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Urban Green Spaces And Mental Health

Swastik Baranwal, Arhan Khan, Rishu Singh

Student, Student, Student
Department of Computer Science and Engineering,
KCC Institute of Technology and Management, Greater Noida, India

Abstract: Urban environments throughout India, especially large metro cities like Delhi are experiencing heavy construction and rapid Population growth has gradually reduced natural green areas. Given the wide recognition of exposure to greenery for its
psychological and emotional benefits, our study investigates the association of urban green spaces in terms of accessibility and quality with residents' mental well-being. We analyse survey data collected from Delhi residents, studying the variation in their responses to stress relief, usage patterns, quality perception, and comfort levels. The clear trends arising from the visual analytics of the responses show frequency of visits to green areas, better quality of the space, and Safety as a factor leading to better well-being. This connects to SDG-3 (Good Health and Well-being), 11 (Sustainable Cities and Communities), and 13 (Climate Action) at large, focusing on urban greenery in relation to both environmental and mental resilience.

Index Terms **- SDG, Climate, Action, Greenery**

I. INTRODUCTION

The green open spaces of urban areas are important to a sustainable and livable city. Such spaces consist of public parks, community gardens, and roadside tree corridors, along with open natural areas. There is plenty of evidence in environmental psychology and urban health research suggesting that such green open spaces make vital contributions to mental well-being and stress reduction in urban residents, helping them pursue a healthier lifestyle. Natural environments enable physical activities, social interaction, aesthetic enjoyment, and psychological restoration. In today's high-speed routines, accessibility to such green environments is gaining ever greater importance [1], [2].

Delhi is one of India's largest and fastest-growing urban metropolitan areas; it therefore offers a particularly relevant context in which to test the hypothesis relating nature exposure to mental health. The city has undergone rapid growth in built-up land cover due to the expansion of infrastructure, commercial development, and population pressure over recent decades. This rapid urbanisation has led to an imbalance in the distribution of green spaces: while some areas have well-planned zones that include well-maintained parks and tree-lined streets, many localities suffer from a severe lack of access to natural environments. Such disparities could have both direct and indirect influences on how residents perceive and utilise these green spaces.

Therefore, the motivation for the present research arises from the need to evaluate how variations in green space availability affect the mental well-being of Delhi's population. As a student research team, we aimed to explore whether residents' interaction patterns with green spaces—such as visit frequency, duration, perceived quality, and sense of safety—relate to self-reported emotional health. Our work differs from typical perception-based studies in that we combine structured survey responses with quantitative analysis and visual representations derived from cleaned real-world data. This dual approach helps to identify clear behavioural

trends and provides evidence-based insights into how people experience and interpret the environmental conditions surrounding them.

The study also closely aligns with several United Nations Sustainable Development Goals (SDGs), including SDG 3: Good Health and Well-being, which promotes physical and mental health at the community level; SDG 11: Sustainable Cities and Communities, which emphasizes inclusive, green, and resilient urban planning; and SDG 13: Climate Action, which supports adaptation strategies involving environmental preservation [5].

II. BACKGROUND AND RELATED WORK

Many studies around the world suggest that people who live near green areas feel less stressed, have better moods, and are able to think more clearly. Theories such as Attention Restoration Theory and Stress Recovery Theory explain these effects by suggesting that exposure to nature allows the brain to relax and recover from mental fatigue and stress. Simply being around trees, parks, and other natural environments can significantly improve emotional well-being [2], [6].

In India, however, research in this area is not as extensive. Most existing studies rely primarily on self-reported perceptions rather than incorporating objective environmental data. There are relatively few studies that use spatial tools, maps, or measurable indicators to assess how green an area actually is. Delhi provides a particularly suitable setting for such research, as some regions have abundant green spaces while others have very limited access to them. This contrast makes it easier to examine how variations in green space availability may influence residents' emotional health.

The present study currently relies on survey-based responses, but it can be expanded in the future by integrating geospatial tools such as Normalized Difference Vegetation Index (NDVI) maps, which quantify vegetation density. Incorporating such objective measures would allow for a more accurate and scientific assessment of the relationship between real-world greenery and mental health outcomes [3], [7].

III. METHODOLOGY

A basic survey was designed and shared with participants from different age groups and occupational backgrounds across Delhi. The survey included general questions such as whether respondents have access to green spaces near their homes and how frequently they visit them. Participants were also asked about the duration of their visits and the activities they typically engage in, such as walking, jogging, or relaxing.

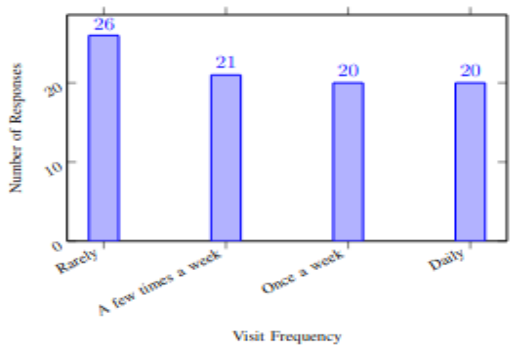
Additional questions focused on respondents' perceptions of safety within these green spaces and their assessment of overall quality. The survey also explored whether visiting green areas helps reduce stress or improves their overall emotional well-being. The collected responses provide valuable insight into the behavioural and psychological trends of the surveyed population.

After cleaning the data, Python was used to analyse the survey responses. To better understand and interpret the findings, four simple visualizations were created. One chart illustrates how frequently people visit green spaces, while another presents respondents' ratings of green space quality. A pie chart shows the proportion of participants who believe that green spaces help reduce stress. The final visualization is a scatter plot that compares visit frequency with perceived improvements in well-being.

IV. RESULTS

3.1 Frequency of Visiting Green Spaces

The bar chart in Fig. 1 shows how often people visit green spaces. Most people said they go either every day or a few times a week. This means that when green spaces are close by and easy to get to, people actually use them more.



The smaller numbers for once a week and rarely show that some people do not visit as much. This might be because they are busy, the green spaces are too far, or they just do not find the places good enough to visit often.

Overall, the chart makes it clear that people visit green spaces more when they are simple to reach and look nice. Visiting more often can help people feel less stressed and improve their mood, which matches what other studies also say.

3.2 Quality Ratings of Green Spaces

Most people rated their nearby green spaces as “Good” or “Excellent,” which means they are generally happy with the parks and natural areas around them. Only a small number of people said their green spaces were just “Average,” showing that some places still need improvement. Many respondents also mentioned that cleanliness and proper maintenance are important. If the grass is trimmed, the walking paths are clean, and the area feels well cared for, people enjoy spending more time there. Clean and well-maintained green spaces make people feel relaxed, safe, and comfortable. When parks look messy or are not taken care of, people tend to avoid them. So good maintenance not only improves how a park looks but also helps people use it more often, which can make them feel happier and less stressed.

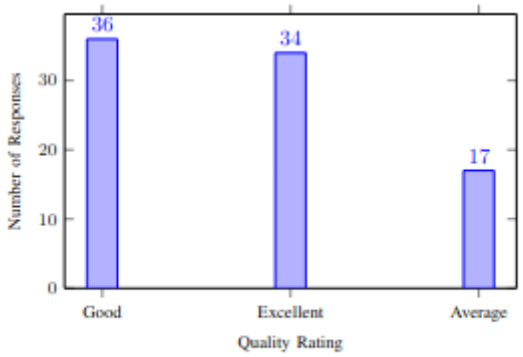


Fig. 2. Quality Ratings of Green Spaces

3.3 Stress Reduction

The pie chart in Fig. 3 shows that almost all the people in the survey feel that green spaces help them reduce stress. About 58

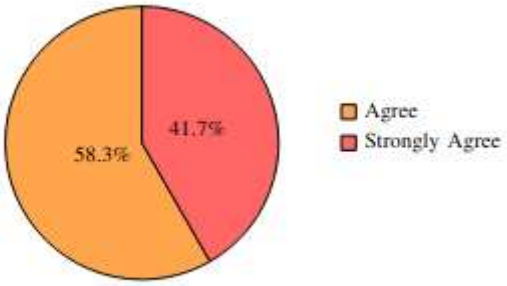


Fig. 3. Distribution of responses to "Does visiting green spaces reduce stress?"

These results show how important even small green spaces can be in a busy city like Delhi. Many people live in crowded and noisy areas, so having a peaceful natural spot nearby can make a big difference in how they feel during the day.

Green spaces give people a break from traffic, noise, and daily pressures, and even a short visit can help them relax mentally.

This outcome also connects well with SDG 3, which is about improving health and well-being. If so many people say that green spaces help them feel better, then maintaining and creating more of these spaces can be a simple and effective way to support mental health in cities.

Overall, the strong positive response in the survey shows that green spaces are not just nice to have, but actually play an important role in helping people manage stress.

3.4 Relationship Between Visit Frequency and Well-being

The scatter plot in Fig 4. shows that people who visit green spaces more often usually report better well-being scores. Most of the points are higher on the chart when the visit frequency is higher. This means that people who go to parks or green areas more regularly tend to feel better overall. Even though the survey is simple and does not measure anything medical, the pattern is still easy to see. The more someone visits green spaces, the more they say it helps their mood and general well-being. This suggests that going outside and spending time in nature, even for a short while, can make people feel happier and more relaxed.

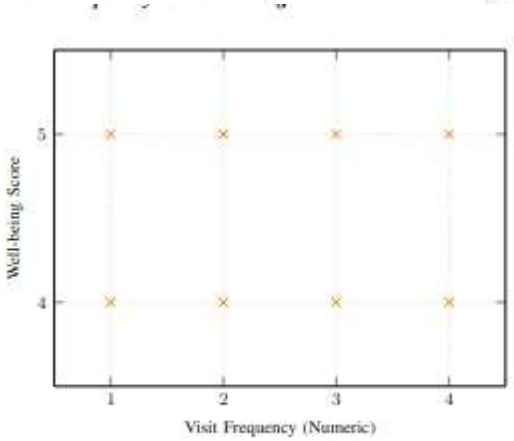


Fig. 4. Relationship Between Visit Frequency and Well-being

V. DISCUSSION

The results from all four graphical analyses clearly indicate that urban green spaces play a significant role beyond leisure and recreation, contributing meaningfully to the mental well-being of urban residents.

In a densely populated and rapidly developing city such as Delhi, where residents are routinely exposed to traffic congestion, noise pollution, poor air quality, and high population density, daily life often involves continuous psychological stress.

Access to natural environments, even in limited or fragmented forms, appears to provide a necessary mental pause from these pressures, allowing individuals to regain a sense of calm and emotional balance.

The findings suggest that green spaces function as informal yet effective mental health support systems. Respondents who reported more frequent visits to parks and green areas consistently indicated better emotional well-being and reduced stress levels.

This reinforces the idea that regular interaction with natural surroundings can help mitigate the cumulative effects of urban stress. Importantly, the benefits observed are not restricted to long or intensive visits; even short, routine exposure seems to have a positive influence on mood and mental clarity.

Another key insight from the discussion is the importance of quality and safety in determining how green spaces are used. Well-maintained parks that are clean, visually appealing, and perceived as safe encourage repeated visits and longer durations of stay.

In contrast, poorly maintained or unsafe green spaces may remain underutilised despite being physically present. This highlights that the mental health benefits of green spaces are strongly influenced by planning, maintenance, and accessibility rather than by availability alone.

Overall, the discussion emphasises that urban green spaces should be recognised as essential components of healthy city infrastructure. Their contribution to mental well-being, stress reduction, and emotional stability underscores the need for urban policies that protect existing green areas while also expanding and improving them.

In the context of increasing urbanisation, integrating green space development with mental health and environmental planning can play a vital role in creating more liveable and psychologically resilient cities.

VI. CONCLUSION

Our analysis demonstrates a strong link between the usage of urban green spaces and improved mental well-being among Delhi residents. Frequent visits, high-quality environments, and a strong sense of safety consistently contribute to reduced stress levels, improved mood, and greater emotional stability.

These findings reinforce the growing body of evidence suggesting that everyday exposure to natural environments plays a meaningful role in supporting psychological health, particularly within high-density urban settings.

The study further highlights that environmental development and mental health outcomes are deeply interconnected with broader sustainability objectives. In rapidly urbanising Indian cities, where infrastructure expansion often comes at the cost of ecological spaces, the preservation and expansion of urban greenery should be viewed as a public health priority rather than an optional aesthetic feature.

Green spaces act as accessible, non-clinical mental health resources that offer stress relief, cognitive restoration, and emotional balance to a wide demographic range, including populations that may not have easy access to professional mental health services.

Beyond individual benefits, urban green spaces also contribute to social cohesion by encouraging community interaction, recreational activity, and a shared sense of belonging. Well-maintained and safe parks foster

inclusive environments where people from diverse socioeconomic backgrounds can engage in physical exercise and informal social interaction, which are known protective factors against mental distress.

This social dimension strengthens the argument that investments in urban greenery yield collective benefits that extend beyond environmental conservation alone.

From a policy perspective, the findings suggest that urban planning strategies should prioritise equitable distribution, accessibility, and maintenance of green spaces across all residential zones. Merely increasing the number of parks is insufficient if these spaces remain poorly maintained, unsafe, or inaccessible to large sections of the population.

Integrating mental health considerations into environmental and urban development policies can significantly enhance long-term urban resilience and quality of life.

This research also provides a foundation for future investigations that can move beyond perception-based analysis toward more data-driven and objective methodologies. Incorporating geospatial techniques such as NDVI-based vegetation mapping, satellite imagery, and GIS-based accessibility analysis would enable researchers to quantify green cover more accurately and examine its relationship with mental health outcomes at a regional scale.

Longitudinal studies combining environmental indicators with demographic and health data could further strengthen causal understanding.

Overall, the study underscores the importance of recognising urban green spaces as critical infrastructure for sustainable and healthy cities. As Indian metropolitan regions continue to grow, balancing development with environmental preservation will be essential not only for ecological stability but also for safeguarding the mental well-being of urban populations in the long term.

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