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EVALUATING SPATIAL LEGIBILITY AND WAYFINDING EFFICIENCY IN LAGOS HEALTHCARE FACILITIES: A MULTI-METHOD ARCHITECTURAL ASSESSMENT

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Abstract

Wayfinding is a critical component of healthcare design because patients and visitors often navigate hospitals while unfamiliar with the environment, under time pressure, or while experiencing physical and psychological stress. This study evaluated wayfinding efficiency and spatial legibility in selected healthcare facilities in Lagos, Nigeria, using a multi-method descriptive design that combined a facility-based cross-sectional user survey with comparative architectural case-study analysis. The survey was administered electronically to 350 adult patients, visitors and staff recruited from three Lagos facilities: Lagos State University Teaching Hospital (LASUTH), Ifako-Ijaiye General Hospital and the National Orthopaedic Hospital, Igbobi. The international hospitals were not survey sites. Survey items covered familiarity, navigation burden, spatial legibility, circulation, visual accessibility, signage, landmarks, psychological responses and navigation outcomes. Quantitative data were analysed descriptively using frequencies and percentages. For design interpretation, the survey findings were triangulated with seven architectural cases comprising the three Lagos facilities and four international precedents: Tata Medical Centre, Jacobs Medical Centre, Meander

Keywords: Wayfinding Efficiency, Spatial Legibility, Post-Occupancy Evaluation, Visual Accessibility, Signage Systems, Lagos.

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Medical Centre and Nemours Children's Hospital. Overall, 43.7% reported getting lost or taking a wrong turn, 52.3% needed to ask staff or other people for directions, and 46.9% spent more than ten minutes actively searching for a destination. Only 40.8% agreed that they could locate destinations quickly and efficiently, while 33.5% reported stress, anxiety or frustration during wayfinding. Positive ratings were modest for floor-plan clarity (45.4%), visual access from the main entrance (44.9%), mental-map support (41.7%), architectural differentiation (45.1%) and prominent landmark availability (36.3%). By comparison, language accessibility of signage (60.9%), logical room/unit numbering (55.7%) and destination-sign legibility (54.8%) received stronger ratings. The findings support an integrated wayfinding system in which spatial hierarchy, visible circulation, landmarks, consistent signage and optional digital support reinforce one another. Because the survey dataset was analysed as a pooled multi-site sample, the results identify cross-site design priorities rather than hospital-specific performance.

Introduction

Healthcare facilities are among the most complex public buildings in which people are required to move purposefully. Unlike navigation in many commercial or recreational environments, hospital journeys are often undertaken because a user needs a specific clinical service, must arrive at a particular location within a limited time, or is accompanying a patient who may already be distressed. The physical and emotional condition of hospital users can reduce attention, memory, and confidence, making the legibility of the environment an important component of service accessibility. Wayfinding therefore has implications beyond convenience: it influences whether users can reach destinations efficiently, whether staff time is diverted to giving directions, and how users perceive the quality and responsiveness of the healthcare environment (Jamshidi *et al*., 2020; Jamshidi *et al*., 2025).

Wayfinding describes the process through which people identify their location, develop a route to a destination, execute movement decisions, and confirm that they remain on the correct path. Contemporary research treats this process as a human-environment interaction rather than simply a matter of reading signs. Architectural configuration, visibility, circulation hierarchy, decision points, landmarks, colour, lighting, numbering systems, digital information and user characteristics operate together to shape navigation performance (Al-Sharaa *et al*., 2022a). In a healthcare setting, the effectiveness of any one component depends on its consistency with the others. A well-designed sign may still fail if the route indicated is spatially ambiguous; likewise, a legible corridor

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network may be undermined by inconsistent names, poorly positioned information, or indistinguishable destinations.

The spatial layout of hospitals deserves particular attention because many healthcare campuses develop incrementally. New clinics, diagnostic units, wards and support buildings are often inserted into existing sites as service demand grows. Although such expansion may be operationally necessary, it can produce fragmented routes, repeated corridor patterns, multiple entrances and changes in vertical circulation that make it difficult for unfamiliar users to construct a reliable mental map. Recent research using visibility analysis and spatial modelling demonstrates that strategic visual access to destination cues and vertical circulation elements can influence route choice and navigation success (Gath-Morad *et al*., 2021; 2024). A Nigerian axial-analysis study similarly found that less complex hospital configurations with longer linear sightlines and fewer turns were associated with lower spatial disorientation than more fragmented layouts (Anselm *et al*., 2024).

Signage remains indispensable but is not a substitute for spatial clarity. Effective signs need readable text, understandable symbols, appropriate contrast, coherent terminology, and placement at the points where users actually make decisions. In a tertiary public hospital, Sahoo *et al*. (2024) showed that a systematic multilingual and colour-coded signage intervention improved navigation support, yet many users still verified routes with staff. This illustrates an important distinction between the presence of signs and user confidence in the overall wayfinding system. The 2025 CSA standard on wayfinding for healthcare facilities also treats facility design, natural orientation, consistent communication, decision-point management, memorable cues, accessibility and emerging technology as parts of one integrated system rather than independent interventions (CSA Group, 2025).

The Nigerian context requires particular consideration. Hospitals serve culturally, linguistically and socioeconomically diverse populations, and many users may be unfamiliar with large institutional buildings. Research from Nigerian hospitals has identified visual accessibility, building layout, signage and inclusive access as important determinants of wayfinding. Ahmed *et al*. (2022) reported that visual access to destinations, circulation crowding and the legibility of entrances affected inclusive wayfinding, while Ahmed *et al*. (2020) linked spatial layout and familiarity with navigation behaviour among unfamiliar hospital users. More recent evidence from Lagos identified inadequate wayfinding and directional signage as part of the accessibility challenges affecting users of a general-hospital environment (Olodeoku *et al*., 2024). Stewart (2024) further highlighted the need for culturally responsive signage in a Nigerian health centre serving users with different expectations and communication backgrounds.

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Lagos is an especially important setting for wayfinding research because its healthcare facilities operate within a large, high-density metropolitan environment and include tertiary, secondary, and specialist hospitals developed across different periods. For patients and visitors who use these facilities infrequently, the burden of deciphering complex layouts can compound the stress of seeking care. However, locally grounded quantitative evidence remains limited on how users simultaneously perceive floor-plan clarity, visual access, circulation, signage, landmarks, dependence on human assistance, search time, stress, and overall navigation satisfaction.

International precedents were incorporated to extend the architectural interpretation rather than the empirical sampling frame. Four international medical centres were reviewed from published architectural documentation because they demonstrate circulation spines, orientation spaces, landmark systems, environmental differentiation and zoning strategies relevant to the navigation problems identified in Lagos. They were not survey sites and no respondents were recruited outside Lagos. This separation allows the user evidence to remain locally grounded while the precedent analysis supplies transferable design lessons.

The present study used a multi-method descriptive approach that combined a cross-sectional user survey with comparative architectural case-study analysis. The aim was to evaluate wayfinding efficiency and user experience in selected healthcare facilities in Lagos and to identify architectural and information-design priorities for healthcare planning. Specifically, the study described users' characteristics and familiarity with the facilities, documented navigation difficulties and outcomes, evaluated perceptions of spatial layout, signage and landmarks, and interpreted these findings alongside selected international and Lagos case studies to derive practical design recommendations.

LITERATURE REVIEW

The Concept of Wayfinding in Healthcare Environments

Wayfinding has evolved from an early emphasis on cognitive mapping to a broader understanding of navigation as a coordinated relationship between environmental information, spatial configuration and human decision-making. In practical terms, a hospital user must know or infer where he or she is, identify a meaningful next destination, choose a route, recognise decision points and confirm progress. Failure at any of these stages can lead to hesitation, backtracking, wrong turns or dependence on another person for assistance. Al-Sharaa *et al*. (2022a) proposed a holistic framework in which both environmental factors and individual characteristics shape wayfinding performance. User-centred evaluation approaches similarly emphasise testing wayfinding systems against users' actual navigation experience (Bubric *et al*., 2021). This

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perspective is useful in healthcare research because it prevents the common error of treating navigation as a signage-only phenomenon.

Healthcare wayfinding also differs from many other forms of navigation because the destination is usually purposeful and may be clinically important. A user searching for radiology, an outpatient clinic, a theatre waiting area, or a pharmacy is not merely exploring a building. Delays may affect appointment schedules, increase emotional strain, and place extra demands on staff. Jamshidi *et al*. (2020) therefore conceptualized wayfinding as an environmental-design issue with functional and experiential consequences. The user's assessment of a healthcare environment is partly influenced by how much effort is required to understand it, how confidently a route can be followed, and whether the environment provides reassurance in the face of uncertainty.

Spatial Configuration, Legibility and Visual Accessibility

Spatial legibility refers to the degree to which the organisation of a building can be understood and remembered. In a legible hospital, primary routes are identifiable, important destinations are visually or conceptually connected to circulation, and changes in direction occur at comprehensible nodes. In a poorly legible environment, repetitive corridors, weak spatial hierarchy, concealed circulation cores, and disconnected additions create competing route possibilities. The design of hospital layouts is therefore not merely a functional exercise in departmental adjacency; it also shapes the information available to users as they move through the building (Bayraktar Sari & Jabi, 2024). Comparative case-study research has also applied a spatial-design perspective to wayfinding in emergency-room environments (Haj-Saleh & Çağnan, 2025).

Visibility is one of the strongest architectural mechanisms for reducing uncertainty. Gath-Morad *et al*. (2021) demonstrated that visual information influences vertical wayfinding, while Gath-Morad *et al*. (2024) showed that strategic visibility of actionable destinations can shape navigation behaviour in multilevel buildings. These findings suggest that visibility should be considered at entrances, major intersections, lift lobbies, stair locations, and transitions between departments. In Nigerian hospitals, Ahmed *et al*. (2022) similarly identified inadequate visual access and indistinct nodes as barriers to wayfinding. Anselm et al. (2024) found that configurations with fewer turns and better linear visual connectivity were less disorienting than more complex alternatives.

The capacity to form a mental map is closely related to legibility. Users do not need a complete architectural understanding of a hospital, but they benefit from a simple organizing idea: a main street, central atrium, clearly differentiated wings, a courtyard sequence, or another strong spatial structure. Once this organising logic is understood, users can recover more easily after an error. Repetitive and undifferentiated corridors make such recovery difficult because there are few cues with which to verify location.

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Signage, Information Hierarchy and Decision Points

Graphic information provides explicit route guidance and is essential in large healthcare facilities. Effective signage systems use a consistent naming convention, typography, colour, symbols, directional arrows and placement logic. Information should appear before or at decision points rather than after the user has already committed to a route. Excessive information can be as problematic as insufficient information because users under stress may struggle to scan long destination lists. Progressive disclosure, in which only the information needed for the next stage of a journey is presented, can reduce cognitive burden and support route confirmation. Simulation-based research has also examined how the positioning of wayfinding signs can be optimised within hospital environments (Guo & He, 2022).

Deng, Romainoor and Zhang (2023) demonstrated that hospital signage requirements extend beyond visibility to include user expectations, consistency and reassurance. Sahoo *et al*. (2024) showed the value of multilingual, colour-coded signage in a large public hospital while also demonstrating that staff confirmation may continue when users lack confidence. In Nigeria, Stewart (2024) emphasized culturally responsive signage at the O.B. Lulu Briggs Health Center, illustrating the importance of language, symbolism, and locally meaningful communication. These studies support a systems approach in which signage is coordinated with the architecture rather than applied as a later corrective layer.

Landmarks, Colour, Lighting and Environmental Differentiation

Landmarks are memorable environmental features that help users recognise where they are and confirm that they are moving in the intended direction. In healthcare environments, landmarks may be architectural features such as atria, stairs, courtyards or double-height spaces; interior elements such as artworks, colour zones or material changes; or external views and natural elements. Their effectiveness depends on distinctiveness, visibility and strategic location. A landmark that is visually attractive but hidden from decision points contributes little to navigation.

Colour and material differentiation can strengthen environmental identity when they are applied systematically. Departmental zones may be associated with a limited colour palette, and changes in flooring, ceiling treatment or wall finish can reinforce transitions. However, colour should supplement rather than replace text and symbols, especially for users with colour-vision limitations. Lighting is equally important because it can make signs and destinations more visible, draw attention to entrances and circulation elements, and create a hierarchy between primary and secondary routes. The broader principle is architectural differentiation: users should be able to distinguish one

meaningful place from another without depending on a continuous stream of written instructions.

Inclusive Wayfinding and Diverse User Needs

Hospitals serve users with different ages, levels of education, languages, mobility, vision, hearing, and cognitive capacity. Inclusive wayfinding therefore requires multiple reinforcing cues. *Ahmed et al*. (2022) argued that visual accessibility should support a wide range of unfamiliar users, while Morag et al. (2024) emphasized that diverse abilities and needs should be incorporated into hospital wayfinding evaluation. Pouyan *et al*. (2024), using virtual environments, found that older adults benefited from circulation patterns and design aids that reduced navigational complexity and made destinations easier to recognise.

Universal design principles are relevant to both physical access and information access. Signs should be positioned where they can be seen from standing and seated eye levels, routes should avoid unnecessary physical barriers, and information should not depend exclusively on small text. Users with low literacy or language differences benefit from pictographs, consistent icons and colour used in conjunction with words. Olodeoku *et al*. (2024), in a Lagos hospital setting, reported that shortcomings in wayfinding signage compounded broader accessibility problems for people with disabilities. The implication is that a wayfinding system can be considered efficient only if it supports users who are least familiar with the environment and those with reduced physical or sensory capacity.

Digital Wayfinding and Hybrid Navigation Systems

Digital tools are increasingly used to supplement physical wayfinding. Interactive kiosks, QR-linked maps, mobile web applications, Bluetooth beacons and indoor positioning can provide personalised routes and update information more rapidly than static signs. Their potential is particularly relevant to large hospitals with multiple floors and changing services. Salins *et al*. (2025) reported that a browser-based hospital wayfinding system was positively received and was associated with users' perceptions of reduced navigation time and stress. Virtual-reality environments have also been used to test revisions to the distribution of way-showing devices in existing healthcare facilities (Al-Sharaa *et al*., 2022b).

Digital systems should nevertheless be treated as an additional layer rather than a replacement for legible architecture. Not every user owns a suitable device, has reliable connectivity or feels comfortable using a navigation application. A robust hospital should remain understandable without technology while offering digital assistance to those who prefer it. The best hybrid systems use the same destination names, colour logic,

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landmarks and route hierarchy across physical signs, maps and digital interfaces so that users do not encounter conflicting information.

Wayfinding Outcomes: Search Time, Stress, Assistance and Satisfaction

Wayfinding efficiency can be assessed through objective and subjective outcomes. Objective approaches may measure travel time, route length, wrong turns, hesitation or task completion, whereas post-occupancy surveys capture perceived ease, confidence, stress and satisfaction. In existing hospitals, user-reported search time and the need to ask for directions are particularly useful operational indicators because they reveal whether the physical environment supports independent navigation.

The reliance on staff for directions has organizational consequences. Clinical and administrative employees who are repeatedly interrupted to guide visitors lose time that could be devoted to primary duties. Jamshidi *et al*. (2025) documented staff perceptions of wasted time and frustration associated with ineffective wayfinding in hospitals. Similarly, the persistent checking of routes reported by Sahoo *et al*. (2024) shows that a user may eventually arrive at the correct destination but still experience an inefficient journey. Therefore, success should not be defined only as eventual arrival; confidence, independence, time, and emotional burden are also important.

Nigerian Evidence and the Research Gap

Existing Nigerian studies demonstrate that spatial configuration, visibility, signage and inclusive access are relevant to hospital wayfinding, but the evidence base remains relatively small compared with studies from Europe, North America and Asia. Broader reviews show that indoor wayfinding research has expanded across multiple environmental and methodological approaches (Ghamari & Sharifi, 2021). Within Nigeria, Ahmed *et al*. (2020) examined the influence of spatial layout on unfamiliar users, Ahmed *et al*. (2022) focused on visual accessibility, and Anselm *et al*. (2024) used axial analysis to compare spatial disorientation across hospital layouts. These studies provide important architectural evidence but do not eliminate the need for user-experience data from other urban contexts.

The Lagos setting adds value because healthcare campuses are exposed to intense demand, repeated adaptation, and diverse user populations. The present study extends the Nigerian literature by simultaneously documenting the profile and familiarity of users, their experience of wrong turns and staff dependence, their perceptions of floor-plan clarity and visual access, the performance of signage and landmarks, navigation-related stress, overall satisfaction and self-reported search time. This multi-domain assessment supports a more integrated interpretation of hospital wayfinding and provides a basis for

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design recommendations suited to both new medical centres and the retrofit of existing facilities.

STUDY METHODOLOGY

Research Design

The study adopted a multi-method descriptive design comprising two complementary components: a cross-sectional user survey and a comparative architectural case-study analysis. The survey captured users' experiences and perceptions of wayfinding at a single period of data collection, while the case-study component examined the spatial and environmental features through which selected healthcare facilities support or constrain navigation. The two components addressed the same wayfinding domains and were integrated during interpretation. The case studies were used for contextual and design comparison rather than as statistically comparable samples.

Study Area and Survey Facilities

The study was conducted in Lagos State, Nigeria. The three survey facilities were Lagos State University Teaching Hospital (LASUTH), Ikeja; Ifako-Ijaiye General Hospital, Ifako-Ijaiye; and the National Orthopaedic Hospital, Igbobi, Lagos. These facilities represent tertiary, secondary and specialist healthcare settings with different institutional histories, scales and spatial configurations. They were purposively selected to provide variation in facility type and wayfinding context, while also meeting practical criteria of operational status, accessibility and willingness to participate. All empirical questionnaire data were collected from users of these three Lagos facilities. The international facilities described in the architectural case-study component were design precedents only and did not contribute survey respondents.

Architectural Case-Study Component

The comparative architectural component comprised seven purposively selected cases: four international medical-centre precedents—Tata Medical Centre, Kolkata; Jacobs Medical Centre, San Diego; Meander Medical Centre, Amersfoort; and Nemours Children's Hospital, Orlando—and the three Lagos survey facilities. The international precedents were selected because published architectural documentation clearly illustrated contrasting strategies for public circulation, visual orientation, landmarks, environmental differentiation and zoning that were relevant to the study objectives. The Lagos cases provided local contextual comparison. Published architectural documentation was used for the international cases, while the Lagos cases drew on field and case-study documentation. A common analytical framework was applied to all seven cases, focusing on primary circulation hierarchy, visual accessibility, vertical circulation,

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landmarks, environmental differentiation, public-clinical zoning, daylight/environmental cues and signage/information systems. The case studies were used for interpretive design comparison and were not treated as survey sites or statistically comparable samples.

Study Population and Sample Size

The survey population comprised adult patients, visitors and staff using the three selected Lagos healthcare facilities during the study period. The minimum sample size was estimated using Cochran's formula, $n = Z^2p(1 - p)/d^2$. With $Z = 1.645$ for a 90% confidence level, $p = 0.50$ and $d = 0.05$, the minimum required sample was approximately 271 respondents. A total of 350 completed questionnaires was obtained, exceeding the minimum requirement. The final analytical dataset was pooled across the three facilities and did not retain a valid facility identifier for site-specific tabulation. Hospital-specific respondent counts therefore cannot be reconstructed reliably from the available dataset and are not retrospectively imposed. All percentages reported in this article refer to the pooled multi-site sample and should not be interpreted as estimates for an individual hospital.

Sampling Technique

A two-stage non-probability sampling approach was used. First, the three Lagos healthcare facilities were purposively selected to capture tertiary, secondary and specialist settings with differing spatial configurations. Second, eligible adult patients, visitors and staff who were physically present at the selected facilities during the data-collection period and willing to participate were recruited using convenience sampling until 350 completed questionnaires were obtained. The questionnaire was electronic, but recruitment remained facility-based rather than unrestricted online sampling. This approach was used for a post-occupancy survey in which no complete sampling frame of transient patients and visitors was available.

Survey Instrument and Measurement

Data were collected with a structured electronic post-occupancy questionnaire covering respondent characteristics and facility familiarity, general navigation experience, architectural and spatial legibility, signage and information systems, landmarks and environmental cues, psychological responses and navigation outcomes. The reported wayfinding measures comprised 27 five-category agreement items: eight items on general navigation experience and outcomes, eight items on architectural design and spatial legibility, and eleven items on signage, environmental cues and landmarks. In addition, one binary item recorded whether a respondent had become lost or taken a wrong turn, and one categorical item recorded self-reported search time. For presentation, the five original agreement categories were collapsed into three reporting

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groups: the two disagreement categories, the neutral midpoint, and the two agreement categories. This preserved the direction of responses while keeping the descriptive tables concise.

The questionnaire items were analysed individually rather than summed into a single wayfinding score or composite psychometric subscales. For that reason, a global Cronbach alpha coefficient is not reported, because internal-consistency reliability would imply a common latent scale that was not used in the analysis. Formal construct validation was also not undertaken in this descriptive post-occupancy evaluation; this is acknowledged as a methodological limitation. The item domains were interpreted in relation to the architectural wayfinding constructs reviewed in the literature and were used as descriptive indicators rather than as a validated diagnostic scale.

Data Analysis

Quantitative responses were analysed descriptively using frequencies and percentages. Five-category agreement items were collapsed into disagree, neutral and agree groupings for reporting, while binary and categorical variables retained their original response structure. The architectural case studies were analysed comparatively using the common domains of circulation hierarchy, visual accessibility, vertical circulation, landmarks, environmental differentiation, public-clinical zoning, daylight or environmental cues, and signage or information systems. Survey findings and case-study observations were integrated at the interpretation stage to derive design implications. No hospital-level statistical comparison was undertaken because the pooled analytical dataset did not retain a valid facility identifier.

DATA PRESENTATION, RESULTS AND DISCUSSION

Characteristics of Respondents and Facility Familiarity

A total of 350 respondents were represented in the survey. The sample was predominantly female (68.0%) and concentrated in younger adult age groups: 55.7% were aged 25-34 years, 22.3% were aged 35-44 years and 20.3% were aged 18-24 years. No respondent was recorded in the 45-54-year category, while only 1.7% were aged 55 years and above. The educational profile was high: 51.1% reported tertiary education and 44.0% postgraduate education, giving 95.1% with tertiary or postgraduate education. This pronounced educational concentration and the absence of respondents aged 45-54 years constrain representativeness and require caution when extending the findings to older adults or people with lower literacy. At the same time, the persistence of navigation difficulty in a highly educated sample indicates that the reported problems cannot be attributed solely to difficulty reading conventional text-based signs.

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Visitors constituted 46.3% of respondents and patients 41.4%, while staff/workers represented 12.3%. Thus, most responses came from non-staff users who were less likely than regular staff to possess detailed insider knowledge of the buildings. However, because recruitment was by convenience sampling, this distribution should not be treated as statistically representative of the wider user population. Facility use was generally infrequent: 74.3% visited only occasionally and 17.1% rarely or for the first time, giving 91.4% of respondents who were infrequent users. Only 12.3% described themselves as very or extremely familiar with the layout, whereas 50.6% were slightly familiar or not familiar at all.

Table 1: Selected characteristics of respondents and facility familiarity (N = 350)

Characteristic	Category	Frequency (n)	Percent (%)
Gender	Female	238	68.0
	Male	112	32.0
Reported age group	18–24 years	71	20.3
	25–34 years	195	55.7
	35–44 years	78	22.3
	45–54 years	0	0.0
	55 years and above	6	1.7
Education	Secondary	17	4.9
	Tertiary (Diploma/Undergraduate)	179	51.1
	Postgraduate	154	44.0
Primary role	Patient	145	41.4
	Staff/worker	43	12.3
	Visitor	162	46.3
Visit frequency	Daily/weekly/monthly	30	8.6
	Occasionally (few times/year)	260	74.3
	Rarely/first time	60	17.1
Layout familiarity	Extremely/very familiar	43	12.3
	Moderately familiar	130	37.1
	Slightly/not at all familiar	177	50.6
Mobility, visual or cognitive impairment	Yes	33	9.4
	No	317	90.6

Note: *Frequencies for the reported age categories sum to N = 350; no respondent was recorded in the 45–54-year category.*

The demographic pattern represents an important sampling limitation. The complete absence of respondents aged 45-54 years, the very small proportion aged 55 years and above (1.7%), and the concentration of tertiary/postgraduate education (95.1%) mean that

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the pooled findings predominantly reflect younger, highly educated users. Although 9.4% reported a mobility, visual or cognitive impairment, this subgroup was also relatively small. Older adults, lower-literacy users and people with disabilities may encounter different or greater challenges in complex hospitals. The limitation is comparable to underrepresentation noted in Nigerian wayfinding research (Ahmed et al., 2022) and should be addressed through purposive or stratified recruitment in future post-occupancy evaluations.

General Wayfinding Experience and Navigation Burden

The results demonstrate that navigation difficulties were not isolated events. While 46.9% agreed that the facility was easy to navigate as a newcomer, 26.2% disagreed and 26.9% were neutral. More directly, 43.7% reported in a binary item that they had become lost or taken a wrong turn during their visit. In the categorical item on delay or disorientation, poor signage or directional information was the most frequently selected issue (32.6%), followed by confusing layout (24.9%), lack of maps or digital aids (23.4%) and asking for help (17.4%). Only 1.4% reported no delay or loss in that item.

The persistence of wrong turns among a largely educated sample of infrequent users is consistent with the proposition that wayfinding difficulties arise from interactions between people and the environment rather than from one information component alone. Nigerian spatial studies have similarly shown that complex layout configuration, multiple turns and reduced visual connectivity can intensify disorientation (Ahmed *et al*., 2020; Anselm *et al*., 2024). International evidence also supports the importance of visual access and decision-point structure in route choice (Gath-Morad *et al*., 2021; Gath-Morad *et al*., 2024).

Table 2: Selected wayfinding experiences and outcomes (pooled sample, N = 350)

Indicator	Disagree/No (%)	Neutral (%)	Agree/Yes (%)
Easy to find way as a newcomer	26.2	26.9	46.9
Reported getting lost/taking a wrong turn (binary)*	56.3	—	43.7
Existing wayfinding system reduced stress/anxiety	29.4	31.4	39.2
Confident locating specialised areas	26.3	27.4	46.3
Found destination quickly and efficiently	28.0	31.1	40.8
Needed to ask staff/others for directions	18.3	29.4	52.3
Experienced stress, anxiety or frustration	37.4	29.1	33.5
Agreed that a destination was missed/a wrong turn was taken (Likert item)	37.1	27.7	35.2
Overall satisfied with ease of navigation	29.4	26.9	43.7

Note: *Likert responses are collapsed from the five original response categories. *For the binary wrong-turn item, the first column represents No and the final column represents Yes.*

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All values are pooled across the three Lagos survey facilities; they should not be interpreted as facility-specific performance estimates.

Dependence on human assistance was particularly notable. More than half of respondents (52.3%) agreed that they had to ask staff members or other people for directions, while only 18.3% disagreed. This is a practical measure of incomplete navigational autonomy. The finding resembles the experience reported by Sahoo *et al.* (2024), where a comprehensive signage intervention did not eliminate users' tendency to verify routes with staff. From an operational perspective, the importance of this finding extends to staff productivity, because repeated direction-giving represents an avoidable interruption and an indirect cost of environmental complexity (Jamshidi et al., 2025).

Navigation time reinforces the same pattern. Although 52.9% spent ten minutes or less actively searching for a destination, 46.9% spent more than ten minutes: 26.3% searched for 11–15 minutes, 14.3% for 16–20 minutes and 6.3% for more than 20 minutes. Only 40.8% agreed that they could find their desired destination quickly and efficiently. These results should be interpreted as self-reported rather than directly timed performance, but they nonetheless indicate that a substantial group experienced prolonged searching. In healthcare environments, such delays can contribute to appointment stress and may be particularly burdensome for people in pain, older users and caregivers managing children or dependent relatives.

Table 3: Self-reported time spent actively searching for a destination (pooled sample, N = 350)

Estimated search time	Frequency (n)	Percent (%)
Less than 5 minutes	98	28.0
5–10 minutes	87	24.9
11–15 minutes	92	26.3
16–20 minutes	50	14.3
More than 20 minutes	22	6.3
Unspecified	1	0.3

Architectural Design and Spatial Legibility

The architectural ratings were generally moderate rather than strongly positive. Only 45.4% agreed that the overall floor plan was simple and easy to understand, while 24.0% disagreed and 30.6% were neutral. Similarly, 44.9% reported adequate visual access to a destination or a clear path from the main entrance. These values suggest that the early stage of a user's journey may not provide a sufficiently clear spatial overview. The entrance is a critical orientation point because it is where unfamiliar users construct their

first mental representation of the building and decide whether to rely on direct sight, signs, a map or human assistance.

Circulation continuity received a comparatively stronger rating, with 54.9% agreeing that corridors and walkways were continuous and logically connected. However, only 47.2% regarded intersections and junctions as clearly defined, and 47.1% believed the layout minimised unnecessary turns or direction changes. This difference is important: a circulation system may be physically connected yet still be cognitively demanding if users encounter ambiguous branches and repeated decisions. Anselm *et al*. (2024) identified fewer turns and stronger visual connectivity as characteristics of less disorienting hospital layouts, while Ahmed *et al*. (2022) emphasized visibility of core destinations and high-traffic pathways as a component of inclusive wayfinding.

Only 41.7% agreed that the building helped them form a clear mental map, and 45.1% considered architectural features sufficiently distinctive to differentiate one area from another. These are central measures of legibility. Where spaces look similar, users may know that they are moving through the building without being able to confirm whether they are approaching the correct zone. This underlines the importance of coherent spatial identity: departmental wings, major nodes and vertical circulation should differ enough in form, material, light, colour or landmark character to support recognition without introducing visual clutter.

Table 4: User ratings of architectural design and spatial legibility (pooled sample, N = 350)

Architectural/spatial attribute	Disagree (%)	Neutral (%)	Agree (%)
Overall floor plan simple and clear	24.0	30.6	45.4
Destination/path visually accessible from main entrance	29.7	25.4	44.9
Circulation paths continuous and logically connected	15.4	29.7	54.9
Intersections/decision points clearly defined	21.4	31.4	47.2
Waiting/circulation spaces not overly crowded	34.6	23.7	41.8
Building supports formation of a clear mental map	24.9	33.4	41.7
Layout minimises unnecessary turns/direction changes	24.3	28.6	47.1
Distinctive architectural features differentiate areas	30.6	24.3	45.1

The relatively modest rating for crowding is also relevant. Only 41.8% agreed that waiting and circulation spaces were not overly crowded, while 34.6% disagreed. Congestion can obscure signs, reduce sightlines, interrupt direct walking paths and increase the

perceived complexity of decision points. Wayfinding design therefore needs to be coordinated with waiting-area planning and pedestrian flow rather than addressed as an isolated graphic system.

Environmental Cues, Signage and Information Systems

Signage attributes generally received somewhat stronger evaluations than the architectural attributes, although no signage item approached universal approval. Language accessibility was the highest-rated signage characteristic, with 60.9% agreement. Logical room and unit numbering received 55.7% agreement, destination-sign legibility 54.8%, sign placement 52.3% and availability of directional signs at decision points 50.3%. Clear symbols and pictographs were positively rated by 46.6%, while 44.9% found supplementary visual cues such as colour strips helpful.

This pattern suggests that signage was present and partially functional but not sufficiently coherent to eliminate uncertainty. A system in which approximately half of users rate signs positively while more than half still report asking other people for directions should not be interpreted as a successful signage outcome. Instead, it indicates that signs are operating within a spatial environment that remains difficult for many users to interpret. This interpretation is consistent with Sahoo et al. (2024), who found that users may still seek human confirmation even after a signage improvement, and with the integrated approach proposed by CSA Group (2025), in which spatial design, communication consistency, decision-point management and digital support form one wayfinding programme.

The language finding is nevertheless encouraging in a multilingual urban context. Stewart (2024) emphasized that hospital wayfinding in Nigeria should be culturally responsive and should acknowledge different expectations and communication practices. Language accessibility should therefore be retained while greater attention is given to consistent icons, simple vocabulary, standardised destination names and information hierarchy. Digital maps, appointment messages and physical signs should use identical nomenclature so that users do not have to translate between competing labels for the same place.

Landmarks and Environmental Reference Points

Landmarks were one of the weaker components of the reported wayfinding system. Only 36.3% agreed that prominent and distinctive objects were available and useful as landmarks, the lowest positive rating among the major environmental items. Visibility of landmarks from a distance was positively rated by 42.3%, and 46.0% agreed that landmarks helped confirm location and direction. Natural elements such as courtyards or distinctive trees also received 46.0% agreement.

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The weakness of landmark provision is important because landmarks support both route learning and error recovery. A user who becomes uncertain after a turn can reorient more easily if a visible atrium, artwork, courtyard, staircase, or external view provides an unmistakable reference. When landmarks are visually weak or located away from decision points, users may have to rely on written information at every stage of the journey. This increases cognitive demand and makes navigation more vulnerable to sign omissions or crowding. In new medical centres, landmarks should therefore be planned as part of the circulation structure; in existing hospitals, distinctive environmental features can be introduced strategically at major nodes during renovation.

Table 5: User ratings of signage, environmental cues and landmarks (pooled sample, N = 350)

Wayfinding feature	Disagree (%)	Neutral (%)	Agree (%)
Clear symbols/pictographs on signs	26.3	27.1	46.6
Language accessibility of sign text	15.7	23.4	60.9
Directional signs available at decision points	22.3	27.4	50.3
Room/unit numbering consistent and logical	20.3	24.0	55.7
Supplementary visual cues (e.g., colour strips) helpful	26.6	28.6	44.9
Sign placement appropriate for diverse users	18.6	29.1	52.3
Destination signs clear and legible	12.9	32.3	54.8
Prominent/distinctive landmark objects available	31.4	32.3	36.3
Landmarks visible from distance/decision points	27.7	30.0	42.3
Landmarks help confirm location and direction	24.9	29.1	46.0
Natural elements function as useful landmarks	23.4	30.6	46.0

Psychological Experience and Overall Satisfaction

Wayfinding affected psychological experience for a meaningful minority of respondents. Only 39.2% agreed that the existing wayfinding system reduced stress and anxiety, while 29.4% disagreed. In a separate outcome item, 33.5% agreed that they experienced stress, anxiety or frustration while trying to find their way. Overall satisfaction with ease of navigation was 43.7%, with 29.4% dissatisfied and 26.9% neutral. These values indicate that the facilities were navigable for some users but did not provide a consistently reassuring experience.

The psychological dimension is important because healthcare users often arrive with baseline anxiety that is unrelated to the building itself. Environmental confusion can compound that anxiety by creating uncertainty about arrival time, missed appointments or access to clinical services. Pouyan *et al*. (2024) found that difficult circulation patterns were associated with disorientation and anxiety in both younger and older users. Digital

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tools can help when carefully integrated: Salins *et al.* (2025) reported that users of a hospital wayfinding application perceived reduced navigation time and psychological stress. However, the present findings suggest that digital intervention should be introduced alongside architectural and signage improvements, not as a substitute for them.

Integrated Interpretation of the Findings

Taken together, the pooled results reveal a recurring discrepancy between the moderate availability of signage and the continued burden of navigation. Language accessibility, room numbering and destination-sign legibility were among the stronger-rated features, yet more than half of respondents still reported asking staff or other people for directions, 43.7% reported a wrong turn, and 46.9% spent more than ten minutes searching. Because facility identifiers were unavailable in the analytical extract, these patterns describe the combined multi-site sample and cannot establish which hospital performed better or worse. Their value lies in identifying recurring design domains that warrant closer site-specific investigation.

The most important implication is that adding more signs to a confusing configuration is unlikely to produce an optimal system. Signage should reinforce a readable spatial hierarchy. Primary public routes should be obvious, major destinations should be visible or strongly signalled from decision nodes, vertical circulation should be easy to identify, and each major zone should possess a distinctive environmental identity. Where the existing layout cannot be substantially altered, renovation should focus on reducing unnecessary decision points, opening sightlines where feasible, establishing clear route hierarchies and adding memorable landmarks that correspond to the graphic information system.

The findings also support the concept of social wayfinding as an operational indicator. Asking staff for directions is not necessarily a failure in every circumstance; human help is an important part of patient-centred service. However, when more than half of users depend on such assistance, the built environment may be transferring navigation work from the user to staff. This can be particularly problematic in busy public hospitals. Wayfinding audits should therefore record not only signs and maps but also the locations where staff are most frequently asked for directions, because these points may reveal hidden spatial or information-design failures.

Finally, the study demonstrates the value of a Nigerian evidence base. International design guidance cannot be applied mechanically without considering language, culture, maintenance capacity, technology access and patterns of hospital expansion. The local studies of Ahmed *et al.* (2020, 2022), Anselm *et al.* (2024), Olodeoku *et al.* (2024) and Stewart (2024) show that the core principles of visibility, legibility, inclusivity and clear

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communication remain relevant in Nigeria, while the specific design response must be adapted to local users and institutional resources.

COMPARATIVE CASE STUDY ANALYSIS

The survey findings were complemented by architectural case studies selected to illustrate how different healthcare environments organise circulation, landmarks, visual access and information systems. Four international medical centres were reviewed as design precedents, while three Lagos facilities were examined as contextually relevant cases. The purpose of the comparison was not to rank the hospitals, but to identify spatial strategies that can be translated into practical wayfinding principles for healthcare design in Nigeria. The comparative reading focused on the legibility of the primary circulation system, visibility of destinations, strength of landmarks, relationship between public and clinical zones, use of daylight and environmental cues, and the extent to which signage supports rather than compensates for the underlying architectural configuration.

The case-study evidence is particularly useful when interpreted alongside the respondent survey. The survey showed substantial wrong-turn experience, dependence on staff assistance, prolonged search time and only moderate ratings of floor-plan clarity and landmark effectiveness. The precedent studies therefore provide a design-oriented explanation of what a more legible system can look like in practice: a recognisable main route, fewer ambiguous decision points, visible vertical circulation, differentiated zones, memorable reference points and layered information at the point where decisions are made.

Case Study 1: Tata Medical Centre, Kolkata, India

Tata Medical Centre is a specialised oncology facility whose spatial organisation demonstrates the value of generous public circulation and visually open waiting environments. The case-study documentation shows a broad, daylit internal circulation zone with seating, artwork and strong visual continuity. Rather than treating the corridor as residual movement space, the design gives the public route an identifiable architectural character. This supports orientation because users can recognise the primary movement zone as a stable reference while approaching diagnostic, treatment and support areas.

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Figure 1: Public waiting and circulation environment at Tata Medical Centre, Kolkata
Source: ArchDaily

For wayfinding, the principal lesson is the usefulness of combining route clarity with environmental comfort. Large glazed openings, long sightlines and a restrained palette reduce visual obstruction, while artwork and waiting clusters create memorable intermediate reference points. In a healthcare setting, these features can reduce the need to repeatedly decode signs because the architecture itself communicates direction and hierarchy. The approach is relevant to the Lagos findings, where only 44.9% of respondents reported satisfactory visual access from the entrance and only 41.7% felt able to form a clear mental map. A similarly legible public spine, reinforced by daylight and landmarks, could support faster orientation in large Nigerian medical centres.

Case Study 2: Jacobs Medical Centre, San Diego, United States of America

Jacobs Medical Centre illustrates a high-capacity academic hospital in which the entrance and lobby function as a major orientation device. The documented reception environment combines a tall open volume, visible circulation, curved interior forms and a clearly expressed stair. This configuration allows the arriving user to read several spatial relationships immediately rather than encountering an enclosed lobby that conceals subsequent routes. The central space therefore performs both social and navigational functions.

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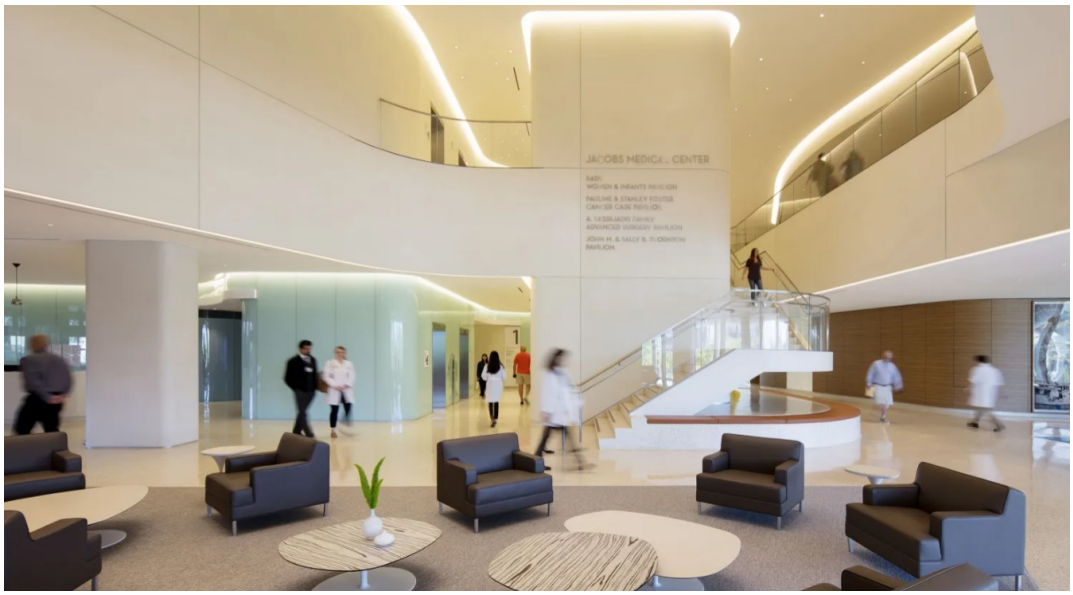

Figure 2: Reception and main orientation space at Jacobs Medical Centre, San Diego
Source: ArchDaily

The case reinforces the importance of strategic visibility at the beginning of the journey. When reception, stairs, lifts and major corridors are perceptually connected, users can construct an initial mental model before they begin moving deeper into the hospital. This reduces uncertainty at the first decision point and gives signage a clearer architectural context. The lesson is especially relevant to the survey finding that fewer than half of respondents considered destinations or clear paths readily visible from the main entrance. For future medical-centre design, entrance halls should therefore be planned as orientation spaces rather than merely as security, registration or waiting zones.

Case Study 3: Meander Medical Centre, Amersfoort, The Netherlands

Meander Medical Centre provides one of the clearest examples in the case-study set of an internal-street approach to hospital planning. The facility is organised around a principal axis known as De Laan, from which identifiable public squares and functional zones are accessed. The architectural concept reduces the number of competing primary routes and gives users a persistent spatial reference. Instead of navigating a sequence of similar corridors, patients and visitors repeatedly return to a recognisable organising spine.

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Figure 3: Meander Medical Centre, Amersfoort, illustrating a clearly articulated hospital form
Source: ArchDaily

Daylight, external views and landscaped courtyards strengthen this organisation by providing orientation cues that change with location. The design demonstrates that landmarks do not have to be applied graphics; they can be spaces, views, atria, gardens or changes in volume that are embedded in the building. This is directly relevant to the Lagos survey, where prominent landmarks received one of the weakest ratings and only 36.3% of respondents agreed that distinctive objects functioned effectively as reference points. A central internal street supported by visible courtyards or atria would therefore address both circulation complexity and landmark deficiency at the architectural level.

Case Study 4: Nemours Children's Hospital, Orlando, United States of America
Nemours Children's Hospital was conceived as a family- and child-centred healthcare environment. The architectural expression, extensive glazing, landscaped setting and deliberate use of colour and art demonstrate how environmental identity can support both emotional reassurance and spatial differentiation. In paediatric care, where patients and caregivers may already be anxious, memorable environmental features can help transform a complex medical building into a sequence of recognisable places.

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Figure 4: Nemours Children's Hospital, Orlando, showing a distinctive and highly identifiable architectural character
Source: ArchDaily

The case study supports an important distinction between decoration and wayfinding. Colour, landscape and artwork become useful only when they are coordinated with zones, routes and decision points. When that coordination is achieved, the environment supplies redundant information: a destination may be recognised by its name, its colour family, a nearby landmark and its location on the main route. Such redundancy is beneficial in diverse healthcare populations because it reduces dependence on literacy or a single mode of communication. For Lagos hospitals, this suggests that colour coding and biophilic features should be integrated with departmental zoning and signage rather than applied as isolated aesthetic additions.

Case Study 5: Lagos State University Teaching Hospital (LASUTH), Ikeja, Lagos

LASUTH represents the realities of a large Nigerian teaching-hospital campus that has evolved over time. Its multiple departments, specialist units and continuing physical development create the type of complex destination structure in which users must repeatedly make route decisions. The outpatient environment documented in the thesis shows a functional clinical frontage but also demonstrates the importance of making departmental identity, entrances and onward routes unmistakable within a busy campus.

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Figure 5: Outpatient Department environment at Lagos State University Teaching Hospital (LASUTH)
Source: Author's field survey/case-study documentation, 2026

For wayfinding, the central challenge in incrementally developed hospitals is that new buildings and services may be added without a corresponding reorganisation of the public circulation hierarchy. As a result, signs are often expected to repair an underlying spatial problem. The survey findings are consistent with this concern: confusing layout, poor signage and lack of maps or digital aids were all reported as causes of delay or disorientation. A practical response for facilities such as LASUTH is a campus-wide wayfinding audit that identifies a small number of primary public routes, standardises destination naming and sign families, establishes clearly marked orientation hubs, and provides consistent maps at entrances and major intersections.

Case Study 6: Ifako-Ijaiye General Hospital, Lagos

Ifako-Ijaiye General Hospital provides a secondary-care comparison within the Lagos context. Unlike very large teaching hospitals, a general hospital may have a smaller overall footprint, but users can still experience uncertainty when service points, maternity and child-care units, clinics and support departments are distributed across separate blocks or added in phases. The case-study photograph of the maternal and child-care entrance shows how destination identity and directional information become

especially important at the interface between outdoor movement and internal circulation.



Figure 6: Maternal and Child Care Centre entrance at Ifako-Ijaiye General Hospital, Lagos
Source: Author's field survey/case-study documentation, 2026

The wayfinding lesson from this case is the need for continuity between campus navigation and interior navigation. A user should not have to relearn the information system after entering a building. Department names, colours, symbols and map references should remain consistent from the gate and parking areas through reception and into internal decision points. This continuity is also important for emergency access, caregivers and users unfamiliar with the facility. In the survey, more than half of respondents reported relying on staff or other people for directions; strengthening arrival information and ensuring that directional signs are available before each decision point can reduce this dependence.

Case Study 7: National Orthopaedic Hospital, Igbobi, Lagos

The National Orthopaedic Hospital, Igbobi, is a specialist referral facility with a campus arrangement that includes wards, outpatient functions, diagnostic services and emergency-related movement. The satellite-based case-study image illustrates the dispersed relationship between major functional components and the number of possible movement paths within the site. Such a configuration can be understandable to staff who use it daily but demanding for first-time patients, caregivers and visitors who must translate verbal directions into a sequence of outdoor and indoor decisions.



Figure 7: Campus relationship of major service areas at the National Orthopaedic Hospital, Igbobi, Lagos
Source: satellite base imagery is credited to Maxar Technologies in the original image.

This case highlights the importance of campus-scale legibility. The location of major destinations should be communicated before users enter the deeper clinical environment. A coherent hierarchy can be created through a clearly identified main pedestrian route, repeated zone markers, visible entrance names, numbered buildings, consistent directional signs, and orientation maps that show "You Are Here" in relation to the most frequently requested destinations. For orthopaedic users, accessibility is particularly important because mobility limitations may increase the physical cost of a wrong turn. Wayfinding planning should therefore minimise unnecessary travel distance and make accessible routes visually obvious rather than treating accessibility as a separate system.

Cross-Case Synthesis and Relevance to the Lagos Survey

Across the seven cases, the most transferable wayfinding lesson is that successful navigation depends on the coordination of architecture and information. The international precedents use spatial hierarchy, daylight, visible circulation, identifiable public zones and memorable environmental features to reduce the amount of information users must consciously process. The Lagos cases show why these principles are difficult to retrofit when facilities grow incrementally, but they also reveal practical opportunities for improvement through route hierarchy, standardised signage, orientation hubs, colour zoning, mapping and periodic post-occupancy wayfinding audits.

The survey results make this comparison empirically relevant. Respondents did not report a complete absence of signage; rather, they reported a system in which signs, landmarks and spatial organisation performed inconsistently. This distinction is important for design practice. A hospital can contain many signs yet remain difficult to navigate if the user encounters too many equivalent corridors, weak visual access, ambiguous junctions or destinations whose names change across maps and signs. The design objective should therefore be an integrated wayfinding system in which spatial configuration provides the primary structure and graphic or digital information confirms the user's decisions.

Table 6: Comparative wayfinding lessons from the seven healthcare case studies

Case study	Wayfinding characteristic	Transferable lesson for Nigerian healthcare design
Tata Medical Centre	Daylit, visually open public circulation with identifiable waiting nodes	Treat the main public route as a recognisable architectural space and reinforce it with daylight, art and visible destinations.
Jacobs Medical Centre	Large orientation lobby with visible vertical and horizontal circulation	Use the entrance hall as an orientation device; make reception, lifts, stairs and major routes visually connected.
Meander Medical Centre	Internal-street spine, public squares, courtyards and external views	Organise complex hospitals around a dominant circulation spine and memorable spatial landmarks.
Nemours Children's Hospital	Strong environmental identity, colour, art, glazing and landscape	Coordinate colour and environmental character with zones and signs to create redundant, easy-to-remember cues.
LASUTH	Large, incrementally developed teaching-hospital campus	Undertake campus-wide wayfinding audits, simplify route hierarchy and standardise destination names, maps and signs.
Ifako-Ijaiye General Hospital	Multiple service blocks and transition from external to internal navigation	Maintain continuity of symbols, colours and terminology from gate/parking areas through entrances to internal decision points.
National Orthopaedic Hospital, Igbobi	Dispersed specialist campus with mobility-sensitive users	Prioritise campus-scale orientation, accessible route visibility and reduction of unnecessary walking distance.

The cross-case synthesis indicates that the strongest design response is not a single device but a hierarchy of mutually reinforcing cues. At the macro scale, users need a legible campus or building structure. At the intermediate scale, they need identifiable zones and landmarks that confirm progress. At the decision-point scale, concise signs and maps should resolve the next choice. Digital tools can then provide personalised support without becoming the only means of navigation. This layered approach directly addresses

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the study's principal finding: navigation difficulty persisted even where several individual wayfinding elements were present.

DESIGN IMPLICATIONS FOR HEALTHCARE FACILITIES

The descriptive findings can be translated into a set of design priorities for new medical centres and for post-occupancy improvement of existing hospitals. The table below links the main empirical gaps observed in the study with an evidence-based architectural response.

A hierarchy-based design strategy is particularly important in hospitals because users do not process all information at once. At the first stage of the journey, they need to recognise the correct building, entrance or zone. At the second stage, they need to understand the principal public circulation route. Only after reaching the appropriate zone should detailed information about clinics, rooms or service points be introduced. This progressive-disclosure approach reduces information overload and makes the sign system consistent with the way users actually make navigation decisions.

For existing Lagos hospitals, the most feasible interventions may combine low-cost operational changes with targeted physical modifications. Standardising destination names, removing contradictory temporary signs, identifying high-frequency destinations, improving lighting at junctions and repositioning maps can be undertaken without major reconstruction. More capital-intensive interventions - such as opening sightlines, consolidating entrances, creating atria or restructuring corridor networks - should be prioritised where post-occupancy audits demonstrate persistent disorientation that cannot be corrected by information design alone.

Table 7: Evidence-based design priorities derived from the study findings

Observed design domain	Study indication	Recommended architectural/wayfinding response
Floor-plan clarity and mental mapping	Only 45.4% rated the floor plan clear; 41.7% reported good mental-map support	Establish a simple public circulation hierarchy, preferably a visible main spine/internal street with clearly differentiated secondary routes.
Visual access	44.9% reported clear visual access from the main entrance	Open sightlines to reception, major corridors and vertical circulation; avoid concealed lifts/stairs and visually blocked decision nodes.
Decision points and route complexity	47.2% rated junctions clear; 47.1% said turns were minimised	Reduce unnecessary branches; place route confirmation before and at intersections; use architectural cues in addition to arrows.
Signage coherence	50.3% reported directional signs at decision points; 54.8% rated destination signs legible	Use progressive disclosure, consistent nomenclature, standardised symbols, high contrast and repeated confirmation signs.

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Observed design domain	Study indication	Recommended architectural/wayfinding response
Landmarks	Only 36.3% positively rated prominent landmark availability	Introduce distinctive atria, artworks, courtyards, colour/material zones or external views at major nodes and make them visible from approach routes.
Human assistance	52.3% reported asking staff/others for directions	Map recurring direction-request points and redesign them; maintain staffed help points at major entrances while reducing unnecessary dependence on clinical staff.
Search time	46.9% spent more than 10 minutes searching	Provide pre-arrival information, entrance maps and direct routes to high-demand destinations; evaluate navigation time in post-occupancy audits.
Digital support	23.4% cited lack of maps/digital aids as a cause of delay/disorientation	Add optional QR-linked maps, browser-based navigation or kiosks using the same destination names and colour logic as physical signage.
Inclusive access	9.4% reported mobility/visual/cognitive impairment; older adults underrepresented	Apply universal design: accessible sign heights, pictographs, tactile/contrast cues where appropriate, barrier-free routes and testing with older/disabled users.

The design response should be implemented as a coordinated system rather than a list of isolated additions. For example, colour zoning is most effective when the same colour appears on maps, signs, walls or floor cues and digital interfaces; a landmark is most useful when its name is also used in directions; and a central route is most understandable when departments are organised consistently along it. Periodic post-occupancy evaluation can then determine whether the intervention actually reduces wrong turns, search time and staff interruptions.

STUDY LIMITATIONS

Several limitations should guide interpretation of the findings. First, respondents were recruited through facility-based convenience sampling, so the sample should not be treated as statistically representative of all users of the three hospitals. Second, the age and educational distributions were uneven: no respondent was recorded in the 45–54-year category, only a small proportion was aged 55 years and above, and 95.1% had tertiary or postgraduate education. Older adults, people with lower literacy and users with disabilities may therefore experience different or greater navigation difficulties. Third, the final analytical dataset was pooled and did not retain a valid hospital identifier, preventing facility-specific sample counts, disaggregated Tables 2–5, or comparative ranking of the hospitals. Fourth, search time and navigation difficulty were self-reported

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rather than directly observed or timed. Fifth, the cross-sectional descriptive design does not establish causality. Finally, the questionnaire was used as an item-level post-occupancy instrument rather than a validated multi-item psychometric scale; no composite subscale scores or formal construct-validation statistics were produced. Future studies should use stratified or purposive recruitment of underrepresented groups, retain facility identifiers, conduct hospital-specific analyses, combine surveys with observed route-tracing or timed navigation tasks, and prospectively test the measurement properties of any composite wayfinding scales.

CONCLUSION AND RECOMMENDATIONS

This study evaluated wayfinding efficiency and spatial legibility in selected Lagos healthcare facilities using a pooled survey of 350 patients, visitors and staff, complemented by comparative architectural case-study analysis of three Lagos facilities and four international precedents. The survey findings show that navigation challenges remain substantial among a user population that was largely educated but generally unfamiliar with the facilities. Specifically, 43.7% reported getting lost or taking a wrong turn, 46.9% spent more than ten minutes searching for a destination, only 40.8% agreed that they could find destinations quickly and efficiently, and 52.3% reported asking staff or other people for directions. These outcomes indicate that autonomous navigation was not consistently achieved across the pooled sample.

The physical and informational environment showed uneven performance. Language accessibility, room numbering and destination-sign legibility were comparatively stronger, whereas floor-plan clarity, visual access, mental-map formation, architectural differentiation and landmark availability received more modest ratings. The descriptive pattern supports an integrated interpretation: hospital wayfinding should be addressed through architectural legibility, circulation and visibility together with graphic information, landmarks and technology. These findings should be interpreted as pooled cross-site priorities rather than hospital-specific performance estimates. Given the convenience sample, demographic imbalance, self-reported navigation measures and descriptive cross-sectional design, the results do not establish causal effects or permit ranking of individual hospitals. Their principal value lies in identifying practical priorities for post-occupancy improvement and in guiding more rigorous facility-specific evaluations.

Based on the findings, healthcare architects and facility managers should prioritize the following actions:

1. Create a clear public circulation hierarchy in new hospitals, using a visible primary spine or internal-street concept from which major departments can be understood and accessed.

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2. Improve visual accessibility at entrances and decision points by making reception, lifts, stairs, major corridors and destination zones visually obvious wherever possible.
3. Apply progressive disclosure to signage so that users receive only the level of information needed for the next stage of the journey, with consistent destination names, symbols, numbering and arrows.
4. Use distinctive architectural, artistic and biophilic landmarks at major junctions and route transitions to support mental mapping and recovery from navigation errors.
5. Coordinate colour, material, lighting, signage and digital interfaces as one information system rather than independent decorative interventions.
6. Provide optional digital support, including QR-linked maps, browser-based wayfinding or kiosks, while ensuring that the physical environment remains understandable for users who cannot or do not wish to use technology.
7. Undertake periodic wayfinding audits in existing facilities, recording common wrong-turn locations, staff direction requests, search times, temporary signs and user complaints, and use the results to guide targeted retrofits.
8. Include older adults, people with disabilities, low-literacy users and first-time visitors in future usability testing so that improvements are evaluated against the needs of users who are most vulnerable to navigational difficulty.

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