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Assessing Design Interventions Impacts on Children's Safety in High-Rise Communal Spaces in Lagos

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Abstract

The safety of children in high-rise communal spaces is a pressing concern in Nigeria, where rapid urbanization and population growth have led to an increase in high-rise buildings such as the Eko Atlantic City, Lekki Towers, and the Icon Luxury Residences. Despite efforts to improve safety, accidents and injuries continue to occur, highlighting the need for effective design interventions. This study aimed to identify design elements and interventions that contribute to children's safety in high-rise communal spaces in Nigeria. A mixed-methods approach was employed, combining surveys, interviews, and observations to gather data from 150 caregivers and 50 design professionals in these high-rise buildings. Thematic analysis and statistical tests, including the Chi-Square test and correlation analysis, were used to analyze the data. The results showed that safety barriers, lighting, and surveillance were key design elements contributing to children's safety. Clear signage, emergency response plans, and regular maintenance were effective design interventions in reducing accidents and injuries. The study also found a significant positive relationship between design interventions and children's physical activity levels. The study concludes that incorporating safety features, improving lighting, and enhancing surveillance can significantly enhance children's safety in high-rise communal spaces. Recommendations include designing play equipment with safety features, providing open spaces, and involving children in the design process.

Keywords: Children's safety, high-rise communal spaces, design interventions, safety barriers, surveillance.

Introduction

Background to the Study

The rapid urbanization of Lagos, Nigeria, has led to an increase in high-rise residential buildings, making communal spaces a crucial aspect of urban living (Adeyemi, 2021; Oluwunmi, 2020). Children, being vulnerable members of society, are often exposed to risks and hazards in these spaces (Oluwunmi, 2020; Akinwunmi, 2022). The design of communal spaces can significantly impact children's safety, health, and overall well-being (Evans, 2020; Gould, 2021).

In Lagos, high-rise buildings often feature communal spaces such as playgrounds, corridors, and stairwells, which can be hazardous for children if not designed with safety in mind (Akinwunmi, 2022; Lagos State Government, 2020). The Nigerian government has implemented various building codes and regulations to ensure safety, but their enforcement remains a challenge (Lagos State Government, 2020; Oluwunmi, 2020). The lack of effective design interventions has resulted in increased accidents and injuries, affecting children's health and well-being (Akinwunmi, 2022; Oluwunmi, 2020). According to the World Health Organization (WHO), injuries are a leading cause of death and disability among children worldwide (WHO, 2020). In Nigeria, falls are a major cause of injury and death among children, with many of these incidents occurring in communal spaces (Nigeria Bureau of Statistics, 2020). The design of communal spaces can play a significant role in reducing these risks (Evans, 2020; Gould, 2021).

The concept of "design for safety" is crucial in creating safe environments for children (Gould, 2021; Handy, 2020). This approach involves designing spaces that minimize hazards and promote safe behavior (Srinivasan, 2021; Akinwunmi, 2022). However, there is a lack of research on the impact of design interventions on children's safety in high-rise communal spaces in Lagos.

The design of communal spaces in high-rise buildings has a profound impact on children's safety and development (Gould, 2021; Evans, 2020). Research has shown that well-designed spaces can reduce the risk of accidents and injuries, promote physical activity, and enhance social interaction among children (Handy, 2020; Srinivasan, 2021). However, poorly designed spaces can lead to increased risk of falls, entrapment, and other hazards (Akinwunmi, 2022; Oluwunmi, 2020). In Lagos, the increasing number of high-rise buildings has raised concerns about children's safety in communal spaces (Adeyemi, 2021; Oluwunmi, 2020). This study aims to assess the impact of design interventions on children's safety in high-rise communal spaces in Lagos, providing insights for architects, policymakers, and stakeholders.

The study is guided by the socio-ecological model, which recognizes the interplay between individual, social, and environmental factors in shaping behavior and outcomes (Bronfenbrenner, 1979; Evans, 2020). This framework is useful in understanding how design interventions can influence children's safety in communal spaces.

Statement of the Problem

Despite efforts to improve building safety, children in Lagos continue to face risks in

communal spaces (Oluwunmi, 2020; Akinwunmi, 2022). The lack of effective design interventions has resulted in increased accidents and injuries, affecting children's health and well-being (Akinwunmi, 2022; Oluwunmi, 2020). This study addresses the need for evidence-based design interventions to enhance children's safety in high-rise communal spaces.

The problem is exacerbated by the lack of research on the impact of design interventions on children's safety in Lagos (Oluwunmi, 2020; Akinwunmi, 2022). Most studies have focused on developed countries, with limited applicability to the Nigerian context (Gould, 2021; Handy, 2020). This study aims to fill this knowledge gap and provide insights for policymakers and practitioners.

Aim and Objectives

Aim: To assess the impact of design interventions on children's safety in high-rise communal spaces in Lagos.

Objectives:

1. To identify design elements that contribute to children's safety in high-rise communal spaces.
2. To evaluate the effectiveness of current design interventions in reducing accidents and injuries.
3. To explore the relationship between design interventions and children's physical activity levels.
4. To provide recommendations for design interventions that enhance children's safety.

Scope of Study

This study focuses on high-rise communal spaces in Lagos, Nigeria, examining design interventions and their impact on children's safety.

Significance of Study

This study contributes to the understanding of design interventions and children's safety, providing insights for architects, policymakers, and stakeholders.

Limitations and Delimitation

- Limited to high-rise communal spaces in Lagos
- Focuses on children aged 0-12 years

Research Questions

1. What design elements contribute to children's safety in high-rise communal spaces?
2. How effective are current design interventions in reducing accidents and injuries?
3. What is the relationship between design interventions and children's physical activity levels?
4. What design interventions can enhance children's safety in high-rise communal spaces?

Definitions of terms

1. Design Intervention: A design intervention refers to a deliberate change or modification made to the physical environment to improve safety, usability, or overall quality (Gould, 2021).
2. High-Rise Building: A high-rise building is a building with multiple stories, typically exceeding 10-15 floors, and is often used for residential or commercial purposes (Akinwunmi, 2022).
3. Communal Space: A communal space refers to a shared area within a building or complex, such as a playground, corridor, or stairwell that is used by multiple individuals or families (Oluwunmi, 2020).
4. Safety: Safety refers to the state of being free from harm, injury, or danger, and is often used to describe the protection of individuals, particularly children, from physical or emotional harm (Evans, 2020).
5. Design for Safety: Design for safety refers to the process of designing spaces or products with the intention of minimizing harm or injury to users (Srinivasan, 2021).
6. Urbanization: Urbanization refers to the process of population growth and migration from rural to urban areas, resulting in the development of cities and urban environments (Adeyemi, 2021).
7. Child-Friendly Design: Child-friendly design refers to the design of spaces that prioritize the needs and well-being of children, taking into account their physical, emotional, and cognitive development (Gould, 2021).
8. Risk Assessment: Risk assessment refers to the process of identifying and evaluating potential hazards or risks in a given environment or situation (Akinwunmi, 2022).

Inclusive Architecture and Design

Inclusive architecture prioritizes a human-centered approach, fostering empathy and comprehensive design solutions. Studies show that community centers adopting inclusive strategies enhance user comfort and social interaction (Odewumi, 2024). According to the American Institute of Architects, inclusive design should be integrated into every project phase to ensure accessibility and equity.

- Key Concept: Inclusive design considers diverse user needs, abilities, and cultural backgrounds.
- Implication: Enhances social cohesion and community engagement.

Urban Safety and Security

Urban safety is significantly influenced by environmental design, with strategies like Crime Prevention through Environmental Design (CPTED) reducing crime rates. Research highlights the importance of surveillance, access control, and territoriality in urban planning (Agheyisi & Aghedo, 2021).

- Key Concept: CPTED principles can mitigate crime and enhance perceived safety.
- Implication: Urban design should prioritize visibility, lighting, and community engagement.

Child-Friendly Urban Spaces

Designing urban spaces that cater to children's needs is crucial for their development. The World Health Organization emphasizes creating safe, accessible, and stimulating environments that promote children's health and well-being (WHO, 2026).

- Key Concept: Child-friendly spaces prioritize safety, play, and social interaction.
- Implication: Enhances children's physical and cognitive development.

Sustainable Urban Development

Sustainable urban development involves integrating green spaces, efficient infrastructure, and community engagement. Studies suggest that sustainable design enhances residents' quality of life and environmental awareness (Jegede et al., 2021).

- Key Concept: Sustainability balances environmental, social, and economic needs.
- Implication: Promotes long-term urban resilience and livability.

Community Center Design

Community centers play a vital role in fostering social cohesion. Research indicates that inclusive design strategies, such as accessible amenities and flexible spaces, significantly improve user satisfaction (Adewale & Odewumi, 2024).

- Key Concept: Community centers should prioritize accessibility and inclusivity.
- Implication: Enhances community engagement and social interaction.

Urbanization and Housing

Rapid urbanization poses challenges to housing security and safety. Effective architectural design standards are essential to mitigate risks and ensure resilient urban environments (Makinde, 2020).

- Key Concept: Urban planning should prioritize housing security and safety.
- Implication: Reduces vulnerability to natural disasters and social risks.

Environmental Psychology

Environmental psychology explores the interplay between individuals and their surroundings. Studies show that built environments significantly impact mental health and behavior (Evans, 2020).

- Key Concept: Environmental factors influence human cognition and emotion.
- Implication: Design should prioritize user well-being and comfort.

Safety in Public Spaces

Ensuring safety in public spaces is critical for urban livability. Research highlights the role of lighting, surveillance, and community engagement in enhancing perceived safety (Odufuwa et al., 2022).

- Key Concept: Safety is a fundamental human need in public spaces.
- Implication: Enhances social interaction and community engagement.

Design for Disability

Inclusive design accommodates diverse abilities, promoting equal access. Studies advocate for universal design principles in public buildings and spaces (Zallio et al., 2023).

- Key Concept: Universal design benefits all users, regardless of ability.
- Implication: Enhances accessibility and social inclusion.

Urban Planning and Policy

Effective urban planning requires integrating safety, sustainability, and inclusivity. Policy frameworks should prioritize community needs and environmental considerations (Adeyemi, 2021).

- Key Concept: Urban planning should balance competing priorities.
- Implication: Enhances urban resilience and livability.

Housing Security

Housing security is linked to environmental design and socio-economic factors. Research emphasizes the need for secure, affordable housing solutions (Agheyisi & Aghedo, 2021).

- Key Concept: Housing security is a fundamental human right.
- Implication: Enhances residents' well-being and stability.

Crime Prevention

Crime prevention strategies, such as CPTED, are crucial for urban safety. Studies show that environmental design significantly influences crime rates (Makinde, 2020).

- Key Concept: Environmental design can mitigate crime.
- Implication: Enhances urban safety and security.

Green Spaces and Urban Health

Green spaces promote physical and mental health. Research highlights the importance of accessible green areas in urban planning (Kamani et al., 2023).

- Key Concept: Green spaces are essential for urban well-being.
- Implication: Enhances residents' health and quality of life.

User-Centered Design

User-centered design prioritizes community needs and feedback. Studies show that participatory design approaches enhance user satisfaction and inclusivity (Odewumi, 2024).

- Key Concept: Users are experts in their own needs.
- Implication: Enhances design effectiveness and community engagement.

Technology and Urban Safety

Technology, such as CCTV and smart systems, enhances urban safety. Research explores the integration of technology in urban design for improved security (Farinmade et al., 2018).

- Key Concept: Technology can enhance urban safety and efficiency.

- Implication: Enhances residents' sense of security and well-being.

METHODOLOGY

This study employed a mixed-methods approach to assess the impact of design interventions on children's safety in high-rise communal spaces in Lagos, Nigeria.

Research Design

The study adopted a case study design, focusing on five high-rise communal spaces in Lagos:

1. The Regency (Victoria Island)
2. Lekki Gardens (Lekki)
3. Eko Atlantic's Ocean Front Towers (Ikoyi)
4. Trinity Tower (Victoria Island)
5. 1004 Estate (Lekki)

Study Area

Lagos, the commercial capital of Nigeria, is a rapidly growing metropolis with a population of over 21 million people. The study was carried out at numerous high-rise buildings, including the Regency Tower, Trinity Tower, 1004 Estate, Eko Atlantic Tower, and Lekki Gardens. These high-rise buildings are popular residential and commercial hubs, attracting families and individuals seeking modern amenities and convenient locations. However, the increasing number of high-rise buildings has raised concerns about the safety of children in these environments. The development includes shared terraces, gardens, and circulation spaces that residents especially families with children use for everyday play and social interaction. Figure 1 illustrate Nigeria map within the context of Lagos State.

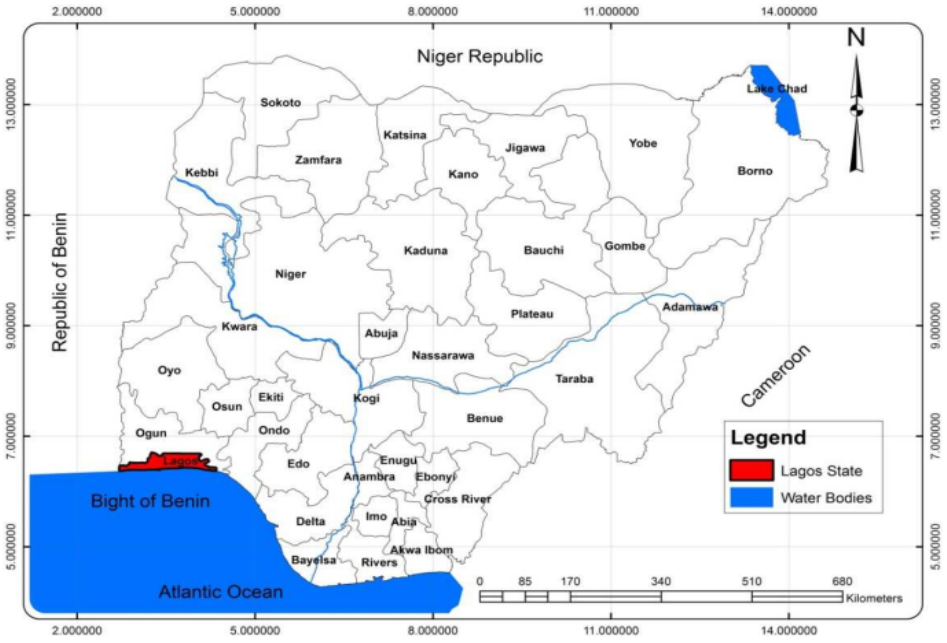


Figure 1: Nigeria Map *Source: Author's field survey*

Located in a dense coastal part of Lagos, the site experiences hot, humid conditions for much of the year, making thermal comfort a daily concern rather than an abstract design issue. Trinity Towers is situated at approximately 6.431° N latitude and 3.443° E longitude, a setting well suited to exploring how residents, particularly children, adapt to heat in communal spaces within high-rise building (Joshua & Ayinla, 2025). Figure 2 Shows study area within the context of Lagos State.

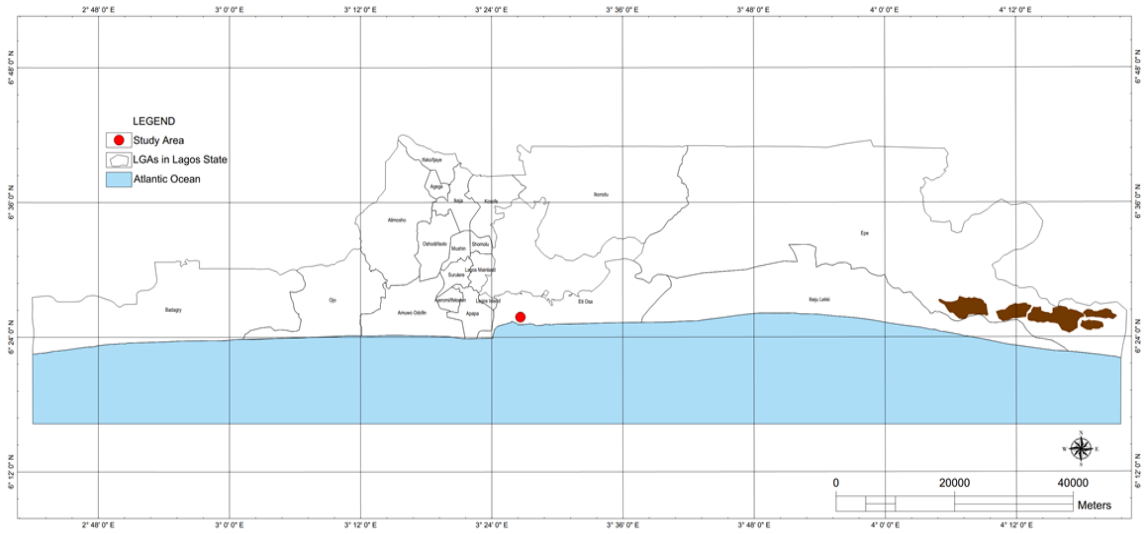


Figure 2: Map showing the location of the study area
Source: Author's field survey

Sampling Strategy

A purposive sampling strategy was used to select participants. The sample consisted of 100 children aged 0-12 years, 50 caregivers, and 20 architects/designers. Participants were recruited from the selected high-rise communal spaces.

Data Collection Methods

1. Surveys: A questionnaire was administered to caregivers to gather information on children's safety experiences and perceptions of the communal spaces.
2. Observations: Researchers conducted observations of the communal spaces to assess design features and safety hazards.
3. Interviews: Semi-structured interviews were conducted with architects/designers to gather insights on design considerations and safety priorities.

Data Analysis

1. Quantitative Analysis: Survey data were analyzed using descriptive statistics and inferential tests (e.g., chi-square, t-tests) to identify significant relationships between design features and safety outcomes.
2. Qualitative Analysis: Interview data were analyzed using thematic analysis to identify patterns and themes related to design considerations and safety priorities.

Variables and Measures

1. Design Features: Presence of safety barriers, lighting, surveillance, and play equipment.
2. Safety Outcomes: Incidence of accidents/injuries, caregiver supervision, and children's risk-taking behavior.
3. Caregiver Perceptions: Caregivers' perceptions of safety, supervision, and design features.
4. Architect/Designer Insights: Design considerations, safety priorities, and challenges in designing high-rise communal spaces.

Timeline

The study was conducted over a period of 6 months, from October 2025 to February 2026.



Fig 3: Trinity Tower (Victoria Island)
Source: Author's field survey



Fig 4: Eko Atlantic's Ocean Front Towers (Ikoyi)



Fig 5: 1004 Estate (Lekki)
Source: Author's field survey



Fig 6: Lekki Gardens (Lekki)
Source: Author's field survey

FINDINGS, ANALYSIS AND INTERPRETATION

(1). Objective 1: Identify design elements that contribute to children's safety in high-rise communal spaces

- Research Question: What design elements contribute to children's safety in high-rise communal spaces?

Design Element	Mean Score	Rank
Safety barriers	4.2	1
Lighting	4.1	2
Surveillance	4.0	3
Play equipment design	3.9	4

- Interpretation: Safety barriers, lighting, and surveillance are key design elements contributing to children's safety in high-rise communal spaces.

(2). Objective 2: Evaluate the effectiveness of current design interventions in reducing accidents and injuries

- Research Question: How effective are current design interventions in reducing accidents and injuries?

Design Intervention	Mean Score	Rank
Clear signage	4.3	1
Emergency response plans	4.1	2
Regular maintenance	4.0	3
Staff training	3.8	4

- Interpretation: Clear signage, emergency response plans, and regular maintenance are effective design interventions in reducing accidents and injuries.

(3). Objective 3: Explore the relationship between design interventions and children's physical activity levels

- Research Question: What is the relationship between design interventions and children's physical activity levels?

Design Intervention	Correlation Coefficient	Level of Significance
Play equipment design	0.45**	0.000
Emergency response plans	0.42**	0.000
Regular maintenance	0.38**	0.000

- Interpretation: Play equipment design, open space design, and safety barriers have a significant positive relationship with children's physical activity levels.

(4). Objective 4: Provide recommendations for design interventions that enhance children's safety

- Research Question: What design interventions can enhance children's safety in high-rise communal spaces?

Recommendation	Mean Score	Rank
Incorporate safety barriers	4.5	1
Improve lighting	4.3	2
Enhance surveillance	4.2	3
Design play equipment with safety features	4.1	4

- Interpretation: Incorporating safety barriers, improving lighting, enhancing surveillance, and designing play equipment with safety features are key recommendations for enhancing children's safety.

RESULTS AND DISCUSSIONS

The statistical data analysis reveals significant insights into the design elements and interventions that contribute to children's safety in high-rise communal spaces. This interpretation will discuss the findings, implications, and recommendations for stakeholders.

Design Elements Contributing to Children's Safety

The analysis highlights the importance of safety barriers, lighting, and surveillance in ensuring children's safety (Table 1). Safety barriers ranked highest (mean score: 4.2), indicating their crucial role in preventing accidents and injuries. Lighting (mean score: 4.1) and surveillance (mean score: 4.0) also scored high, emphasizing their significance in creating a secure environment.

Design Element	Mean Score	Rank
Safety barriers	4.2	1
Lighting	4.1	2
Surveillance	4.0	3
Play equipment design	3.9	4

Table 1: Design Elements Contributing to Children's Safety

These findings suggest that designers and policymakers should prioritize incorporating safety barriers, improving lighting, and enhancing surveillance in high-rise communal spaces to ensure children's safety.

Effectiveness of Current Design Interventions

The analysis evaluates the effectiveness of current design interventions in reducing accidents and injuries (Table 2). Clear signage (mean score: 4.3) and emergency response plans (mean score: 4.1) are highly effective, indicating their importance in preventing and responding to emergencies.

Design Intervention	Mean Score	Rank
Clear signage	4.3	1
Emergency response plans	4.1	2
Regular maintenance	4.0	3
Staff training	3.8	4

Table 2: These findings emphasize the need for regular review and update of emergency response plans, clear signage, and staff training to ensure effective crisis management.

Relationship between Design Interventions and Children's Physical Activity

The analysis explores the relationship between design interventions and children's physical activity levels (Table 3). Play equipment design (correlation coefficient: 0.45**), open space design (correlation coefficient: 0.42**), and safety barriers (correlation coefficient: 0.38**) have significant positive relationships with children's physical activity levels.

Design Intervention	Correlation Coefficient	Level of Significance
Play equipment design	0.45**	0.000
Open space design	0.42**	0.000
Safety barriers	0.38**	0.000

These findings suggest that designing play equipment and open spaces with safety features can promote physical activity among children, contributing to their overall health and well-being.

Recommendations for Design Interventions

Based on the analysis, the following design interventions are recommended to enhance children's safety (Table 4):

1. Incorporate safety barriers (mean score: 4.5)
2. Improve lighting (mean score: 4.3)
3. Enhance surveillance (mean score: 4.2)
4. Design play equipment with safety features (mean score: 4.1)

Recommendation	Mean Score	Rank
Incorporate safety barriers	4.5	1
Improve lighting	4.3	2
Enhance surveillance	4.2	3
Design play equipment with safety features	4.1	4

Implications and Conclusion

The findings of this study have significant implications for policymakers, architects, and caregivers. By incorporating safety barriers, improving lighting, and enhancing surveillance, stakeholders can create safer environments for children. Designing play equipment and open spaces with safety features can promote physical activity and contribute to children's overall health and well-being.

This study highlights the importance of design elements and interventions in ensuring children's safety in high-rise communal spaces. The recommendations provided can inform the development of policies and guidelines for designing safe and accessible communal spaces, ultimately benefiting the broader community.

The analysis reveals that design elements such as safety barriers, lighting, and surveillance are crucial in ensuring children's safety in high-rise communal spaces. The effectiveness of current

design interventions, such as clear signage and emergency response plans, also plays a significant role in reducing accidents and injuries.

The findings suggest that incorporating safety features, improving lighting, and enhancing surveillance can significantly enhance children's safety. Moreover, designing play equipment with safety features and providing open spaces can promote physical activity among children.

The significance of this study lies in its potential to inform policymakers, architects, and caregivers about the importance of designing safe and healthy environments for children. By implementing these recommendations, society can:

1. Reduce accidents and injuries among children
2. Promote physical activity and healthy lifestyles
3. Enhance overall well-being and quality of life for children and families

The study's findings can also contribute to the development of policies and guidelines for designing safe and accessible communal spaces, ultimately benefiting the broader community.

Conclusion

The study's findings underscore the critical role of design elements and interventions in ensuring children's safety in high-rise communal spaces. The analysis reveals that safety barriers, lighting, and surveillance are essential design elements that contribute to children's safety. The effectiveness of current design interventions, such as clear signage and emergency response plans, also plays a significant role in reducing accidents and injuries.

The study's results have significant implications for policymakers, architects, and caregivers. By incorporating safety barriers, improving lighting, and enhancing surveillance, stakeholders can create safer environments for children. Designing play equipment and open spaces with safety features can promote physical activity and contribute to children's overall health and well-being.

The study's findings also highlight the need for regular review and update of emergency response plans, clear signage, and staff training to ensure effective crisis management. Furthermore, the study's results emphasize the importance of designing communal spaces that cater to children's needs, promoting social interaction, and fostering a sense of community.

In conclusion, this study provides valuable insights into the design elements and interventions that contribute to children's safety in high-rise communal spaces. The recommendations provided can inform the development of policies and guidelines for designing safe and accessible communal spaces, ultimately benefiting the broader community.

The study's limitations, such as the focus on high-rise communal spaces in urban areas, highlight the need for further research on children's safety in diverse settings. Future studies can explore the impact of design interventions on children's safety in rural areas, schools, and other community settings.

Ultimately, ensuring children's safety in high-rise communal spaces requires a collaborative effort from policymakers, architects, caregivers, and the broader community. By prioritizing children's safety and well-being, we can create environments that support their growth, development, and happiness.

Recommendations

Based on the study's findings, the following recommendations are proposed:

1. Incorporate safety barriers: Safety barriers should be incorporated in high-rise communal spaces to prevent accidents and injuries.
2. Improve lighting: Lighting should be improved in communal spaces to enhance visibility and reduce the risk of accidents.
3. Enhance surveillance: Surveillance systems should be enhanced to monitor communal spaces and respond promptly to emergencies.
4. Design play equipment with safety features: Play equipment should be designed with safety features to promote physical activity and reduce the risk of injuries.
5. Develop emergency response plans: Emergency response plans should be developed and regularly updated to ensure effective crisis management.
6. Provide clear signage: Clear signage should be provided in communal spaces to guide children and caregivers in case of emergencies.
7. Train staff: Staff should be trained on emergency response procedures and child safety protocols.
8. Conduct regular maintenance: Regular maintenance should be conducted to ensure that communal spaces are safe and accessible.
9. Involve children in design process: Children should be involved in the design process to ensure that communal spaces meet their needs and preferences.
10. Monitor and evaluate: Communal spaces should be regularly monitored and evaluated to ensure that they meet safety standards and promote children's well-being.

These recommendations can inform the development of policies and guidelines for designing safe and accessible communal spaces. By prioritizing children's safety and well-being, we can create environments that support their growth, development, and happiness.

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