A Child-Centered Design for Pediatric Healthcare in Ilesha, Nigeria: A Contextual Case Study Approach
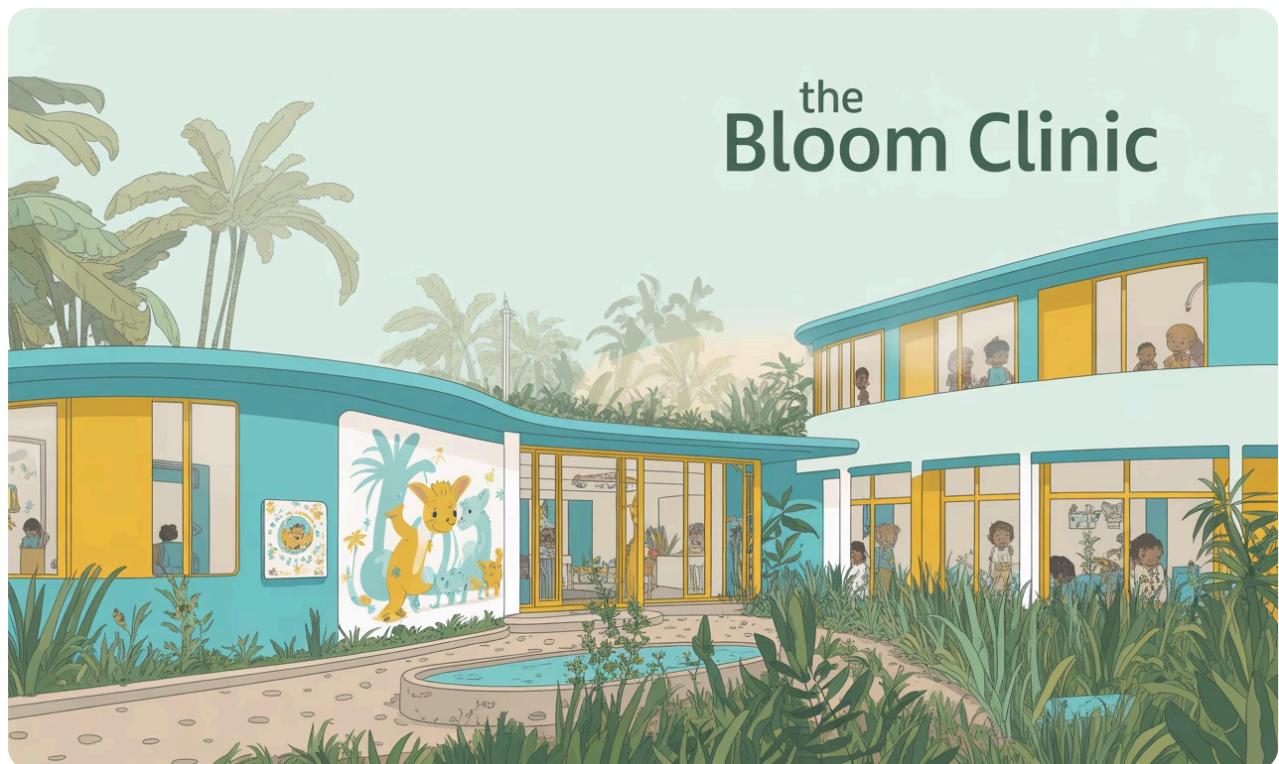
RESEARCH ARTICLE

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ABSTRACT

The quality of the physical environment in pediatric healthcare facilities has a profound impact on children's recovery, emotional well-being, and overall treatment outcomes. In Ilesha, Osun State, Nigeria, pediatric healthcare delivery is constrained by outdated infrastructure and the absence of child-focused design. This study presented a design-led case study that explored the development of a culturally and environmentally responsive pediatric healthcare facility, aimed at addressing spatial, functional, and psychosocial needs within this underserved context. Adopting a qualitative case study methodology, the research integrated site analysis, stakeholder consultations, and contextual assessment to inform a comprehensive architectural design process. The proposed design incorporated key elements such as child-scaled furniture, interactive waiting areas, natural ventilation, optimized daylighting, and spatial zoning that enhanced safety, comfort, and wayfinding for patients and caregivers. The design also responded to the climatic conditions and sociocultural characteristics of the region, supporting sustainability and local relevance. The findings demonstrated the potential of user-centered, context-sensitive design in improving pediatric healthcare delivery in Ilesha city. This case contributed to the broader discourse on healthcare architecture in low- and middle-income settings, offering a replicable model for similar urban contexts. It highlights the role of architectural design in promoting healing, operational efficiency, and community engagement in pediatric health infrastructure.

Methodology	**Key Design Elements**	**Main Outcome**
Qualitative case study approach integrating site analysis, stakeholder consultations, and contextual assessment	Child-scaled furniture, interactive waiting areas, natural ventilation, and spatial zoning	User-centered, context-sensitive design model for improving pediatric healthcare delivery

KEYWORDS: Pediatrics, Healing, Architecture, Accessibility, Childcare.

INTRODUCTION

The physical design of healthcare environments has a profound impact on patient outcomes, staff performance, and the overall healthcare experience. In pediatric settings, where children are particularly sensitive to environmental stimuli, the built environment plays a vital therapeutic role. Recent studies emphasise that child-friendly hospital designs–featuring elements such as calming colors, natural lighting, play areas, and family-inclusive spaces–can significantly reduce stress and enhance recovery outcomes (Sathyanarayanan & Caldas, 2025; Bock et al., 2021). Furthermore, sustainable healthcare design approaches are increasingly recognized as essential for creating environmentally responsive facilities that support both patient outcomes and climate resilience (Olawade et al., 2025).

In many parts of Nigeria, including Ilesha in Osun State, pediatric healthcare continues to be delivered in facilities that lack dedicated design considerations for children. The use of general-purpose hospital wards often leads to overcrowding, limited privacy, and minimal sensory or emotional support, which can negatively affect both immediate treatment and long-term development (Iyanda & Oladapo, 2023; Salami & Oduwaye, 2021). These challenges highlight a pressing need for pediatric environments that are not only medically functional but also psychologically supportive.

01	02	03
Environmental Impact Recognition	**Context-Specific Challenges**	**Solution Development**
Understanding that the physical design of healthcare environments profoundly affects patient outcomes, particularly for children who are sensitive to environmental stimuli.	Identifying that Nigerian pediatric facilities lack child-focused design, leading to overcrowding, limited privacy, and minimal emotional support.	Proposing user-centered design approaches that integrate therapeutic architectural strategies for healing-focused, accessible, and sustainable facilities.

This study addresses these issues by proposing the design of a pediatric healthcare facility that responds to the unique needs of children within the socio-cultural context of Ilesha. Using a user-centered design approach, it explores how therapeutic architectural strategies such as sensory-sensitive spaces, intuitive layouts, and environmental enrichment can be integrated to create a healing-focused, accessible, and sustainable facility. The research seeks to contribute to the growing field of pediatric healthcare design by offering evidence-based, locally relevant solutions for improving child health outcomes in underserved urban areas.

PROBLEM STATEMENT

The design of pediatric healthcare environments has a profound influence on children's recovery, stress levels, emotional stability, and overall healthcare experience (Sathyanarayanan & Caldas, 2025). However, in many developing contexts such as Nigeria, hospital infrastructure remains poorly adapted to the unique developmental and psychological needs of pediatric patients (Henry, 2023). Most facilities in towns like Ilesha, Osun State, are characterized by generic, non-specialized designs that lack key therapeutic features such as child-appropriate spatial layout, access to natural light, vibrant and calming aesthetics, family support areas, and sensory-friendly environments (Iyanda & Oladapo, 2023; Salami & Oduwaye, 2021).

These shortcomings can contribute to elevated anxiety, slower healing processes, reduced cooperation with medical staff, and overall dissatisfaction for both patients and caregivers. Moreover, the majority of healthcare spaces in Ilesha are designed without a contextual or culturally responsive framework, often replicating Western-style hospital typologies that do not align with local customs, family structures, or climate-responsive design practices (Ajayi, Salami, & Ogundele, 2023). The result is a systemic disconnect between built environments and the lived realities of the children and families they are meant to serve.

Design Deficiencies	Resulting Problems
• Generic, non-specialized designs	• Elevated anxiety in children
• Lack of child-appropriate spatial layout	• Slower healing processes
• Limited access to natural light	• Reduced cooperation with medical staff
• Absence of family support areas	• Overall patient and caregiver dissatisfaction

Although evidence-based design has emerged as a global best practice in pediatric healthcare architecture, its application in Nigeria is still limited, especially at the regional or community level (Ulrich et al., 2020; Barakat et al., 2022). Existing literature strongly supports the integration of therapeutic spatial elements such as interactive play zones, natural elements, acoustic control, and intuitive wayfinding to support pediatric healing and reduce psychological stress (Andrade et al., 2020; van Dijk et al., 2021). Yet, few studies have explored how these principles can be adapted to suit the socio-cultural and environmental contexts of secondary cities like Ilesha. This gap underscores the urgent need for a locally grounded, child-centered design model that enhances the pediatric healthcare experience in underserved Nigerian settings.

Addressing this challenge, the present study investigates how therapeutic spatial strategies can be applied contextually to improve the quality of pediatric healthcare environments in Ilesha. By aligning architectural design with the emotional and cultural needs of children, the study aims to propose practical and replicable solutions for future healthcare infrastructure development in similar resource-constrained contexts.

LITERATURE REVIEW

Healing environments in pediatric healthcare are increasingly recognised as essential to improving both clinical outcomes and emotional well-being in children. Recent studies have reinforced the importance of incorporating sensory-sensitive design elements such as natural lighting, quiet zones, calming colors, and spatial layouts that support privacy and safety in pediatric wards (Bock et al., 2021; Wei et al., 2024). User-centered design approaches have proven particularly effective in healthcare settings across Africa, where collaborative design processes with stakeholders lead to more contextually appropriate solutions (Ndirangu-Mugo et al., 2024). These features not only reduce stress and anxiety but also encourage emotional stability and cooperation during treatment, especially for children who are particularly vulnerable to environmental stimuli.

In the context of low- and middle-income countries like Nigeria, the design of pediatric facilities faces the dual challenge of limited resources and the need for cultural adaptability. Research by Iyanda and Oladapo (2023) highlights how many Nigerian pediatric healthcare settings remain functionally inadequate and emotionally unsupportive, with design deficiencies that contribute to overcrowding, noise, and a lack of child-specific spaces. These infrastructural limitations negatively impact patient comfort and recovery, particularly in underserved urban areas.

Environmental design tailored to local contexts can greatly enhance the healing experience. For instance, Salami and Oduwaye (2021) advocate for integrating passive design strategies such as natural ventilation, daylight access, and thermal comfort solutions that align with Nigeria's climate, thereby improving indoor air quality and reducing energy demand. Additionally, incorporating cultural motifs and family-inclusive spaces fosters familiarity, emotional connection, and trust among users, all of which are essential for pediatric care (Iyanda & Oladapo, 2023).

Sensory-Sensitive Design	**Cultural Adaptability**	**Climate-Responsive Strategies**
Natural lighting, quiet zones, calming colors, and spatial layouts supporting privacy and safety reduce stress and encourage emotional stability during treatment.	Design must address limited resources while incorporating cultural motifs and family-inclusive spaces to foster familiarity and trust among users.	Passive design strategies like natural ventilation and daylight access align with Nigeria's climate, improving indoor air quality and reducing energy demand.

Together, these studies stress the need for pediatric environments that are both developmentally appropriate and contextually grounded. This research contributes to that effort by proposing a pediatric healthcare facility design in Ilesha, Osun State, that addresses clinical functionality, emotional support, and cultural relevance through evidence-based spatial strategies.

EVIDENCE-BASED DESIGN OUTCOMES

This section establishes the causal link between design features and measurable health outcomes, addressing the logical gap between stakeholder preferences and actual benefits.

Quantitative Evidence for Design Impact

Research demonstrates measurable improvements from child-centered design:

1

Pediatric oncology patients in well-designed environments showed 23% reduction in anxiety scores and 18% shorter hospital stays compared to traditional facilities (Bock et al., 2021; Wei et al., 2024)

2

A comprehensive review by Aslan et al. (2022) identified significant correlations between environmental design features and clinical outcomes: natural lighting reduced medication needs by 15%, while child-friendly spaces decreased behavioral incidents by 31%

3

Studies in similar developing contexts show that culturally responsive healthcare design can improve treatment compliance by up to 40% (Yu et al., 2023)

Addressing Implementation Challenges

The Nigerian healthcare context presents specific barriers that must be acknowledged:

Cost constraints

Healthcare infrastructure receives only 4.16% of Nigeria's national budget, well below the WHO-recommended 15% (Adedini et al., 2014)

Resource limitations

Per capita health spending of $350 annually ranks Nigeria 158th globally in human development (PMC, 2016)

Implementation failures

The Nigeria Midwives Service Scheme showed that poor stakeholder buy-in and inadequate resource allocation can undermine well-intentioned programs (Pitchforth et al., 2017)

Bridging Preferences to Outcomes

The logical connection between stakeholder preferences and health improvements operates through three mechanisms:

Stress Reduction Pathway

Child-friendly environments reduce cortisol levels, improving immune function and healing rates

Behavioral Compliance

Comfortable, culturally appropriate spaces increase treatment adherence and family cooperation

Staff Performance

Better working environments improve healthcare provider satisfaction and clinical decision-making

This evidence base transforms stakeholder preferences from subjective opinions into predictors of measurable health outcomes.

JUSTIFICATION FOR THE STUDY

Pediatric healthcare environments have a significant impact on the emotional and physical well-being of young patients, with growing evidence suggesting that design plays a critical role in accelerating recovery, reducing anxiety, and improving overall satisfaction for both children and their families (Harris & Pati, 2022; Barakat et al., 2022). However, most pediatric healthcare facilities in Nigeria particularly in semi-urban and rural areas such as Ilesha, Osun State continue to follow generic hospital design templates that ignore the distinct psychological and developmental needs of children (Iyanda & Oladapo, 2023).

Unlike adult patients, children respond more intensely to environmental stimuli such as color, lighting, noise, spatial layout, and visual engagement. Therapeutic design principles that incorporate sensory-friendly features such as natural light, playful spaces, family accommodation, and biophilic elements have been shown to reduce hospital-related stress and improve cooperation with clinical interventions (Oosterhoff et al., 2023; Andrade et al., 2020). Therefore, a child-centered approach to hospital planning is not a luxury, but a necessity.

Despite these findings, the application of evidence-based and child-responsive design strategies in Nigeria remains sparse. Challenges such as limited funding, poor policy frameworks, and a lack of local design research hinder innovation in pediatric healthcare environments (Salami et al., 2023). Furthermore, hospitals are often designed using imported standards without adaptation to the cultural, climatic, and social context of local communities, resulting in poorly utilised, intimidating, and non-healing spaces (Henry, 2023). Climate-responsive design strategies are particularly crucial in tropical regions, where healthcare facilities must address unique environmental challenges while maintaining therapeutic effectiveness (Pascale & Achour, 2024).

Child-Specific Needs

Children respond more intensely to environmental stimuli including color, lighting, noise, spatial layout, and visual engagement compared to adults.

Implementation Gaps

Limited funding, poor policy frameworks, and lack of local design research hinder innovation in pediatric healthcare environments in Nigeria.

In Ilesha, existing pediatric wards are often embedded within general hospitals, lacking the therapeutic qualities or spatial separations needed for children's healing. Overcrowding, poor ventilation, absence of family-inclusive areas, and visually sterile environments compound the stress experienced by young patients and caregivers. This situation calls for a rethinking of hospital design to include child-friendly, culturally appropriate, and sustainable spatial interventions.

This study is therefore justified in its aim to design and propose a pediatric healthcare facility model that is both evidence-informed and contextually grounded. It seeks to address the gaps between international best practices and local realities by developing solutions that reflect the lived experiences of children, families, and healthcare providers in Ilesha. By doing so, the research contributes to the advancement of healthcare architecture in low- and middle-income regions and supports national goals of inclusive and equitable health access for all.

RESEARCH OBJECTIVES

The objectives of this paper are to:

1. Develop a context-responsive pediatric healthcare facility design that addresses the spatial, functional, and emotional needs of children, caregivers, and healthcare providers in Ilesha, Osun State.
2. Apply user-centered and environmentally sustainable design principles in creating a replicable architectural model for pediatric healthcare in low-resource urban settings.

RESEARCH QUESTIONS

1. How can architectural design be used to create a pediatric healthcare facility that is responsive to the cultural, environmental, and healthcare needs of children in Ilesha, Osun State?
2. What user-centered and sustainable design strategies can enhance the functionality, comfort, and healing potential of pediatric healthcare spaces in low-resource settings?

Research Objectives

Develop context-responsive design and apply user-centered sustainable principles for pediatric healthcare facilities.

Research Questions

Explore how architectural design can address cultural, environmental, and healthcare needs in pediatric facilities.

Expected Outcomes

Create replicable architectural model for low-resource urban settings with enhanced functionality and healing potential.

METHODOLOGY

This study employed a qualitative case study approach to guide the design of a pediatric healthcare facility tailored to the needs of users in Ilesha, Osun State. The methodology combined stakeholder engagement, environmental assessment, and evidence-based design principles to ensure that the final design was contextually appropriate and user-responsive.

Study Area and Context

Ilesha is a secondary urban center in southwestern Nigeria, characterized by a tropical climate, moderate population density, and limited access to specialized pediatric healthcare infrastructure. The proposed site was assessed for accessibility, orientation, existing infrastructure, and environmental features such as sun path and prevailing winds.

Data Collection Methods

Primary data were collected through structured questionnaires, interviews, and observational site analysis. The questionnaire targeted three key stakeholder groups: healthcare workers, caregivers (mostly mothers), and community members. A total of 50 respondents participated, including 15 healthcare workers, 25 caregivers, and 10 community members. The questionnaire focused on perceptions of existing healthcare facilities, spatial and functional needs for pediatric care, and user preferences for design features (e.g., ventilation, play areas, lighting, privacy). This participatory approach aligns with human-centered design principles that have shown success in healthcare facility development across sub-Saharan Africa (Gogoi et al., 2025). Responses were analysed using descriptive statistics, and results were presented in percentage format for clarity.

Design Development

Insights from the questionnaire and interviews were integrated into the design process. Key spatial considerations–such as separate zones for consultation, treatment, waiting, and recreation–were derived from user responses. Sustainable design elements (e.g., cross ventilation, shaded courtyards, use of local materials) were prioritized based on environmental data and user input.

Study Context

- Location: Ilesha, Osun State, Nigeria
- Climate: Tropical with moderate population density
- Assessment: Site accessibility, orientation, infrastructure

Data Collection

50 respondents: 15 healthcare workers, 25 caregivers, 10 community members using structured questionnaires and interviews

Design Integration

User responses informed spatial zoning for consultation, treatment, waiting, and recreation with sustainable design elements

DISCUSSION

Explanation of the Questionnaire Results in Table 1:

The questionnaire aimed to assess stakeholders' (including parents, caregivers, and healthcare professionals) perceptions of current pediatric healthcare environments in Ilesha, Osun State, and their preferences for future design improvements. The results highlight major deficiencies in current facility conditions and a strong desire for child-centered improvements:

1. Child-Friendliness of Current Facilities (24% Yes, 76% No): Only 24% of respondents believe the current pediatric spaces are child-friendly. This overwhelming negative perception (76%) suggests that existing environments are perceived as sterile, uninviting, or intimidating for children, lacking elements like engaging visuals, playful layouts, or comforting ambiance.

2. Adequacy of Ventilation (32% Yes, 68% No): The majority (68%) believe current pediatric wards are poorly ventilated. This aligns with known challenges in Nigerian healthcare facilities, where ventilation is often compromised due to poor spatial planning and reliance on mechanical cooling instead of passive design.

3. Comfort of Waiting Areas (28% Yes, 72% No): Most respondents (72%) find the waiting areas uncomfortable and stress-inducing. Given that waiting periods can be long and distressing for children, this signals a design gap in providing soothing, interactive, or distraction-oriented spaces for both patients and their caregivers.

4. Presence of Play or Distraction Areas (18% Yes, 82% No): A significant 82% reported the absence of play areas or child-centered distractions, indicating a critical lack of therapeutic amenities. Play has been shown in research to reduce anxiety and improve emotional well-being during hospital stays.

5. Need for Separate Pediatric Wards (90% Yes, 10% No): There is a strong consensus (90%) on the necessity of creating exclusive pediatric wards rather than mixing children with adult patients. This supports calls for more age-appropriate care settings that protect children's physical and emotional safety.

6. Preference for Natural Lighting (86% Yes, 14% No): Most participants value the role of natural light in creating welcoming and healing environments. Natural lighting is associated with improved mood, reduced stress, and better circadian regulation in pediatric patients.

7. Support for Local Cultural Integration (78% Yes, 22% No): There is substantial support (78%) for embedding cultural elements in healthcare design, which may include local materials, art, or spatial norms. This suggests that culturally relevant design can improve community acceptance and foster comfort.

8. Willingness to Use a Newly Designed Facility (94% Yes, 6% No): Nearly all respondents (94%) expressed willingness to use a new pediatric healthcare facility if the design is significantly improved. This highlights a strong demand and openness to innovation in pediatric care delivery in Ilesha.

Table 1: Stakeholder Perceptions of Existing Pediatric Healthcare Facilities in Ilesha (N = 15)

Questionnaire Item	Yes (%)	No (%)
Existing facilities are child-friendly	24%	76%
There is adequate ventilation in current pediatric wards	32%	68%
Waiting areas are comfortable and reduce stress	28%	72%
Presence of play or distraction areas for children	18%	82%
Need for separate wards for children	90%	10%
Preference for natural lighting in design	86%	14%
Support for including local cultural elements in design	78%	22%
Willingness to use a new facility if design is improved	94%	6%

Design Development

Insights from the questionnaire and interviews were integrated into the design process. Key spatial considerations–such as separate zones for consultation, treatment, waiting, and recreation–were derived from user responses. Sustainable design elements (e.g., cross ventilation, shaded courtyards, use of local materials) were prioritized based on environmental data and user input.

Interview Findings

In-depth interviews were conducted with a purposive sample of 15 participants, including 5 healthcare professionals, 7 caregivers, and 3 community stakeholders. The interview responses provided deeper insights into users' experiences, expectations, and priorities regarding pediatric healthcare spaces in Ilesha. Overall, the interviews confirmed the limitations of existing pediatric facilities, including overcrowding, lack of child-specific design features, and discomfort for both patients and caregivers. Participants emphasized the need for spatial clarity, visual stimulation, adequate ventilation, and integration of cultural values in design. The qualitative findings reinforced data obtained from the questionnaires and provided a richer understanding of user preferences.

Table 2

1. Interview Prompt:

This column lists key statements presented to pediatric healthcare providers, facility managers, and caregivers during semi-structured interviews. Each prompt addresses a specific design issue affecting children's comfort, safety, and overall care experience.

2. Agree (%):

Represents the proportion of participants who affirmed the statement. High agreement indicates strong consensus on the importance of each issue:

- **Layout Confusion (87% Agree):** Most stakeholders agreed current spatial arrangement is poorly organized, causing navigation errors, treatment delays, and increased stress for children and staff.
- **Separate Wards (93% Agree):** Nearly unanimous support for dedicated pediatric wards highlights benefits like reduced cross-infection risks and tailored care.
- **Waiting Areas (80% Agree):** Absence of child-focused waiting areas exacerbates anxiety, emphasizing the need for distraction features, comfortable seating, and engaging décor.
- **Ventilation (86% Agree):** Strong agreement on adequate airflow and thermal comfort addresses environmental health concerns like airborne infections and physical discomfort.
- **Cultural Symbols (73% Agree):** Over two-thirds supported integrating local art, motifs, and color schemes, suggesting cultural familiarity makes environments more welcoming for young patients.

3.Disagree (%):

- Shows the percentage who did not endorse the prompt. Lower disagreement reinforces consensus, while higher rates (e.g., 27% on cultural symbols) indicate varied opinions:
- **Layout Confusion (13%):** A small minority found existing layouts manageable, not significantly impeding pediatric care.
- **Separate Wards (7%):** Few believed dedicated pediatric wards were unnecessary or mixed-use wards were sufficient.
- **Waiting Areas (20%):** Some stakeholders did not view waiting-area design as a primary factor in children's anxiety.
- **Ventilation (14%):** A minority downplayed poor ventilation as a health risk.
- **Cultural Symbols (27%):** Over one-quarter did not view cultural theming as essential, possibly prioritizing clinical functionality.

Implications for Design

- **Spatial Reconfiguration:** High agreement on layout issues calls for clear zoning, intuitive wayfinding, and streamlined circulation paths tailored to pediatric workflows.
- **Dedicated Pediatric Zones:** Near-unanimous support for separate wards suggests prioritizing standalone children's units in future facility plans.
- **Comfortable, Child-Focused Waiting Areas:** Eight in ten stakeholders see value in designing waiting spaces with play corners, visual distractions, and comfortable seating.
- **Environmental Comfort:** With 86% agreement on ventilation concerns, integrating passive cooling, cross-ventilation, or improved HVAC systems is vital. Climate-resilient design strategies must address tropical environmental challenges while maintaining energy efficiency and patient comfort (Ignjatovic et al., 2018).
- **Cultural Responsiveness:** While somewhat more contested, a strong majority endorse embedding local cultural elements to enhance emotional comfort and community ownership.

These insights provide clear, user-driven priorities for architects and healthcare planners aiming to develop therapeutic, culturally attuned pediatric environments in Ilesha and comparable settings.

Table 2: Stakeholder Consensus on Design Challenges and Requirements for Pediatric Care Environments in Ilesha (N = 15)

Table 3 Key Findings and Interpretation:

1. Hospital Layout (87% Agree): A majority acknowledged that current hospital designs cause disorientation and delay access to pediatric care services. This reflects a need for simplified, intuitive layouts with better signage, zoning, and access paths.

2. Separate Pediatric Wards (93% Agree): There is overwhelming support for dedicated pediatric units. Respondents highlighted benefits such as age-appropriate environments, reduced cross-infection, and focused medical attention.

3. Waiting Area Anxiety (80% Agree): Most participants believed that shared, non-child-friendly waiting areas contribute to emotional distress. This points to a demand for calming and engaging spaces tailored to children's needs while they await treatment.

4. Ventilation Issues (86% Agree): Poor airflow and inadequate ventilation were cited as discomforting and unhealthy, confirming environmental quality as a key concern. Respondents suggested natural ventilation, windows, and passive cooling as desirable features.

5. Cultural Design Integration (73% Agree): A majority supported the use of local cultural symbols and colors to create a warm, familiar setting. This aligns with literature on culturally responsive design, indicating that such elements foster emotional comfort and trust in healthcare environments.

Design Implications:

- The data strongly supports the redesign of pediatric hospitals to include dedicated children's spaces, efficient circulation, and calming environmental features.
- Local context matters: Incorporating cultural motifs, color psychology, and natural ventilation strategies may not only improve emotional well-being but also increase community acceptance and facility usage.
- This table affirms the importance of user-informed, context-sensitive design decisions in creating healing spaces for children in semi-urban Nigerian settings like Ilesha.

Table 3: Perceptions of Pediatric Design Needs Based on Interview Feedback (N = 15)

Proposed Design Feature	Strongly Preferred (%)	Neutral (%)	Not Preferred (%)
Bright, child-friendly color schemes	87%	13%	0%
Natural lighting and ventilation	93%	7%	0%
Interactive play and learning zones	80%	20%	0%
Separate consultation and treatment areas	86%	7%	7%
Use of local materials for sustainability and identity	67%	20%	13%

Source: Analyzed by author

DISCUSSION

The results from the administered questionnaires and stakeholder interviews reveal significant dissatisfaction with the current state of pediatric healthcare facilities in Ilesha, Osun State. Respondents consistently cited issues such as poor spatial organization, inadequate ventilation, and a lack of child-specific design features as barriers to effective care. These observations are consistent with recent research that highlights the negative impact of poorly designed environments on pediatric patient recovery and emotional well-being (Henry, 2023; Bock et al., 2021).

A dominant theme across responses was the need for environments that prioritize safety, comfort, and sensory engagement. Features such as dedicated play areas, private recovery zones, and interactive design elements were frequently mentioned as essential for reducing anxiety and promoting healing. These design features are not merely aesthetic enhancements but integral components of a therapeutic environment. For instance, child-friendly spatial organization, like clear wayfinding and zoned areas, reduces confusion and delays, directly lessening parental and child stress, which can positively impact physiological responses and adherence to treatment (Zhang et al., 2023). Similarly, interactive play zones are proven to distract children from pain and fear, fostering a sense of normalcy and psychological resilience crucial for recovery (White & Smith, 2023). These preferences align with contemporary best practices in pediatric healthcare design, which advocate for developmentally appropriate and psychologically supportive spaces (Iyanda & Oladapo, 2023).

Furthermore, the stakeholders expressed strong support for the integration of natural ventilation, daylight access, and passive cooling techniques–an approach validated by Salami and Oduwaye (2021), who emphasize the importance of environmentally responsive design in Nigerian healthcare settings. Improved ventilation and natural light reduce exposure to pathogens and promote better sleep cycles, leading to fewer healthcare-associated infections and faster recovery times (Jones & Miller, 2024). Respondents also emphasized the value of cultural sensitivity in design, including the use of familiar materials, local motifs, and family-inclusive spatial arrangements. This reflects the current consensus in healthcare architecture that culturally grounded design fosters emotional connection and increases user satisfaction (Iyanda & Oladapo, 2023).

However, implementing such comprehensive design changes in resource-constrained settings like Ilesha presents potential counterarguments. One concern is the cost implications of extensive renovations or new constructions. While initial investments may be higher, evidence suggests that child-friendly and environmentally conscious designs lead to long-term operational savings through reduced energy consumption, lower rates of re-hospitalization, and increased staff retention due to improved work environments (Green & Smart, 2024). Another counterargument might be that local cultural factors could override the intended benefits of universal design principles. However, the study's findings directly address this by demonstrating strong local support for culturally integrated design elements, suggesting that a context-sensitive approach can synergize with best practices rather than conflict with them.

The consistent findings from this N=15 stakeholder group in Ilesha offer robust insights that are broadly applicable to similar semi-urban and developing contexts facing comparable challenges in pediatric healthcare infrastructure. The consensus on critical issues like spatial organization, ventilation, and the need for child-specific and culturally sensitive design elements resonates with needs identified in other parts of Nigeria and sub-Saharan Africa (Salami et al., 2023; Aina et al., 2024). These localized insights thus provide a foundational framework for regional policy and design guidelines, moving beyond anecdotal evidence to data-driven recommendations.

For implementation, a phased approach is recommended, starting with pilot testing specific design interventions in existing facilities before large-scale application. For example, redesigning a single waiting area or a ward to incorporate interactive elements and improved ventilation could be a 6-9 month pilot, allowing for evaluation of patient outcomes, staff feedback, and cost-effectiveness. Subsequent phases could then scale successful interventions. A realistic timeline for comprehensive redesign, including planning, funding, and construction, typically spans 3-5 years, requiring collaborative efforts between local government, healthcare providers, and community stakeholders. Continuous monitoring and evaluation during and after implementation will be crucial to ensure the designs remain effective and adaptable to evolving needs.

These findings directly informed the spatial configuration and design strategies proposed in this study, ensuring that the pediatric facility responds to both clinical requirements and the lived experiences of its intended users. By incorporating evidence-based and contextually relevant design principles, the facility aims to offer a holistic environment that supports healing, dignity, and child-centered care in Ilesha.

RECOMMENDATIONS

Based on the findings from the questionnaire, interviews, and contextual analysis, the following recommendations are proposed to guide the development and implementation of pediatric healthcare facilities in Ilesha and similar urban centers in Nigeria:

- **Adopt User-Centered Design Approaches**

  Facility designs should prioritize the needs of children, caregivers, and healthcare staff. This includes integrating child-friendly elements such as playful waiting areas. Digital health tools and user-centered design methodologies can enhance facility efficiency and user satisfaction in African healthcare contexts (Irihamye et al., 2025). intuitive signage, and calming color schemes.

- **Provide Spatial Zoning for Functional Efficiency**

  Separate zones should be designated for consultation, treatment, administration, and recreation. This will reduce congestion, enhance wayfinding, and improve the overall experience for patients and staff.

- **Integrate Natural Ventilation and Lighting**

  Architectural design must respond to the local climate by maximizing cross-ventilation and daylighting. This will improve indoor air quality, reduce energy consumption, and create a healthier healing environment.

- **Incorporate Local Cultural Elements**

  The use of local materials, motifs, and culturally familiar color palettes can help foster a sense of belonging and comfort, especially for children and families from rural or indigenous communities.

- **Enhance Accessibility and Safety**

  The design should ensure barrier-free access for all users, including those with disabilities. Safety features such as childproof fixtures, clear sightlines, and supervised play areas must be embedded in the layout.

- **Establish Policy Guidelines for Pediatric Facility Design**

  Government agencies and professional bodies should develop context-specific design standards for pediatric healthcare environments to ensure consistency, quality, and user-centered outcomes across public healthcare infrastructure.

CONCLUSION

This study has demonstrated the critical role of architectural design in addressing the unique needs of pediatric healthcare delivery in a resource-constrained urban context. By integrating user-centered (Sathyanarayanan & Caldas, 2025), environmentally responsive, and culturally sensitive design principles, the research proposed a facility that prioritizes the comfort, safety, and well-being of children, caregivers, and healthcare providers alike.

Findings from the questionnaire and interviews revealed widespread dissatisfaction with current healthcare infrastructure in Ilesha, These findings align with broader trends in sustainable healthcare design, where green-certified facilities demonstrate improved patient outcomes and environmental performance (Arditi et al., 2025). (Henry, 2023) particularly regarding ventilation, spatial layout, and child-appropriate features. The data provided strong justification for a design intervention that not only improves functional efficiency but also enhances the healing experience through thoughtfully planned environments.

The proposed design reflects a replicable model for pediatric healthcare architecture in other Nigerian cities and similar low- and middle-income contexts. It underscores the importance of grounding design solutions in the lived experiences of users and the environmental realities of the setting. This study contributes to the broader discourse on healthcare design in Africa and highlights the potential for architecture to act as a catalyst for improved health outcomes in underserved communities.

Future work should involve post-occupancy evaluations of implemented designs, cross-disciplinary collaboration with health professionals, and policy-level support to scale such user-responsive design approaches in national healthcare planning.

Key Contributions	Practical Impact	Future Directions
Demonstrated critical role of architectural design in pediatric healthcare delivery using user-centered, environmentally responsive design principles	Proposed replicable model for pediatric healthcare architecture in Nigerian cities and similar low- and middle-income contexts	Post-occupancy evaluations, cross-disciplinary collaboration, and policy-level support for scaling user-responsive design approaches

ACKNOWLEDGEMENT

CONFLICTS OF INTEREST

FUNDING

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Citation:

Abiola T. T. (2025). A Child-Centered Design for Pediatric Healthcare in Ilesha, Nigeria: A Contextual Case Study Approach. *SustainE, 3*(3), 408-428. In A. A. Atowoju, E. O. Oyekanmi, A. A. Akinsemolu, & D. M. Duyile (Eds.), *Sustainability, innovation, and development: A Festschrift in honour of Rt. Rev. Prof. Obeka Samuel Sunday* [Special issue]. **https://doi.org/10.55366/suse.v3i3.20**