

STRUCTURAL INFLUENCE ON INDOOR RADON LEVELS: A STUDY OF RESIDENTIAL HOUSING IN TASHKENT

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Introduction

Indoor radon exposure is a major environmental health issue, yet it often goes unnoticed due to the gas's undetectable nature — it is invisible, odorless, and tasteless. Radon originates from the natural decay of uranium in soil and rocks and can enter buildings through foundations and construction materials. Prolonged inhalation of radon is a well-established risk factor for lung cancer and has been identified by the World Health Organization (WHO) as the second most common cause of the disease globally, after tobacco use.

In Uzbekistan, and specifically in the capital city of Tashkent, there is a lack of comprehensive data on how building-related factors affect radon accumulation indoors. The city features a mix of traditional and modern housing constructed from diverse materials, such as brick, concrete, and clay — each with different properties in terms of radon permeability and emission potential.

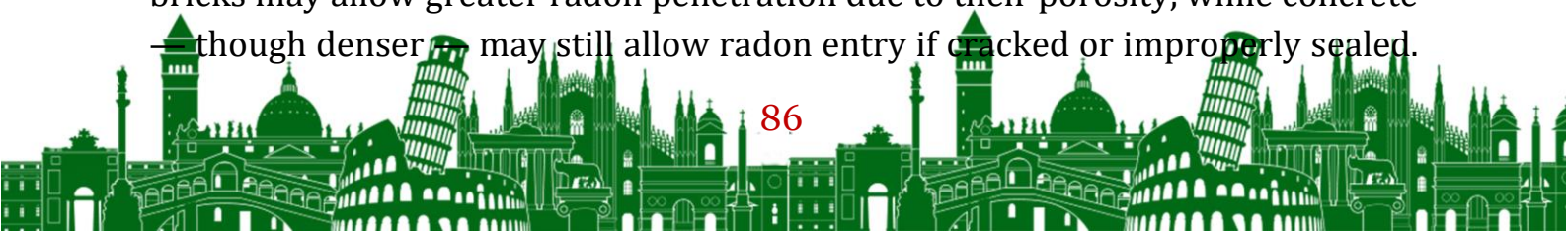
This study seeks to evaluate how the type and condition of building structures influence indoor radon levels in residential areas of Tashkent. The goal is to support safer housing policies and inform construction practices that reduce environmental health risks.

Main Body

This investigation focuses on radon levels in homes built using various construction materials, with attention given to structural quality and ventilation efficiency. The research sample includes approximately 50 residential buildings across multiple districts of Tashkent, selected to represent different architectural styles, construction periods, and geological settings.

Measurements will be carried out using calibrated digital radon monitors placed in commonly used indoor spaces — such as bedrooms, living rooms, and basements — to capture reliable exposure data. These readings will be accompanied by an analysis of ventilation systems, room usage patterns, and building maintenance status.

A critical component of the study will involve evaluating the materials used in wall and foundation construction. For instance, materials like hollow clay bricks may allow greater radon penetration due to their porosity, while concrete — though denser — may still allow radon entry if cracked or improperly sealed.



The study will also assess the potential radon contribution of locally sourced materials by examining their uranium content.

To enhance accuracy, soil composition data and geological mapping of radon-prone zones will be integrated into the analysis. Statistical tools, including multivariate regression and correlation analysis, will help identify the most influential variables associated with indoor radon variation.

The study will also draw comparisons with international research findings to contextualize the situation in Tashkent and help determine if existing global safety thresholds are applicable or require local adaptation.

Conclusion

This research will deliver evidence-based insights into how construction choices influence radon exposure in urban Uzbek homes. The findings are expected to guide health-conscious building strategies, including the selection of low-radon-emitting materials and the design of effective ventilation systems.

By highlighting structural risk factors and regional vulnerabilities, the study will contribute to developing public health policies, building regulations, and awareness campaigns aimed at reducing radon-related disease burdens in Tashkent. Proactive risk management at the construction phase can lead to safer living environments and a measurable decrease in radon-induced health outcomes.

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