

# Pigeons & Buildings: Understanding the Impacts and Mitigation Strategies

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**Abstract**— Pigeon menace has become a major problem, which is increasing day by day as the urbanization is increasing. Pigeon droppings, nesting, and roosting behaviors cause aesthetic damage to the building facades. It also causes health issues to the occupants in the buildings. This paper aims to explore the impacts that pigeons cause to buildings and evaluate non-lethal mitigation strategies that address pigeon-related issues. The study includes surveys of residents in buildings and a survey of agencies that provide non-lethal solutions to control the pigeon menace. Based on the surveys, following conclusions were derived: Pigeons roost in balconies, windows, chajjas, openings, niches, etc. on almost all the floors of the building, especially in high-rise residential structures; Netting is the best non-lethal way to control them; Slippery surfaces like glass or circular designs helps to reduce pigeon menace; Architects and agencies providing the services should work together to create solutions that are aesthetically and functionally workable; Current methods are affordable and practical. The study also includes content analysis, analysis of historical data and a case study of a pigeon tower designed by master architect Oscar Niemeyer in order to provide effective mitigation strategies.

**Keywords**— Pigeon menace, building damage, non-lethal, health risks, pigeon droppings, pigeon towers, building maintenance.

## I. INTRODUCTION

Pigeon infestation continues to be a major problem in urban areas impacting both, **the occupants' health and the appearance of building's façade**. According to recent studies, "the availability of building ledges for roosting with overhangs offering protection from predators and readily available food sources has helped in creating an ideal place for a pigeon to live. Pigeon excreta contains highly acidic material and microorganisms which attack metal objects, accelerating corrosion and damage" (Shrestha, Khanal, Pandey, & Kyes, 2022). The nesting behavior of pigeons can clog the gutters of the sloping roofs by roosting on them which can lead to problems in rainwater harvesting, increasing maintenance costs. **Additionally, pigeons are known carriers of diseases such as Psittacosis**, which poses significant health risks to humans through inhalation of dust from their dried droppings (Times of India, 2023). Furthermore, there is an emerging interest in developing pigeon-friendly alternatives, such as designated feeding and nesting areas, to manage their presence. Though existing literature highlights various aspects

of pigeon behavior and management techniques, there is limited research focusing on the pigeon menace, its impact on buildings and proposals of non-lethal mitigation strategies. But we don't know enough about how to deal with them effectively. This study will look into how pigeons interact with buildings and find non-lethal ways to stop them from causing problems. By addressing this problem, we could find out the most effective non-lethal solutions, which may help architects integrate these solutions into their designs and ensure the well-being of urban inhabitants. By understanding what attracts pigeons to certain areas, we can develop non-lethal solutions to avoid pigeons. These non-lethal solutions could range from modifying building features to installing deterrent devices or creating pigeon-friendly alternatives. Ultimately, the goal is to create buildings that avoid pigeon infestations, promoting cleaner, healthier, and more aesthetically pleasing urban environments for all.

## II. REVIEW OF LITERATURE

The reviewed literature aims to provide insights into the complex relationship between urbanization, architecture, and pigeons. Several studies highlight the fact that, how urban expansion impacts avian biodiversity resulting into creating problems to urban inhabitants and vice versa. This is mainly observed in cases such as habitat loss of birds due to industrialization around Visakhapatnam, India, which highlights the integration of avian-friendly designs in buildings to have a mutual human-bird coexistence. A study from Kathmandu, Nepal, finds that the pigeon excreta pose a corrosion hazard to metal monuments and suggests non-destructive preservation methods. Research into pest birds and contemporary architecture focuses on designs that unintentionally encourage the infestation of pest birds, thus calling for joint considerations among architects and pest control experts on to discourage the pigeon roosting by make design changes at the initial design stage. In Hungary, a comparative analysis of pigeon control methods—trapping, falconry, and mist-netting—illustrates the varying effectiveness of these techniques in urban industrial areas, with mist-netting emerging as the most efficient. The University of South Africa's study reinforces the efficacy of visual deterrents and physical barriers, like bird spikes, in reducing pigeon populations. Lastly, a review of urbanization's effect on bird's nesting behavior also reflects

duality of the threats and opportunities due to urban environment coupled with the ability of birds to adapt to various nesting locations, though habitat fragmentation and changes of nesting materials create new challenges. Altogether these studies underscore an urgent need for interventions to mitigate the impact of pigeons on urban environments, which should be non-lethal and economical.

**Methods identified:** Visual survey, experimental research, field study, longitudinal studies, live case studies.

### III. RESEARCH AIMS & OBJECTIVES

#### Aim:

- **To investigate the impacts of pigeons on buildings and develop practical mitigation strategies based on the effectiveness of the prevalent strategies and to analyze problems faced by the occupants in buildings:** the study will analyze the problems faced by occupants in residential buildings due to pigeon infestations, aiming to propose solutions that address both- the building aesthetics and occupant-related challenges.

#### Objectives:

- **To explore non-lethal mitigation strategies aimed at reducing pigeon menace:** evaluation of non-lethal mitigation methods such as deterrents, physical barriers, and habitat modifications, focusing on non-lethal solutions for managing pigeon menace.
- **To analyze online data regarding pigeon behavior in urban environments and examine historical data on Iranian pigeon towers.**
- **To do an online case study of 'O Pombal pigeon House, Brasília', designed by Oscar Niemeyer to understand the use of modern materials to build a contemporary pigeon tower.**

### IV. DEFINITIONS OF THE KEY TERMS/ VARIABLES/ UNIT OF ANALYSIS

1. **Façade:** A building's front portion which defines the elevation of the building.
2. **Mitigation measures:** Solutions or various techniques used to solve a major problem.
3. **Psittacosis:** A disease which can infect humans due to pigeons and other sick birds. It can be severe and may show flu-like symptoms.
4. **Non-lethal:** Strategies for solving an issue without physically hurting or killing the object causing the issue.
5. **Architectural Solutions:** Concepts or mitigations developed by architects to address issues with structures.

**Unit of analysis:** Buildings.

**Independent variable:** Pigeons.

**Dependent variable:** Effectiveness of mitigation strategies.

### V. METHODOLOGY

#### Quantitative research:

##### Survey -

A survey of 40 occupants in different types of buildings and 19 agencies providing services to control pigeon menace was collected through Google Forms to understand the existing problems caused due to pigeons and to understand the effectiveness of the prevalent mitigation strategies. Based on the survey conclusions were derived.

#### Qualitative research:

##### Content analysis -

Reviewing available online literature and on pigeon behavior for assessing their habitat preferences.

##### Analysis of historical data -

Historical data on traditional Iranian pigeon towers was collected to explore their primary functions.

##### Case study -

A case study of O Pombal House, Brasília, designed by Oscar Niemeyer. To understand the use of modern materials in pigeon towers to build contemporary pigeon towers to control pigeon menace and use it as a mitigation measure.

#### Limitations in Methodology:

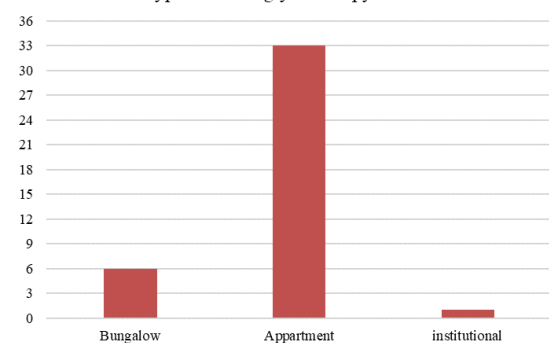
The sample size for the survey conducted for the agencies is small and lack of long-term data collected in quantitative research are the most significant limitations in the methodology.

### VI. DATA ANALYSIS & FINDINGS:

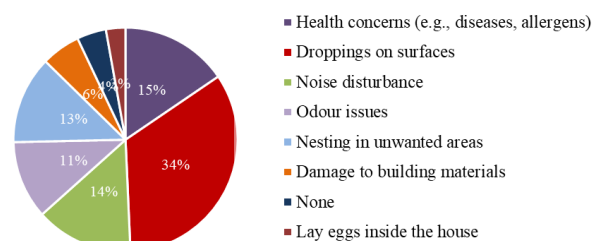
#### Survey of occupants in a building facing problems due to pigeons:

*Analysis of responses collected through Google Forms-*

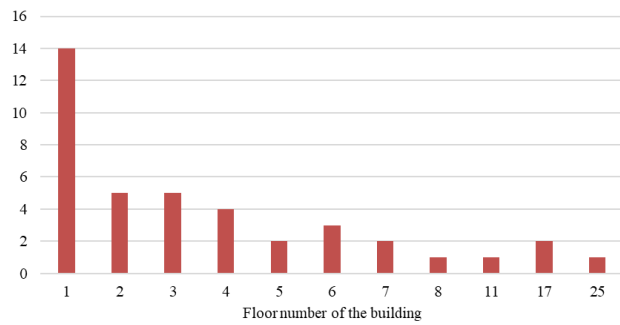
Please select the type of building you occupy



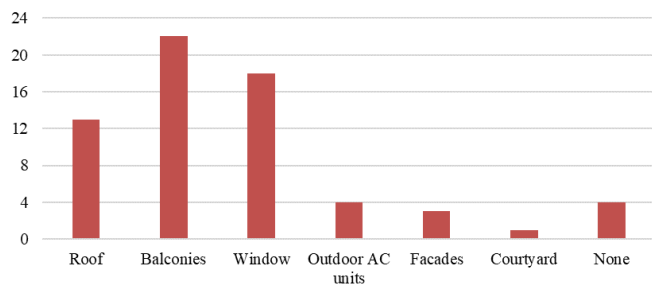
What problems have you experienced due to pigeons at your building?



On which floor number do you live?



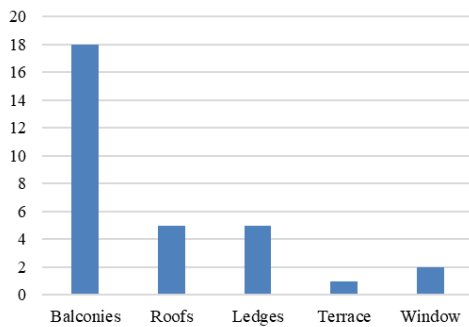
At what locations in the building have you noticed problems caused by pigeons?



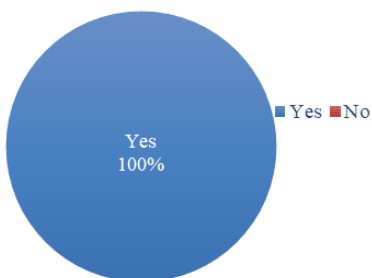
### Survey of dealers/agencies providing services for pigeon control:

Analysis of responses collected through Google Forms-

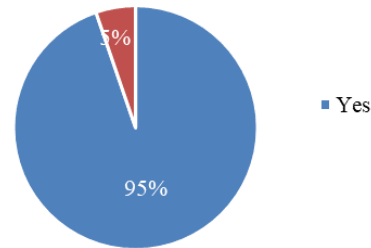
What types of habitats do pigeons prefer for nesting in urban areas?



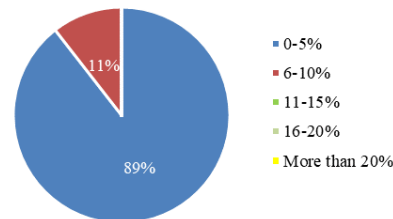
Has the demand for pigeon control services in your area increased or decreased over the years?



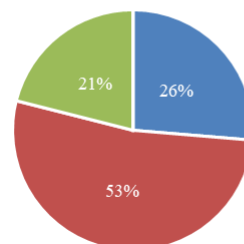
Do certain types of buildings (e.g., residential vs. commercial, high-rises vs. low-rises) require different control strategies?



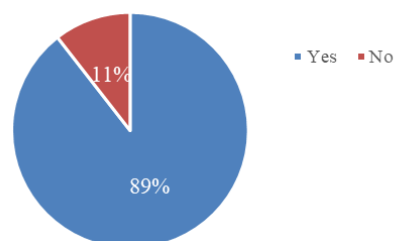
What is the average annual percentage increase in your consultancy rates for pigeon control services?



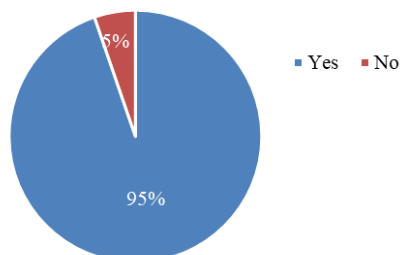
According to you, how much percentage reduction of pigeons do you observe after making it pigeon proof.



Have you collaborated with any Architects to design buildings that minimize pigeon issues?



Have you ever worked on construction projects to make the building pigeon-proof before it has been handed over to the client.



### Content analysis:

#### (Wikipedia contributors, 2024)

Fossil evidences suggests that the rock dove (feral pigeon) **originated in southern Asia, and their fossil remains, have been found in Israel**, which confirms its existence in this region for at least three lakh years. (Wikipedia contributors, 2024). It means that the early fossil remains of pigeons were found in Israel, which results the evolution of the pigeons from this region further resulting in it's spread across several countries. Thus the geographical features of this region, such as rocky cliffs, flat rocky surfaces, rocky ledges, and natural cavities in rocky mountains,etc. provided roosting spots for pigeons.

Hence, pigeons have evolved naturally to adapt and exhibit a preference for **rocky terrains for their roosting habits**. Also this region lacks in the prescence of vegetation which reflect in the habitat preference of pigeons on buildings rather than on trees. The adaptation to rocky areas is observed in the habitat preferences of feral pigeons in urban areas, where buildings act as rocky cliffs similar to the natural habitats of pigeons, which allow them to survive in urban environments.

Habitat preferences include **various urban environments**. They will even survive in desert regions like Sahara so long as an area has rocks, water, and some plant matter. **They prefer to avoid dense vegetation**. Pigeons feed on the ground in flocks or individually. Thus pigeons are naturally granivorous, which means that they prefer to stay in environments where there is plenty of food sources like grains, where they don't need to search for food because its available in that region all the times. The main reason behind this availabilty of food are the humans who feed the pigeons (Wikipedia contributors, 2024).

#### (All India Roundup, 2016)

"The pigeons that we see in cities are actually the Rock Dove. The original Rock Doves came from Europe, and their natural habitat was near **rocky cliffs** (hence the name being 'Rock Dove'). Buildings, windowsills, bridges, etc., are the closest things to cliffs near the city. they'll nest where they have to – preferably a cave of some sort, an old barn or building"(All India Roundup, 2016).

#### (Pigeon ASK, 2024)

"buildings are more stable than trees, and they are more prone to be attacked by predators on trees. Also, pigeons may not be able to **see their surroundings** from a tree as they can from a **building or ledge**. This makes it harder for them to spot possible predators or food sources. Lastly, pigeons may like to sit on buildings because they are **used to living in cities** and have learned that buildings are safe and provide shelter. they have **been seen nesting on cliffs**. Pigeons are adaptable birds that can live in various places as long as they have food, water, and a place to sleep" (Pigeon ASK, 2024)

Table 1: Content analysis

Key Terms	Pointers	Sources
Origin/evolution of pigeons	Rock doves (feral pigeons) originated in southern Asia, which have rocky, dry and arid environments.	(Wikipedia contributors, 2024)
Natural habitats	Their habitat preference includes rocky cliffs, flat rocky surfaces, rocky ledges, and natural cavities in rocky mountains, providing safe and perfect nesting spots.	(Wikipedia contributors, 2024); (All India Roundup, 2016)
Habitat preferences	Nest in rocky areas, avoiding trees in order roost on flat and hard surfaces.	(All India Roundup, 2016)
Predator Avoidance	Increased predation risk in trees drives pigeons to seek safer environments. Limited visibility in trees complicates predator detection.	(Pigeon ASK, 2024)
Adaptation to Hard Surfaces	Pigeons prefer hard surfaces like buildings, resembling rocky habitats. Urban settings provide stability and safety.	(Wikipedia contributors, 2024); (Pigeon ASK, 2024)
Feeding Behavior	Naturally granivorous, pigeons feed on the ground in flocks. Adaptable to various habitats with access to food and water.	(Wikipedia contributors, 2024); (Pigeon ASK, 2024)



### Analysis of historical data:

#### (Pigeon Pedia, 2023)

“The basic structure consisted of a rounded outer drum or wall with a height of up to three meters topped with a roof. Wooden beams would brace the tower which was constructed of mud bricks. The birds enter and exit the tower through openings in the outer wall which are ideal for the pigeons’ size but too small for birds of prey and other predators to get in”.

#### (Zamzam, 2023)

“The towers provided farmers with much-needed fertilizer. They were built from logs and mud. These towers feature conical shapes and round domes. They usually have rooms with small openings for ventilation and for pigeons to enter to escape the heat outside.



A classic symbol, the picture shows two filled in pigeon towers taken at The Cultural Village, Katara.

Downloaded from:

<https://www.flickr.com/photos/ccqatar/6143431700/in/photostream>



In Esfahan, Iran. These towers (there used to be many more of them) are used to collect pigeon droppings, to be used as manure.

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### Case study:

#### (Architizer, 2023)

“Oscar Niemeyer’s O Pombal Pigeon House (1960) in Brasília may be the most recognized pigeon tower in recent times. With mirrored oblong openings on either side, this giant concrete tower stands at the heart of Brazil’s capital. Its interior is constructed with thin rows of horizontal concrete shelves that allow for hundreds of pigeons to perch and roost in”. (Architizer, 2023)

#### (The Common Table, 2022)

“Oscar Niemeyer’s O Pombal pigeon house in Brasília must be the most iconic pigeon tower of modern times. With its

oblong-ovate openings on two sides, this giant concrete plinth, constructed in 1960, stands in the centre of the Praça dos Três Poderes, at the heart of Brazil’s capital. Its interior is constructed with thin rows of horizontal concrete shelves for hundreds of pigeons to perch and roost in”. (The Common Table, 2022)



Pombal, Oscar Niemeyer (1960). @WikiCommons

Downloaded from: <https://architizer.com/blog/inspiration/stories/avian-architecture-building-for-birds/#media-6>



O Pombal, Oscar Niemeyer (1960). @WikiCommons

Downloaded from: <https://architizer.com/blog/inspiration/stories/avian-architecture-building-for-birds/#media-5>

### Materials used in Pombal pigeon house:

- Concrete – The entire structure is made from concrete, depicting the modernist architectural style replacing the traditional materials used in ancient pigeon towers.
- Mirrored Oblong/Ovate Openings – These mirrored openings on both sides contribute to the visual aesthetics yet functional in serving as entrances for the pigeons. Thus it’s form follows a function.
- Horizontal Concrete Shelves – Inside the tower, thin concrete shelves are installed for roosting of pigeons.

### Findings:

#### Findings of survey of occupants in a building facing problems due to pigeons:

- Mostly residential areas are affected by pigeons.
- Almost all floors of buildings are affected by pigeons.
- Based on the responses most of the occupants face issues due to pigeon droppings.
- The most preferred habitats for pigeons are the roofs, balconies, and windows.

#### Findings of survey of dealers/agencies providing services to control pigeon menace:

- The demand for the services has increased which means that the problems caused by pigeons are increasing day by day due to urbanization.
- Netting is the most effective and most used non-lethal way to control pigeons.

- Buildings having niches, ledges, and balconies are affected. Buildings with slippery surfaces like glass, to some extent, help in pigeon control.
- Buildings having circular slippery surfaces don't allow the pigeons to sit.
- There is a need for architects and agencies to collaborate.
- The existing methods used are cost-effective and economical.

#### Findings of content analysis:

- Pigeons avoid trees due to their instinct for rocky surfaces.
- Buildings mimic cliffs, offering safer nesting spots.
- Trees increase predation risk and reduce visibility.
- Understanding these behaviors helps manage urban pigeon populations.

#### Findings of the historical data collection:

- **In the past, pigeon towers were used for obtaining fertilizer in Iran, it helped to concentrate pigeons at one place away from the buildings in the main city.**

#### Following are some architectural characteristics found-

- **Structure:** Rounded mud brick walls up to three meters high, topped with roofs, reinforced with wooden beams.
- **Design:** Openings sized for pigeons to enter, preventing predator access; conical shapes with round domes for ventilation and shade.
- **Function:** Provide fertilizer through pigeon droppings, enhancing agricultural productivity and integrating animal husbandry with farming.

#### Findings of the case study:

- Oscar Niemeyer's O Pombal Pigeon House is an example of modern pigeon tower.
- The structure is made of concrete, reflecting Niemeyer's modernist style. The tower has mirrored oblong/ovate openings on two sides for pigeons to enter and roost in the tower.
- Inside the tower, thin horizontal concrete shelves provide space for hundreds of pigeons to perch and roost. The presence of such towers in the outskirts of the city rehabilitate the pigeon crowd from buildings to these towers which may significantly reduce the number of pigeons in areas where buildings are located.
- It is an iconic example of a modern pigeon tower that merges functional design with aesthetic appeal.

#### VII. RECOMMENDED SOLUTIONS BASED ON RESEARCH FINDINGS

- **Designing buildings with circular forms can improve building aesthetics as well as control pigeon menace.**
- **Planting dense trees and promoting green environments such as parks around buildings can help to reduce pigeons as their natural habitat was an arid region with rocky areas.**

- **Designing modern pigeon towers inspired by Oscar Niemeyer's design.**
- **Utilize bird spikes and netting in existing structures to reduce pigeon activity as these are the most effective existing measures as mentioned in the research findings.**
- **Educate building occupants about the health risks posed by pigeons and the importance of humane control methods. Also educating them to avoid feeding the pigeons as much as possible.**
- **Investigate new materials and technologies that can be integrated into building facades to avoid pigeons while maintaining building aesthetics.**

#### VIII. CONCLUSION

Pigeons pose significant challenges to buildings, particularly in residential areas, affecting aesthetics, and posing health risks through their droppings. This study highlights the effectiveness of non-lethal strategies, with **netting being the most commonly used solution**. Architectural modifications such as **incorporation of sloped chajjas** can deter pigeons. The collaboration between architects and pigeon control agencies is crucial for developing cost-effective, sustainable solutions that address both functionality and aesthetics. **Educating the public and exploring innovative technologies** will help ensure cleaner, healthier urban environments, minimizing the pigeon menace without harming the pigeons. **Integrating more greenery as part of urban design could help reduce pigeon activity**, while enhancing environmental aesthetics.

#### IX. ACKNOWLEDGEMENTS

I would like to extend my gratitude to my research guide, Dr. Parag Narkhede, for his constant guidance, motivation, and support during the course of this study. His feedbacks and suggestions helped me to analyze the data and derive the findings from the study.

I also thank all the respondents of the survey who volunteered to participate in the survey, thereby making this study more inclusive and meaningful.

A special appreciation to the pigeon netting service agencies for sharing their opinions through the survey. Their feedback has been instrumental in understanding the real-life implications concerning the study.

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