# Improving Health and Sustainability in Construction through the Use of AI-Based Models for Prediction and Mitigation of environmental cancer risks

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# Improving Health and Sustainability in Construction through the Use of AI-Based Models for Prediction and Mitigation of environmental cancer risks

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**Introduction:** Sustainable construction practices face significant challenges in eliminating toxic building materials, driven by a lack of awareness among professionals and economic influences shaping regulatory decisions. This study proposes a solution to address these challenges through the implementation of artificial intelligence (AI) models capable of analyzing vast datasets to predict material toxicity, with a particular focus on identifying carcinogenic materials. The objective is to provide real-time insights to architects and civil engineers, fostering environments free from harmful building materials and preventing potential health hazards, including cancer. The presence of carcinogenic materials in construction processes poses severe health risks. Asbestos, a commonly used insulation material, is notorious for causing lung cancer. Silica dust, generated during the manipulation of materials like concrete and stone, is associated with lung cancer and respiratory diseases. Benzene, found in certain adhesives, and formaldehyde, present in paints and coatings, are volatile organic compounds classified as known human carcinogens, with links to various cancers.

**Methods:** To comprehensively understand toxic building materials, this paper utilizes existing data to train AI models and create algorithms for material toxicity prediction. These models leverage advanced algorithms, trained on existing datasets, to analyze extensive information. We particularly focus on volatile organic compounds from paints, impregnating agents, fire-induced toxicity, asbestos, radioactive materials, lead plumbing, silica dust, benzene, and formaldehyde. A comparative analysis is employed to determine the most effective model for predicting material toxicity and identifying carcinogenic elements.

**Results:** Our AI-driven models not only predict carcinogenic emissions and environmental cancer risk but also identify alternative substances that align with safety standards and economic considerations. This dual functionality aims to guide professionals in making informed decisions during the construction process, with a heightened emphasis on cancer prevention. The integration of AI-driven approaches will mark a paradigm shift in sustainable construction practices, facilitating informed decision-making and empowering professionals to effectively eliminate toxic building materials, thereby preventing cancer risks.

**Conclusion:** In conclusion, the implementation of AI-driven models for prediction and recommendation of alternate strategies, presents a transformative solution to the challenges faced in sustainable construction. This study underscores the significance of informed decision-making, promoting the elimination of carcinogenic building materials and fostering a safer and more sustainable construction industry. This study not only contributes to creating environments that prioritize safety and sustainability but also plays a pivotal role in preventing potential health risks, including cancer. This marks a crucial advancement in the field of sustainable construction practices with a profound impact on public health.