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Mitigating Environmental Pollution : A Study on Sustainable approach in the BEST Bus Service

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Abstract:
This study delves into the implementation of sustainable practices within the BEST Bus Service to mitigate environmental pollution. With urbanization on the rise, transportation systems are a significant contributor to air and noise pollution, exacerbating environmental degradation and public health concerns. The BEST Bus Service, being a prominent mode of public transportation in urban areas, holds potential for reducing pollution through sustainable approaches. Through a comprehensive review of literature, this study assesses the current environmental impact of the BEST Bus Service and proposes strategies for sustainable improvement. It explores various facets, including fuel efficiency, fleet modernization, route optimization, and the integration of eco-friendly technologies.The findings suggest that transitioning to cleaner fuel sources, such as compressed natural gas (CNG) or electric power, can substantially reduce emissions. Additionally, the adoption of modern, energy-efficient buses equipped with emission control technologies can further mitigate pollution levels. Route optimization algorithms, coupled with advancements in intelligent transportation systems, can enhance operational efficiency and minimize environmental footprint. Furthermore, the study emphasizes the importance of stakeholder engagement and policy support in fostering a conducive environment for sustainable practices within the BEST Bus Service. Public awareness campaigns, incentives for eco-friendly commuting, and regulatory frameworks are vital for promoting behavioral changes and institutionalizing sustainable transportation practices. By integrating these strategies, the BEST Bus Service can transition towards a more environmentally friendly and sustainable mode of public transportation, contributing to the broader goal of mitigating environmental pollution and fostering urban sustainability.

❖ Introduction

Urbanization and population growth have led to increased pressure on transportation systems, resulting in elevated levels of environmental pollution, particularly in densely populated urban areas. Among various modes of transportation, buses play a crucial role in providing mobility to millions of people daily. However, conventional bus services often rely on fossil fuels and outdated technologies, contributing significantly to air and noise pollution.

In this context, the Brihanmumbai Electricity Supply and Transport (BEST) Bus Service, serving the Mumbai metropolitan region, stands as a significant player in the public transportation sector. As one of the largest bus services in India, the BEST Bus Service not only caters to the mobility needs of millions but also significantly impacts the local environment due to its fleet size and operational scale.

Recognizing the urgent need to address environmental pollution, there is a growing emphasis on adopting sustainable approaches within public transportation systems. Sustainable transportation strategies aim to minimize adverse environmental impacts while maximizing efficiency and promoting social equity.

This study focuses on assessing the current environmental impact of the BEST Bus Service and exploring sustainable approaches to mitigate pollution levels. By examining the feasibility and effectiveness of various strategies, this research aims to provide insights into how the BEST Bus Service can transition towards a more sustainable and environmentally friendly operation.

❖ Review of Literature:

- **Bharadwaj S. et al (2017)** studied the issue of road traffic congestion, which makes travelling on BEST buses a little uncomfortable for passengers, in their research paper. It takes longer to get to the intended location as a result. Additionally, it results in higher fuel consumption and an increase in the amount of hazardous gases released into the atmosphere. The impact of the buses' damaging greenhouse gas emissions is something the researchers are attempting to evaluate.

- **Dhingra S. (2012)** conducted in their research paper that BEST buses faces a lot of problems which result into congestion problems, discomfort for the commuters, increase in the time of travel and as well the environmental pollution it causes. So as to handle and resolve this problems, the BEST are trying to bring certain changes in the scheduling and increasing the number of this passenger buses so as to solve the problem of sustainability.

- **(Kaur et al. 2007)** There are just a few studies that examine the levels of air pollution in different forms of transportation. The majority of studies found that riding in buses and cars exposed people to more particulate matter than walking or cycling did.

- **Curly Tales (1st December, 2023)** To enhance Mumbai's air quality, the BEST buses install portable air purifiers. Fresh air is becoming a commodity that not everyone has access to; it's no longer something that Mother Nature can provide you for free. When discussing Delhi and Mumbai, one cannot overlook the declining levels of air quality that both Indian cities are currently experiencing. Brihanmumbai Electricity Supply and Transport (BEST) has developed a way to address issue in Mumbai. There are now portable air purifiers on the diesel buses! This method allows buses to become portable air purifiers with detachable High-Efficiency Particulate Air (HEPA) filters. These filters can capture 12–15 grammes of suspended particulate matter per hour and have an air-cleaning capacity of up to 15,000 cubic metres.

- **The Economic Times (3rd October, 2023)** Emissions of nanoparticles from Delhi's transport industry may pose serious health risks: According to a study, Delhi has been witnessing dangerously high concentrations of nanoparticles in the urban air, particularly near the roadside, which is directly linked to vehicle exhaust and raises concerns for public health. Nanoparticles are extremely small particles that are typically undetectable to the human eye because of their dimension, which ranges from 10 to 1000 nanometers (nm). Because these particles are smaller than PM 2.5 or PM 10, they pose a greater risk to human health. Their size is 600 times smaller than that of a human hair, which allows them to enter our circulation, lungs, and even the brain.

❖ Research Objectives :

1. To evaluate the environmental footprint of the BEST Bus Service, including emissions of greenhouse gases, particulate matter, and noise pollution.
2. To estimate the associated health risks for residents exposed to these emissions.

❖ Research Problem:

To study the impact of BEST Bus service that significantly contributes to environmental degradation through emissions of greenhouse gases, particulate matter, and noise pollution and health related risks associated with it.

❖ **Research Gap:**

According to what I discovered, there is a lack of comprehensive assessments that simultaneously consider multiple environmental pollutants, such as greenhouse gases, noise pollution and its impact on health of the residents.

❖ **Research Methodology:**

The primary data was collected through survey method among the group of 15-65 years of Agegroup to understand their perception regarding emissions, health concerns and environmental impact caused by BEST Bus Service. For this questionnaire, was developed as a tool and was filled by 52 respondents which were picked up randomly.

The secondary data was collected from online websites, journal, publication, etc.

- Newspapers and Websites
- Journal such as BES&T house Mumbai Journals.
- Publication such as BES&T.

❖ **Significance of the Study :**

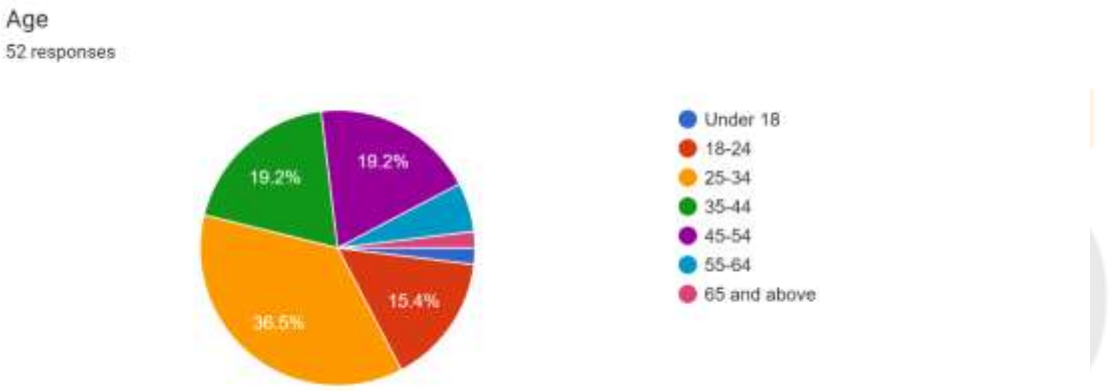
The significance of the study is to highlight the customer's health problems through the harmful emissions by the BEST Bus service.

❖ **Results:**

Data collected from 52 respondents has been collected below. Results can be summarized in terms of answers to the following question.

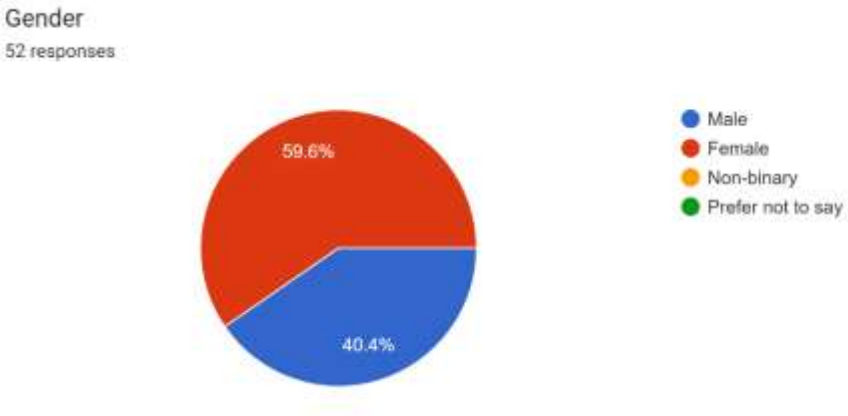
Data Analysis :

- ✓ 36.5% respondents are from age group 25- 34 years
- ✓ 19.2% respondents are from age group 35-44 and 45 – 54 years
- ✓ Blue, Light blue and pink color belong to the other age groups.



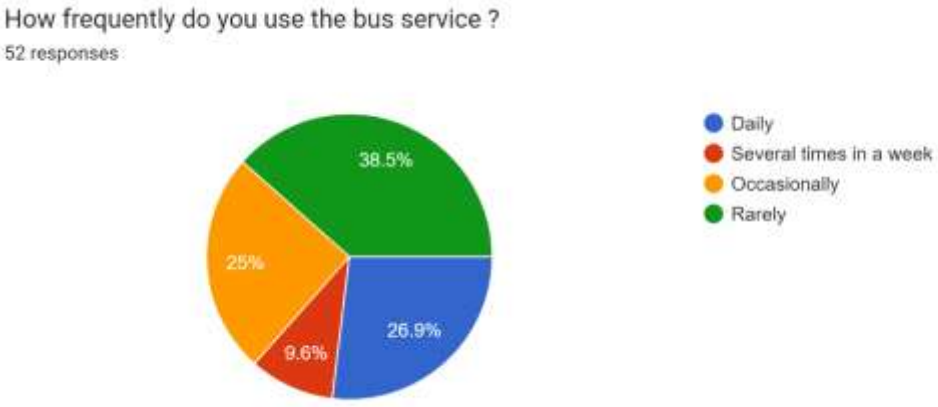
Data Analysis :

- ✓ 59.6% respondents are Females
- ✓ 40.4% respondents are Males



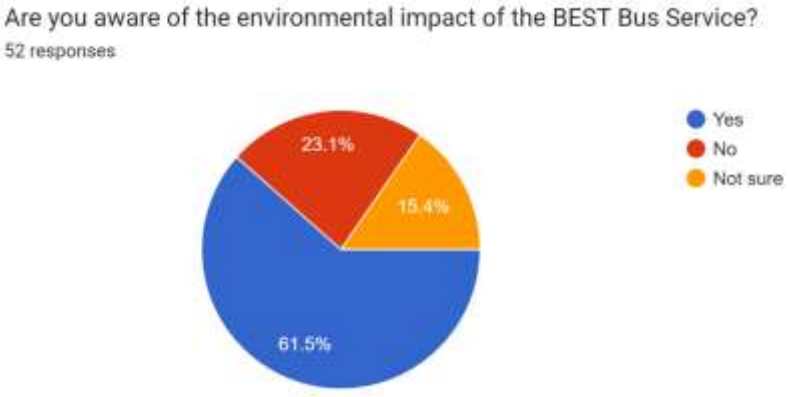
Data Analysis :

- ✓ 38.5% respondents use bus service rarely
- ✓ 26.9% respondents use bus service daily
- ✓ 25% respondents use bus service occasionally



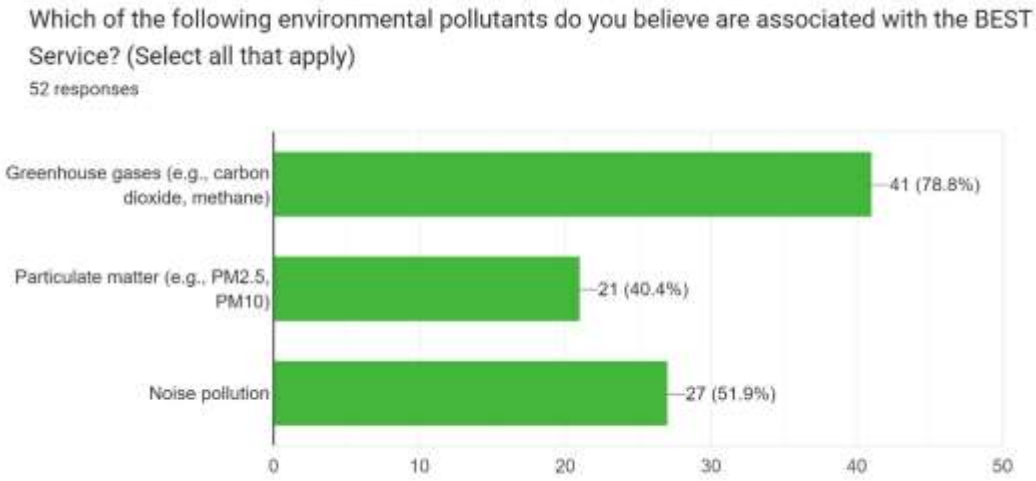
Data Analysis :

- ✓ 61.5 % respondents are aware of the environmental impact of Bus service.
- ✓ 23.1% respondents are not aware of the environmental impact of Bus service.
- ✓ 15.4% respondents are not sure of the environmental impact of Bus service.



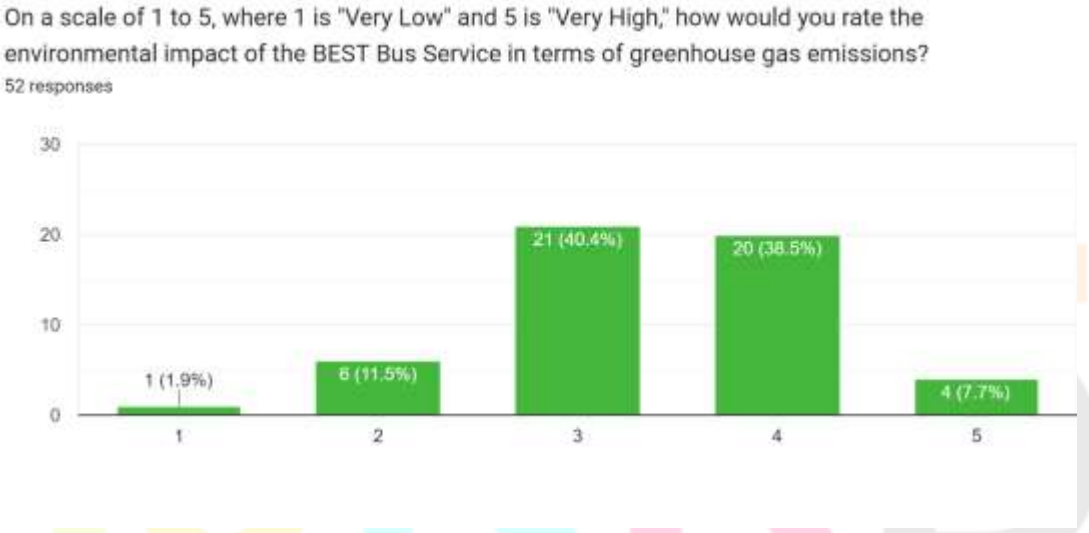
Data Analysis :

✓ From the chart below, it is showing that all the respondents are finding Best Bus services polluting the environment with Green house gases, Particulate matter and Noise pollution.



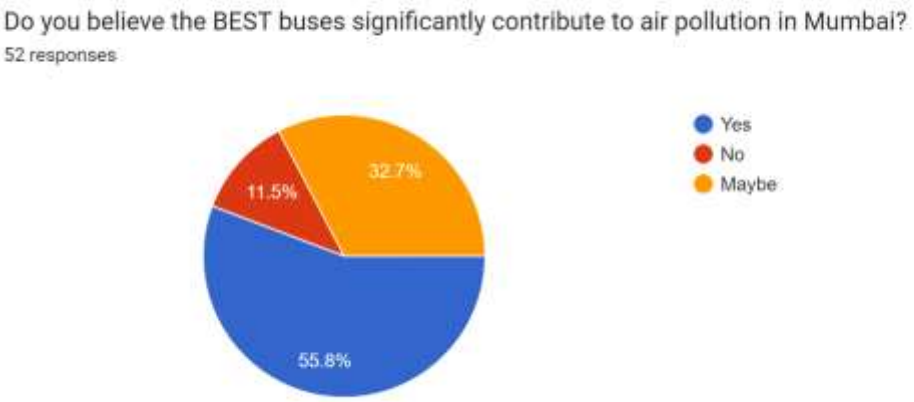
Data Analysis :

✓ From the scale below it is observed that , most of the respondents with 40.4% rates Best Bus service for green house gas emissions.



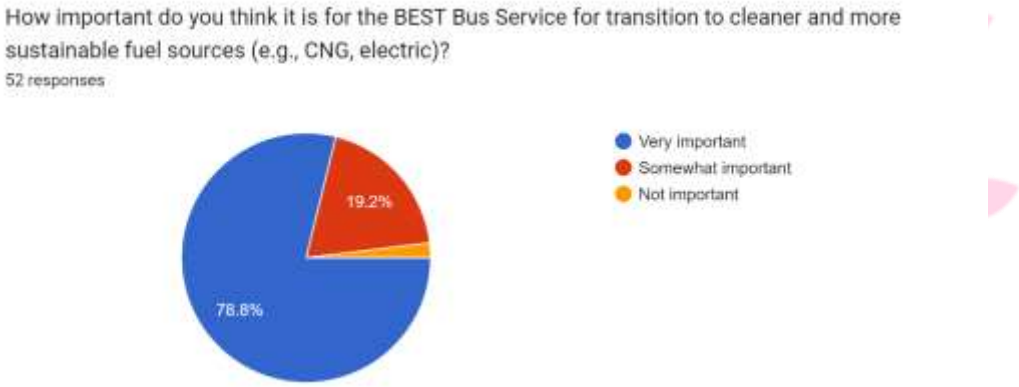
Data Analysis :

✓ From the pie chart below, it is observed that more than 55% of the respondents finds BEST bus significantly contributing to the air pollution.



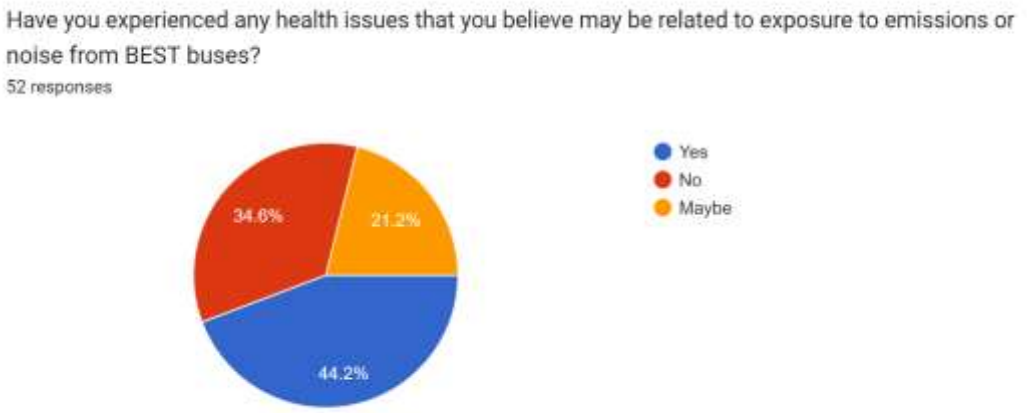
Data Analysis :

✓ From the diagram below it has been observed that more than 78% of the respondents wants the bus service to use the sustainable fuel sources.



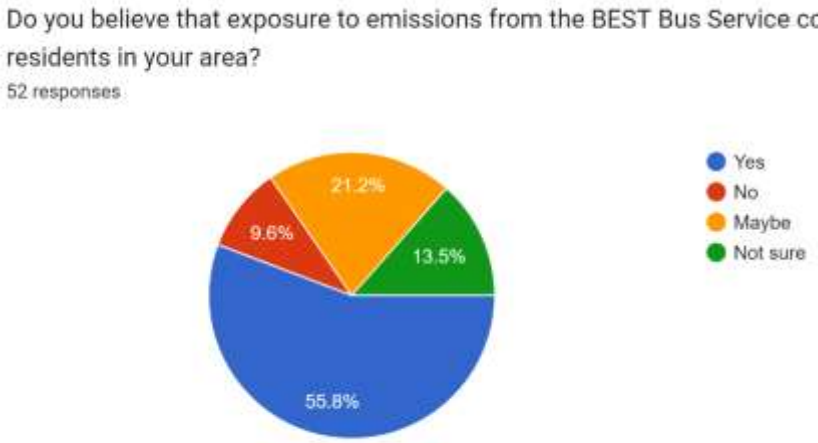
Data Analysis :

✓ 44.2 % respondents have experienced health issues related to exposure from emissions and noise from BEST bus.
✓ 34.6% respondents have experienced health issues related to exposure from emissions and noise from BEST bus.
✓ 21.2% respondents have experienced health issues related to exposure from emissions and noise from BEST bus.



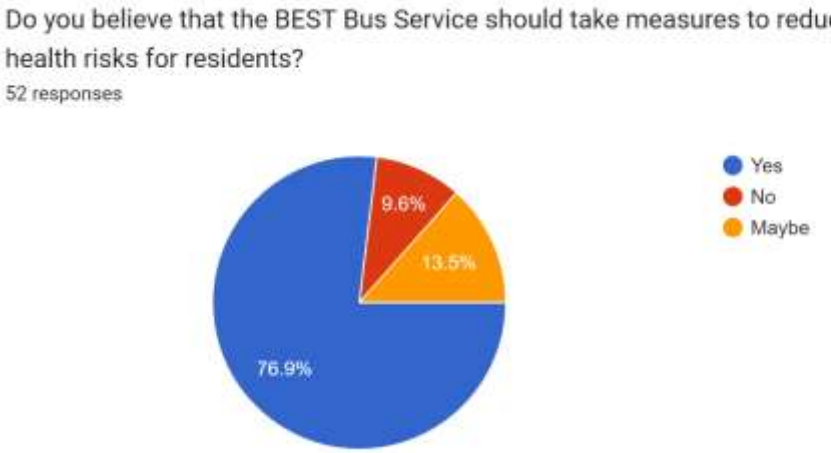
Data Analysis :

✓ From the chart below, it has been showed that more than 50% respondents believe that exposure to emissions will pose to health risks.



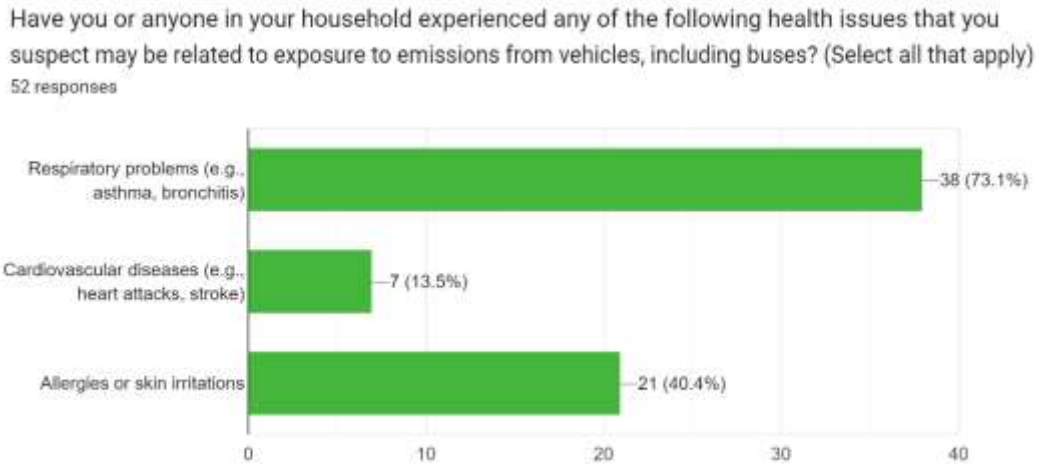
Data Analysis :

✓ More than 75% respondents believe that Best bus should take measures to reduce emissions to mitigate the health risks.



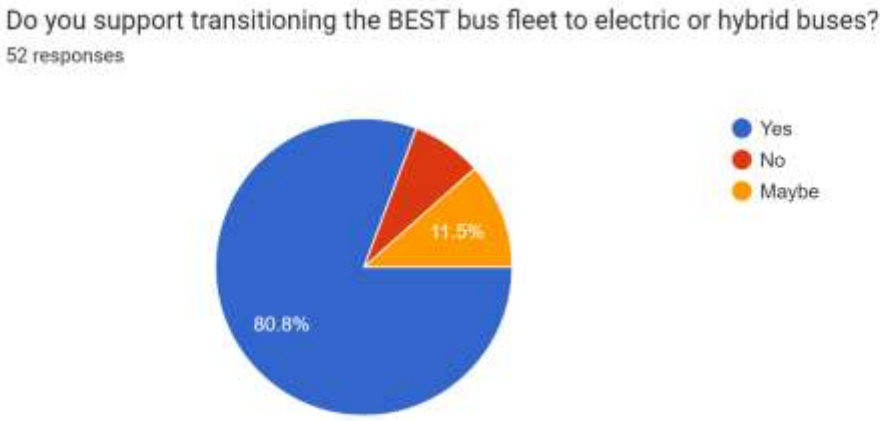
Data Analysis :

✓ More than 70% respondents finds that exposure to emissions suspects the respiratory problems to the people.



Data Analysis :

✓ More than 80% of the respondent supports transitioning of the BEST Bus fleet to electric or hybrid buses.



❖ **Limitations of the Study :**

1. Commuters differ significantly in their fare price, occupation, cultures, and issues, whichmay make, universal findings or recommendations.

2. Responses received from 52 people only.

3. Biasness of the respondents could be one of the limitation.

❖ **Findings of the Study :**

From the above survey which was done to find out perceptions of commuters towards the BEST Bus services, gave slight insights into current beliefs and experiences. I had circulated the questionnaire in approx. people but out of that I only received a response from 52 people.

1. The study found that emissions from buses contribute significantly to air pollution in urban areas, including greenhouse gas emissions and particulate matter, which have adverse effects on public health and the environment.

2. Users have analyzed the fuel efficiency of the bus fleet, highlighting the importance of transitioning to cleaner fuels such as compressed natural gas (CNG) or electric power to reduce emissions per kilometer traveled.
3. Passengers exposed to particulate matter emissions from bus exhaust face an increased risk of respiratory problems such as asthma, bronchitis, and exacerbation of pre-existing conditions.

❖ Conclusion of the Study:

The study on implementing a sustainable approach in the BEST Bus Service to mitigate environmental pollution presents several key conclusions. It highlights the significant environmental impact of bus operations, particularly in terms of emissions of greenhouse gases, particulate matter, and noise pollution. These emissions pose serious health risks to residents living near bus routes, underscoring the urgent need for action.

The study also identifies various opportunities for improvement within the BEST Bus Service. Transitioning to cleaner fuels, improving vehicle efficiency, optimizing bus routes, and implementing emission control technologies are all viable strategies to reduce pollution levels and enhance service sustainability.

The study highlights the importance of adopting a sustainable approach in the BEST Bus Service to mitigate environmental pollution, protect public health, and create a more livable urban environment. It calls for concerted efforts from all stakeholders to prioritize environmental sustainability in transportation planning and decision-making processes.

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