efficient city, to sustain a satisfactory life at minimal expense and financial efficiency in various aspects. The result clearly indicates the significance of the data analytics which guides the individuals to plan their future living in these humungous cities. The report serves as an aid to the common masses to sustain a satisfactory lifestyle in the buzzing metropolitan cities, getting the most out of every penny.

Keywords: Cost, Data, Expenditure, Graph, Metropolitan

I. INTRODUCTION

In modern centuries, both the city and metropolitan areas have progressively developed to scientific, administrative and political interest. Upcoming urban progress will thereby almost exclusively take place in developing countries. Fifty per cent of the world's population presently lives in cities. It is assessed that up to 75% of the universal population will be living in cities by 2050. The largest movement towards urban centres is happening in Asia, Africa and Latin America. The city is at the primary of the metropolitan area and is the centre for all economic and social activities as well as a nest for the majority of the world population. In order to match the growth, a study is conducted to obtain realistic figures of living in metropolitan cities in India so

that this data can be used by the public to make informed decisions while moving to a metropolitan city to settle down for various reasons. The survey circulated to obtain the figures for the cost of living in metropolitan cities covered different areas such as rent, food, medical costs, transport etc.

The detailed information analysed in the article will assist individuals with planning their budgets and organize their requirements while settling down in the city. R Studio is used to analyse and interpret the data systematically. The survey and a statistical study on the cost of living in metropolitan cities will be highly beneficial for the common people of the country.

II. LITERATURE REVIEW

As we are aware of the fact that the development of the country is proceeding with leaps and bounds, we should consider that it also affects our country's economy. Such development has both positive and negative effects, considering all these facts, it is highly necessary for a statistical study to adequately summarise the financial ups and down, to sustain a living in the hustle-bustle of a metropolitan city in the country, a place where most people find solace to support their as well as their families' needs. David Albouy, et.al, [2] points out the necessity of such a study in having a steady estimate of a region's economic status. In this article, complex correlation and regression equations are used to depict the influence of different factors. The data used in the model considers only the housing expenditure and does not provide effective figures of cost of living. The suggested statistical model with graphs and charts acts as a visual representation for the easier understanding of the costs for the general public. The statistical study also covers other parts of the expenditure like transport, consumables such as food, cosmetics and electricity, gas and water supply. In Annual Indices for Expatriates and Ordinary Residents on Cost of Living, Wages and Purchasing Power for World's Major Cities Tan Khee Giap, et.al, [7] consider, finding the cost of living is a fundamental part of the study. However, the main aim is to find the effect of the cost of living on the purchasing power of the residents. Neither does it analyse the variation of taxes and supply across the cities nor does it consider the difference in the choice of people across the wide range of cities. In the suggested statistical model, the sample is taken from a single country, hence making the difference of taxes is null. The primary data is collected through a survey. This makes positive that a complete choice of finding a right city is accommodated within the study to get as much variety as possible without factors such as tax, currency value etc. influence the data.

Ismail Haque and PriyankPravin Patel [5] used city-level census data to study the fashions, designs and contributing factor of metro city development in India. Their experiential outcomes exhibited that the metro cities situated along a riverbank and located in the northern, eastern and southern areas of India, cities with improved quality public amenities and those which are state capitals are exposed to develop more rapidly than others. They concluded that diverting investment and development projects in the direction of conservative regions in addition to subordinate cities for supporting their infrastructure and financial bases may indicate sustainable and balanced metropolitan growth. Boon Seng Tan [1] computes the cost of living of different cities but does so with a mind of an economist. This introduces a lot of specialization into the study which does not aid the common man. The entire survey works on a data set of expenditures at a given period of time. This makes the study highly susceptible to regular changes in cost of needs of a person which is bound to happen.

The statistical analysis using R Studio solves this issue by working on the same processes with different datasets. Hence, regular updation of the result is possible. In this article, it is taken into account the fact that prices change over time and the changes have to be incorporated. This is possible by statistically comparing the old data as well as the presently obtained data using methods like hypothetical testing. Using R Studio, a large amount of data is analysed to present it in an easily understandable form. A number of research studies on cities abroad are available. Hence a survey on cost of living in Indian metropolitan cities serves as a travel guide to know about the expenditure for the basic needs. The main aim of the survey is to create a tool which helps people from different walks of life to weigh the pros and cons of living in a metropolitan city and to plan a healthy living keeping in mind a properly planned budget. The article gives an overview of the best habitable city in the country, in a financial sense, thus providing greater service. The statistical analysis using R studio will prove to be an efficient tool in elevating the living conditions of the common man in India.

III. MODEL FORMULATION

In this model, the following assumptions are made for the ease of study

Collecting price of basic commodities in metropolitan cities.

Comparison of cost of living in different cities.

A survey on best city to live in.

Checking relevancy of the survey.

The statistical model is designed to compute average monthly expenditure in different cities individually to see deviation across the country. Similarly, to compute the deviation of the monthly expenditures in different cities from an average monthly expenditure of the country. The standard monthly expenditure is obtained from the internet to compare against the survey values. To test the significant difference between average from our observations (which acted as sample) and the average from the internet source (as population) testing of the hypothesis is applied.

As stated above a survey is conducted to obtain the essential data for statistical investigation. The survey is categorised into sections with questions related to the cost of needs and commodities. The section wise questions provide us the data on the amount of money spent by a family every month on needs like healthcare, recreational activities, bills, repairs, food, etc. The data obtained from different sources all across India will be clubbed according to sections and graphs to represent them more efficiently in a visual manner. From the graphs, one can easily understand the relation between the expenditure and commodities for the obtained entries.

IV. RESULTS AND DISCUSSION

Case 1: The average monthly expenditure is calculated for a single family for different cities in India, namely Delhi, Mumbai, Kolkata, Hyderabad, Bangalore and Chandigarh. From this, the most economically efficient and sound city to live in India was found to be the metropolitan city of Kolkata. According to our survey, Kolkata has the least average monthly expenditure for a family, thus an economically efficient choice for a city to dwell in.

The output is:

[1] "The mean expenditure in Delhi is 160050.0000000

[1] "The mean expenditure in Mumbai is 107950.000000"

[1] "The mean expenditure in Kolkata is 102925.000000"

[1]"The mean expenditure in Hyderabad is 128200.000000"

[1] "The mean expenditure in Bangalore is 140000.000000"

[1] "The mean expenditure in Chandigarh is 116090.000000"

[1] "The mean monthly expenditure across major cities is: 131103.566667"
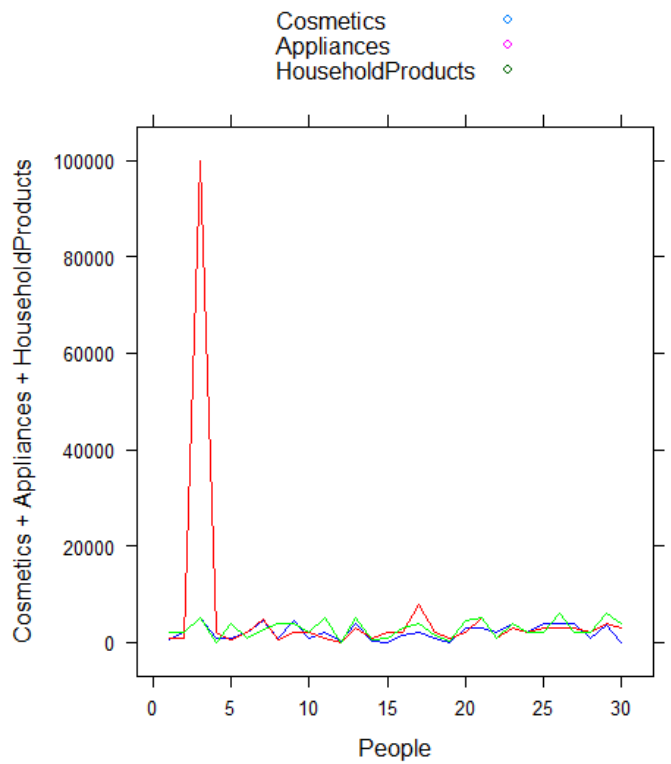
 [1] "The most cost efficient city is Kolkata"

Case 2: The average monthly expenditure of a family all over India is calculated and compared with the secondary source (Internet). Hypothetical testing is applied to investigate the data. Our result fell in range with the online results using the level of significance to be 5%. The online survey results which we used was conducted 3 years ago, thus, we can see a slight rise in the cost but it still falls within the 5% significance range.

[1] "The population mean is 110800.000000"

[1] "The sample mean is 131103.566667"

[1] "The sd of our sample is 82723.212568"

[1] "We assume a NULL HYPOTHESIS where we take alpha as 0.05"

[1] -1.344329

[1] 1.959964

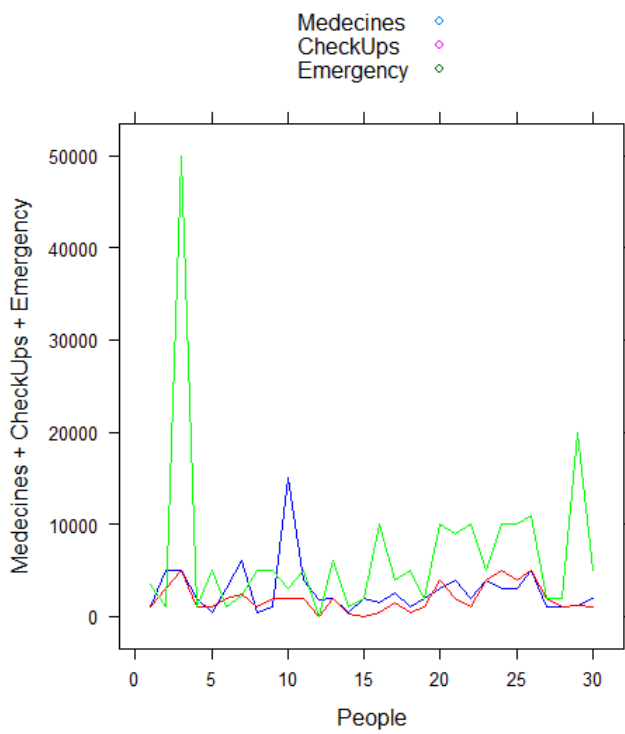[1] "We accept the hypothesis that the change is within the 5% range"

For the purpose of graphical representation for depicting the variation of the costs of products across the country R studio is used.
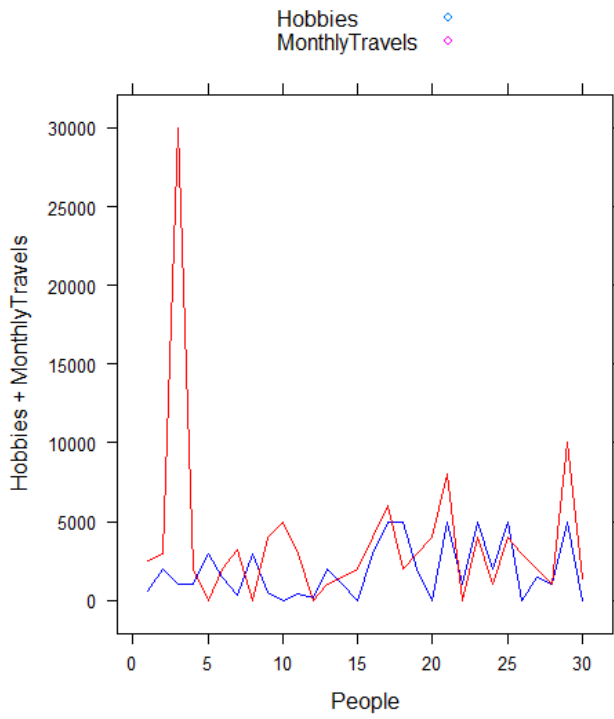
(i)
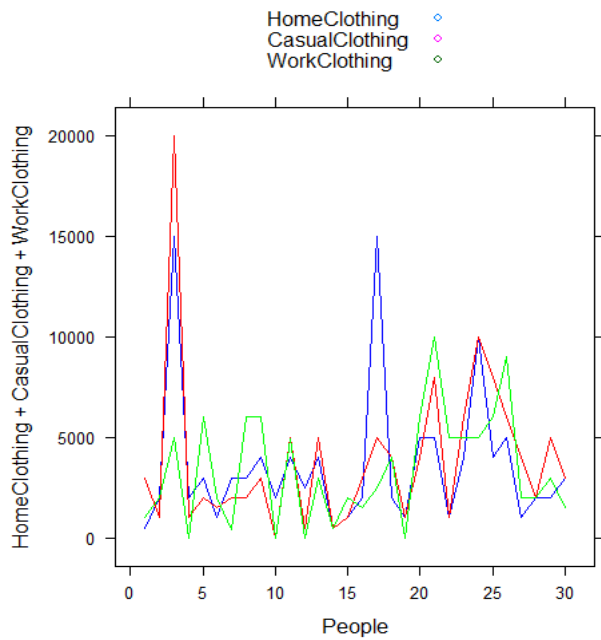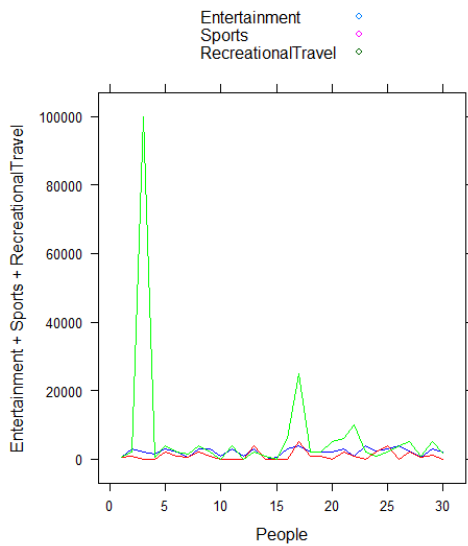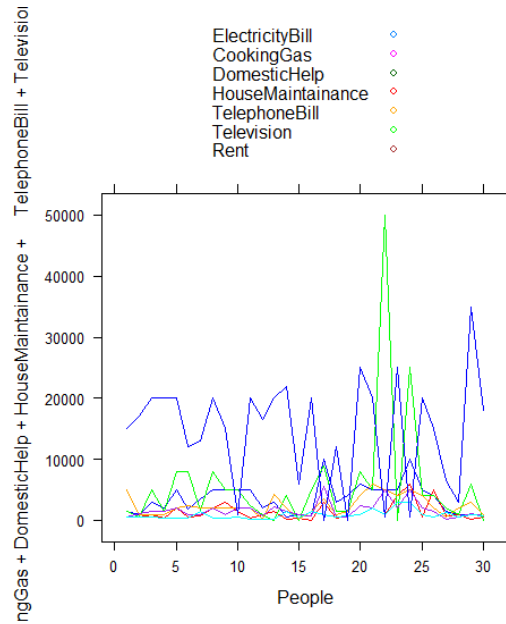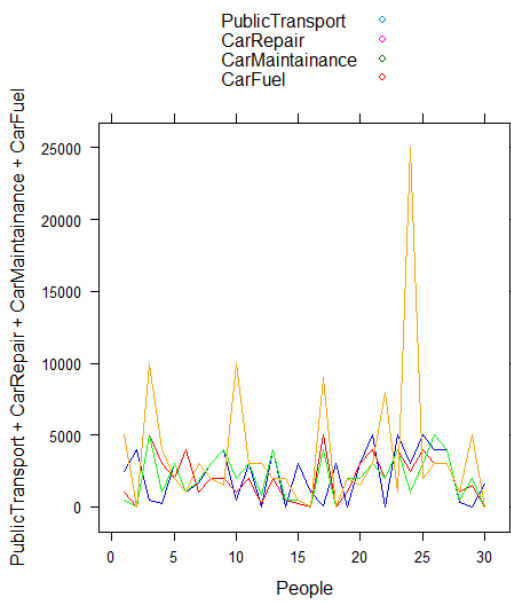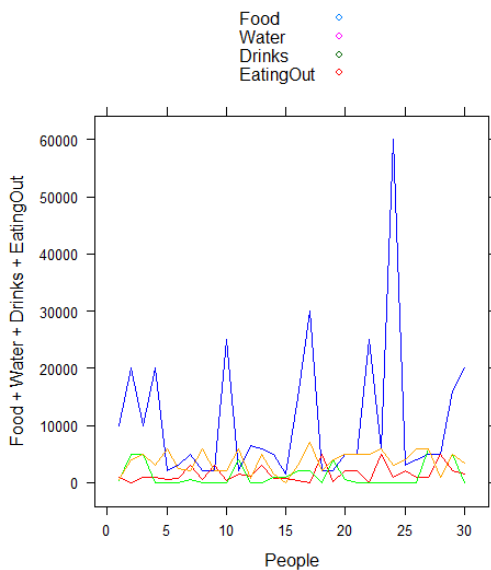

(iii)

(ii)

(iv)

(v)

(vi)

(vii)

(viii)

V. CONCLUSION

Based on the sample survey, it is clear that the most economically efficient and sound city to live in India is Kolkata. Thus, this report will support the common masses to sustain a satisfactory lifestyle in the buzzing metropolitan cities, getting the most out of every penny. The statistical research study would prove to be helpful to the common man as well as the government for ranking the best companies and brands, both in the private and government sector. The future work can be extended in the following ways: 1. Include more cities of India 2. Compare countries and examine the cost of living for similar type of suburbs and cities. 3. Get a good idea of the cost of living in different countries.

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