

Typological Analysis of Hospital Wards Design

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Abstract:- This study explores the typological characteristics of hospital ward design in selected Nigerian federal university teaching hospitals. It argues that this method is advantageous because it adds a typological component to the evaluation of existing buildings and offers insight into the architect's thought processes and design culture. Based on the idea of type as an abstraction and a logical principle that guides design, a morphological approach to typological analysis was undertaken utilizing six selected federal teaching hospital wards in Nigeria's six geopolitical zones. The findings from the analysis indicated the general characteristics and six typologies of ward design. The analysis revealed that hospital ward typologies are best described as low-rise architectures with corridor-accessed units grouped hierarchically around service centers. The six emerging typologies revealed the architects' design culture by revealing the aspects they controlled in these building types' design. Finally, the paper emphasized the significance of examining the typological features of these hospital wards.

Keywords:- Hospital Wards, Typology, Architecture, Design, Evaluation.

I. INTRODUCTION

Several issues have frequently arisen in the study of spaced design in architecture. One of the most pressing is the difficulty of comprehending, describing, and categorizing buildings. Understanding building characteristics is essential because buildings serve as historical reference points and a context for training future architects. Understanding the architectural distinctions between buildings that fulfill diverse services may be easier. The issue arises while attempting to comprehend and describe the architecture of buildings that provide similar purposes. It is frequently stated that describing a thing by what it is not is easier than describing it by what it is. When attempting to understand the architecture of a group of buildings that serve the same functions, many questions must be answered. What are the spatial aspects that make up the building type? What are the relationships between these elements? What are the qualities of this type of structure in common? Do various architects exploit the elements in different ways to define different typologies? If so, what typologies are defined, and what are their characteristics? Do these typologies exhibit regional and cultural characteristics?

Understanding building design is thus more complex. It is necessary to identify the fundamental concepts that underpin design. To accomplish this, buildings must be studied and categorized using relevant and acceptable description tools and concepts. The fundamental method of comprehending buildings is through analysis. As a result, the focus of this study is on the analysis of a certain typology of building. The analysis enables us to comprehend not just the buildings themselves but also the way architects think and design. Furthermore, it aids in clearly identifying and recognizing any regional and cultural influences in architectural design.

A typological approach is used in this study to evaluate the characteristics of hospital wards. While the characteristics of these hospital wards have been studied in the Western and developed worlds, more research needs to be done in Africa, particularly Nigeria. However, the hospital is a universal concept. Furthermore, wards are an important component of a hospital building for most university teaching hospitals in Nigeria. They are noteworthy because they comprise a major amount of the built environment of each institution and represent one of the largest capital investments. Although they are not being developed and built at a rate that matches the great demand, more of these facilities will likely be built soon by the Government, private and possibly foreign businesses. As a result, a typological investigation is important since it will provide a wealth of learning about the architecture of existing hospital wards, which will serve as historical precedents and springboards for future design.

Buildings have been studied and classified from numerous angles. The objectives of the analyses influenced these viewpoints. The buildings' purposes are the most common and commonly used basis for examining and classifying structures. Pervsner, who classified and characterized buildings based on uses such as hospitals, schools, churches, and offices in his book, 'A History of Building Types' (Pervsner, 1976), is a notable example of this category. Buildings are now commonly classified based on the functions they provide. Building classes are another name for Pervsner's categories (Demiri, 1983:131).

This is the functionalist way of thinking. It is the more common concept of the type employed by architectural historians when categorizing structures based on historical periods or societal functions. This strategy, however, has several limitations. The main drawback is that it cannot

account for or explain why specific functions are located in such disparate types of buildings throughout cultures (Lawrence, 1987). The concept of "typology," as articulated by Quatremere de Quincy, is the most widely acknowledged foundation for architectural theorists in studying, classifying, and describing buildings. They regarded typology as a viable theory of form and characterized it as an abstract, basic, general, and indivisible form principle. It is regarded as a valuable analytical approach since it displays the generic properties of the 'type.' This research analyzes and describes hospital wards in Nigeria using Quatremere's concept of typology.

II. THE NOTION OF TYPOLOGY IN ARCHITECTURE

The primary purpose of typology treatises has been to discover the conceptual foundation upon which structures can be characterized and classified into types. A French theorist, Quatremere de Quincy, wrote the first major dissertation on the concept of typology (Vilder, 1997). His typology assumes that all existent forms have antecedents and that their common generic sources may be found and explained. He defines 'type' as a suggestive and generative interpretation of form that cannot be reproduced, drawing a contrast between 'type' and model. This definition of 'type' implies a principle that cannot be lowered anymore. He also mentioned that the 'type' had a cultural and historical foundation. These thinkers contend that architectural typology is concerned with the formal and spatial characteristics of structures. Typology also has the traits of being the product of a long history, being flexible, being culturally specific, and not being a replicable model (Demiri, 1983). Buildings and cities have been studied using typology in both analytical and generative ways (Leupen et al., 1997:134). This theory asserts that "type" is an abstract entity generated by the person conducting the activity and distinguished by a class of items with comparable properties. Golgonen and Laisney (1982) made this claim.

Similarly, Petruccioli (1996:11) remarked, "The birth of a type is conditioned by the fact that a series of buildings share an obvious functional and formal analogy among themselves." The identifying qualities of single buildings are erased during comparing or selectively superimposing distinct forms to determine the type, leaving only the common parts that subsequently appear in the entire series. Type is depicted as "a scheme derived from a group of formal variants to a basic form or common scheme." - Petruccioli (1996), p. 11

This idea has been used extensively in architecture to examine and categorize structures' spatial and morphological characteristics. In this instance, the typomorphological approach is applied (Petruccioli, 1996). The "type" is frequently determined using a reductionist method via the morphological approach (Bandini, 1983). It is a technique for extracting the fundamental and typical morphological attributes from a collection of traits. It eliminates some traits while keeping all other elements that add to the series' coherence (Leupen et al., 1997:138; Argan,

1958). The type, a typological diagram that illustrates the underlying architectural principles of a set of buildings and the fundamental design heuristics employed by architects, may be the outcome of this technique. The 'generic type' for the building class is the result of this. However, to completely appreciate and characterize the building class, its numerous typologies must also be identified. As a result, a second level of typological analysis is frequently required, which involves categorizing the buildings within the same class based on their distinctions. Each of the emergent typologies would contain the generic type inside itself. This research examines the characteristics and types of hospital wards designed in selected federal university teaching hospitals in Nigeria using a two-level morphological approach to typological analysis.

III. TYPOLOGICAL ANALYSIS OF HOSPITAL WARD DESIGN

Six hospital wards were selected from among the formally designed federal university teaching hospitals in Nigeria's six geopolitical zones. The geographical restriction of one hospital ward to each of the six geopolitical zones of Nigeria is to have a fair spread through the country except for about 2 hospital wards; all of the hospital wards were designed by Nigerian architecture firms and built between 1962 and 1990.

In this study, the architectural layouts of the federal university teaching hospitals that were chosen served as the data. Floor plans and sections were the primary drawings used since they were the most basic architectural elements that could show the morphology of the buildings while also giving the framework for how architects' ideas were formed and organized. By graphically distilling the designs down to their core components—the wards, nursing station, circulation, services, facilities, and organizational themes—they were evaluated. A thorough analysis of all the morphological characteristics of the buildings came before this typological investigation. The only characteristics that were looked at were morphological and spatial. Wards, circulation, and services and facilities were the key spatial aspects they were interested in organizing and designing. They did not incorporate the hospital's socio-physical, symbolic, or exterior features. Most of them had been altered and modified from the designer's initial goals, although the spatial, organizational, and formal qualities remained untouched. The subsequent typological study was carried out on two levels. The initial step included removing the buildings' unique characteristics and determining their common morphological properties. This resulted in the generic type. The second analysis entailed finding the primary physical features that distinguished the buildings and using these as the foundation for categorization into typologies. The Common Type of Hospital Wards an analysis of the six-hospital wards revealed the peculiar features that determined the general type of these buildings.

➤ *The Main Characteristics are as follows.*

• *Low-Rise Structures:*

All the hospital buildings used were low-rise structures. None of them exceeded five floors.

• *Corridor Accessed Hospital Wards:*

Every hospital facility was distinguished by a number of wards that were reached via the hallways. Because it was widespread and distinctive, this type of access was a strong characteristic of these wards.

• *The Service Core:*

Another noteworthy feature is the service core. The vertical accesses and sanitary facilities were designed as one service core unit. The service core was a common feature of various hospital wards, despite location, size, and design variations

• *Hierarchies of Spatial Organization:*

In each hospital ward, hierarchies of the spatial organization were found. These were the hospital, the block, and the floor. At each of these tiers, specific facilities were shared. The wards, which included patient bed spaces, nurses station were the initial level of spatial composition. The second level of the spatial composition was the floor, which included the service center, and the corridor access. The hospital was divided into blocks made up of floors. The blocks and the hospital represented the third and last levels of the spatial organization. These traits set hospital wards apart as a particular building type and gave insight into Nigeria's design of hospital structures. The analysis's findings demonstrate that these hospital wards comprise three separate spatial components: the wards, the corridor access, and the service core. Each floor contained these components. They also possessed low-rise structures and a hierarchical sort of socio-spatial organization.

➤ *Indeed, there are several ways hospital structures in Nigeria are distinct from those in Europe and the United States:*

- The hospital buildings that served as the wards for many federal university teaching hospitals in Western nations are not typically low-rise.
- Suite-style layouts are more typical in Europe and North America, notably different from the wards with corridor access reported in this study.
- As it is incorporated into the service center, the staircase or central elevator, a prominent feature in Western hospitals, seems less relevant here.

However, there are also parallels. The hospital wards in this study and those in Western contexts share the hierarchical form of spatial organization.

According to the general design of the hospital structures included in this study, low-rise structures, service cores, corridor accesses, and hierarchical organizations were the best ways for the architects to address the design challenge. These solutions may have been the best given the

technological, regional, and cultural environment in which the architects worked. Research reveals that the decision to design low-rise structures was affected by the lack of technological development when these facilities were being built and the advocacy for appropriate technology (Fry & Drew, 1964:25; Stagno, 2001). Furthermore, the corridor access form was likely developed due to the area's tropical climate (Fry & Drew, 1964). More significant is that architects and planners would use these qualities as part of their spatial repertory when creating hospital ward designs.

➤ *Typologies of Hospital Wards*

The results of the second typological examination showed some notable discrepancies in the morphological traits of the hospital buildings. The criteria for categorical categorization were built around these distinctions. These variations were:

- The corridor's (or horizontal access's) length. The horizontal access was divided into short and long lengths. Short-corridor hospital ward types were those with five patient beds or less between service cores, whereas long-corridor ward types, also known as open plan or nightingale, were those with 10 bedrooms or more between the service cores.
- The service core's format. Each floor's service center, a typical architectural element, is a combination of restrooms and frequently, vertical accesses. There were three different kinds of service cores found. These included the single service core at each end, the single service core in the center, and the decentralized service core (more than two service cores evenly distributed throughout the floor).The weight placed on the horizontal access
- This characteristic indicated that the horizontal access contained wards on either one side alone or on both sides, meaning that the hospital wards typology was either single or double loaded. Double Corridor or a racetrack
- The overall geographical organization. The floor level of the building was represented by the previous two qualities. The hospital ward typologies were distinguished by the following features.

(a)Each block's plan form The single building had a linear, partially enclosed, or entirely enclosed formal structure. (b) Overall formal organization: In terms of the connections between the buildings in the hospital wards, this characteristic characterized the spatial composition of the buildings. The building was either a collection of separate constructions connected only at ground level or a single structure with connections at every floor level.

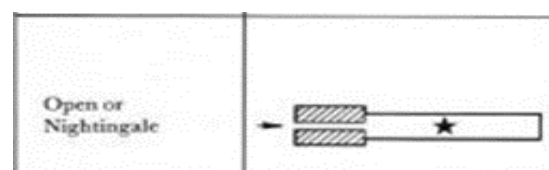


Fig 1 TYPOLOGY A Wards Design typologies, Source: (James & Tatton-Brown, 1986, p. 76)

- Long horizontal access
- Single loading on the corridor
- Nurses' support area is attached to one end of the ward.
- All circulation must go through the ward center
- The nurse station is placed in the ward middle to facilitate surveillance

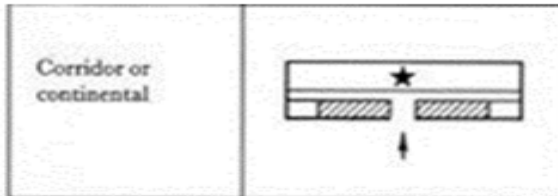


Fig 2 TYPOLOGY B Wards Design typologies, Source: (James & Tatton-Brown, 1986, p. 76)

- Patient rooms are usually placed on one side of the corridor
- The nurse station is in the middle of the ward for the shortest walk and easy monitoring
- The corridor connects various functional zones as the central circulation
- Double loading on horizontal access

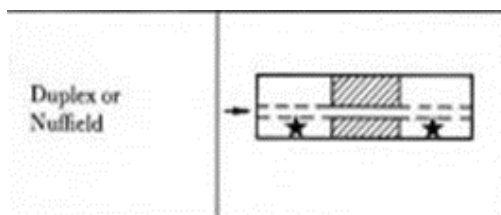


Fig 3 TYPOLOGY C Wards Design typologies, Source: (James & Tatton-Brown, 1986, p. 76)

- The service is perpendicular to the patient area.
- The nurse station is placed at the joint between the patient zone and staff zone to overlook the central circulation
- Single loading corridor access

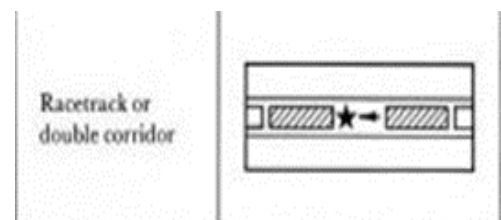


Fig 4 TYPOLOGY D Wards Design typologies, Source: (James & Tatton-Brown, 1986, p. 76)

- Double corridor access
- The corridor length becomes a challenge in countries with higher privacy expectations
- accommodate more patients without increasing the nurses' walking distance.
- The core area is the nurse station and other shared service and ancillary space.

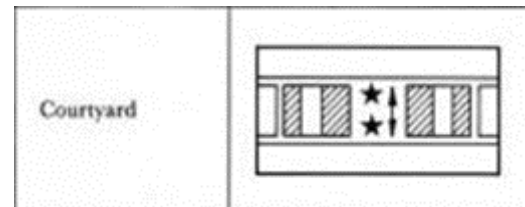


Fig 5 TYPOLOGY E Wards Design typologies, Source: (James & Tatton-Brown, 1986, p. 76)

- Introduced as an alternative to the traditional racetrack layout
- one or more courtyards are inserted in the core area of the plan.
- The service areas are arranged in a circle around the courtyard
- All the patient rooms are arranged along the external perimeter

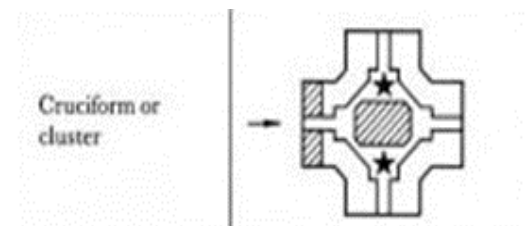


Fig 6 TYPOLOGY F Wards Design typologies, Source: (James & Tatton-Brown, 1986, p. 76)

- Improves visibility from nurse stations to circulations and reduces walking distances
- Single loading on horizontal access
- The majority of nurse service functions are located in the central pod
- Short horizontal access
- Enclosed courtyard linked at ground level

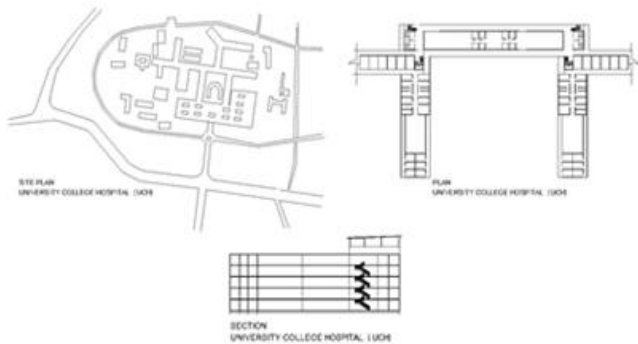
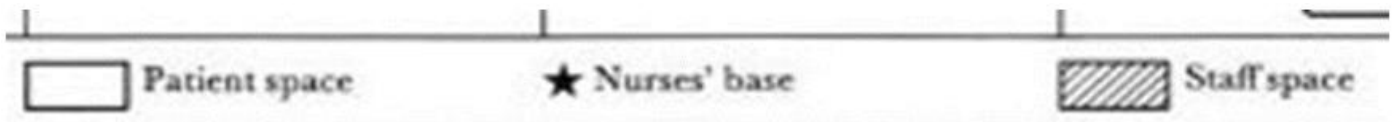


Fig 7 Plan of University College Hospital, Ibadan

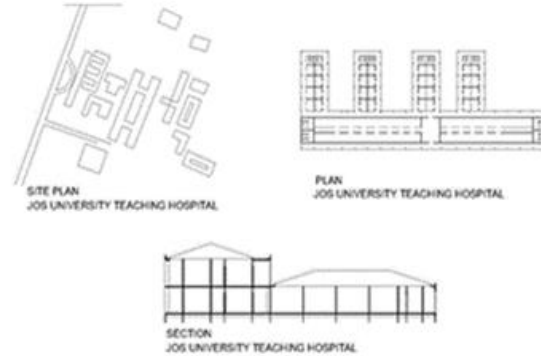


Fig 8 Plan of Jos University Teaching Hospital

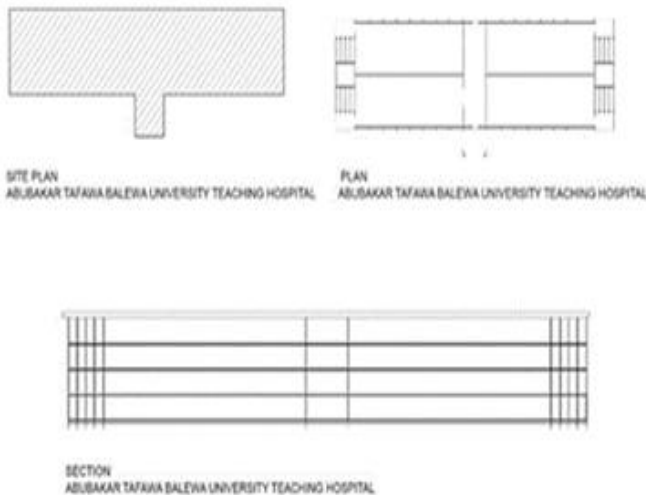


Fig 9 Plan of Abubakar Tafawa Balewa University Teaching Hospital

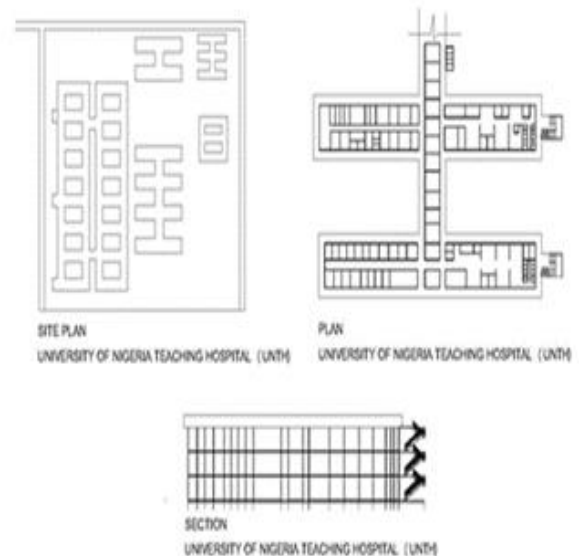


Fig 10 Plan of University of Nigeria Teaching Hospital

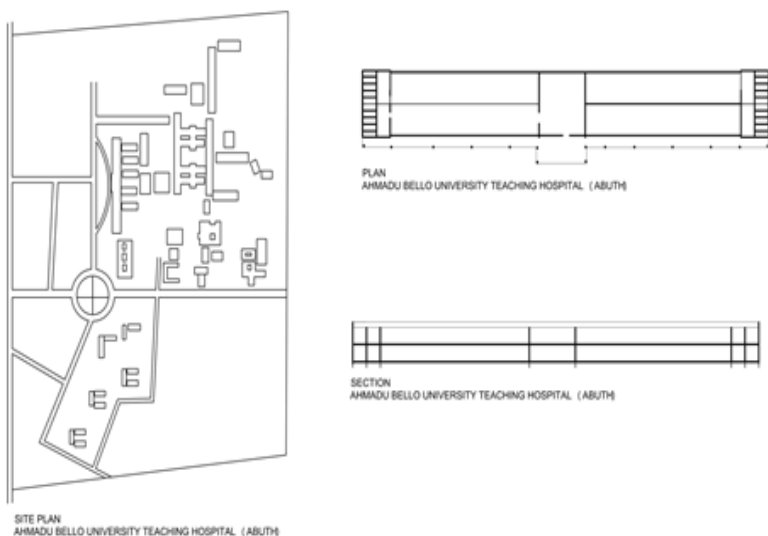


Fig 11 plan of Ahmadu Bello university Teaching hospital

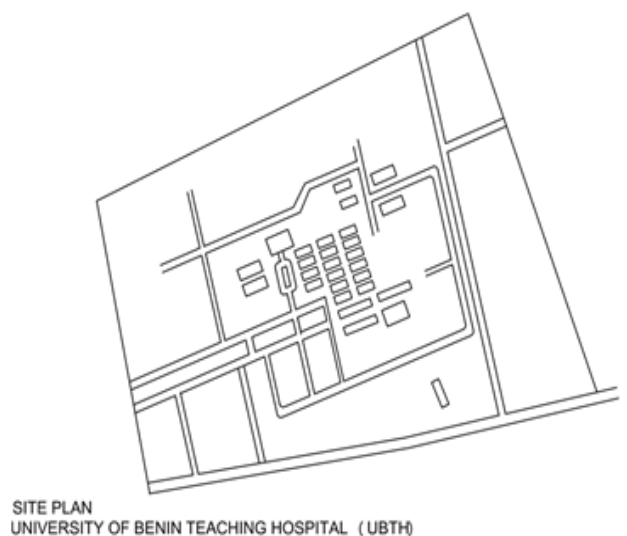
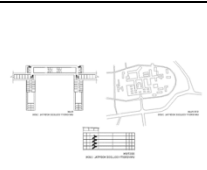
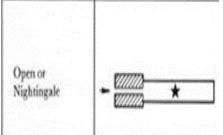
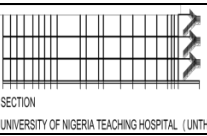
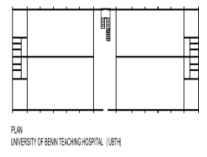
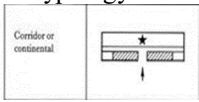

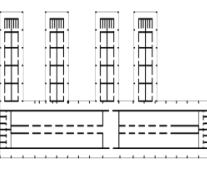
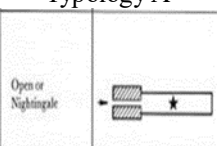
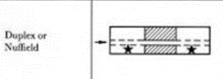
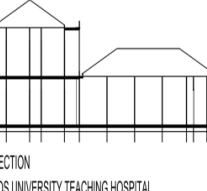
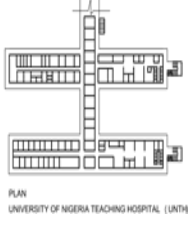
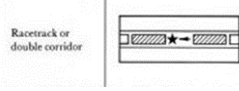
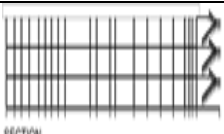
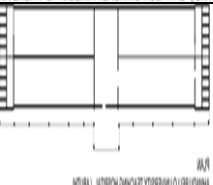

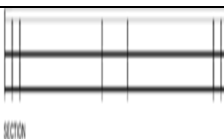
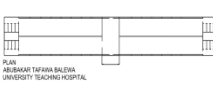



Fig 12 plan of university of benin Teaching hospital

Table 1 Operationalization of variables for Typological Analysis for the Selected Hospitals Wards

No	Hospitals	Instrument	Typology	Typology Description	Tools analysis	Scale
1	University College Hospital (UCH)		Open plan/nightingale Typology A 	Long Horizontal access Circulation through the ward Centre Nurses' support area is attached to one end of the ward. Single loading on the corridor The nurse station is placed in the ward middle to facilitate surveillance	Typological analysis, Spatial Analysis Literature, Morphological Characteristics AutoCAD	Nominal
						
2	University of Benin Teaching Hospital (UBTH)		Corridor Typology B 	Patient rooms are usually placed on one side of the corridor The nurse station is in the middle of the ward for the shortest walk and easy monitoring The corridor connects various functional zones as the central circulation Double loading on horizontal access	Typological Analysis, Spatial Analysis Literature Morphological Characteristics AutoCAD	Nominal
						
3	Jos University Teaching Hospital (JUTH)		Open plan/nightingale Typology A  	The service is perpendicular to the patient area. The nurse station is placed at the joint between the patient zone and staff zone to overlook the central circulation Single loading corridor access	Typological Analysis, Spatial Analysis Literature Morphological Characteristics AutoCAD	Nominal
						

<p>4</p>	<p>University of Nigeria teaching hospital (UNTH)</p>	 <p>PLAN UNIVERSITY OF NIGERIA TEACHING HOSPITAL (UNTH)</p>	<p>Racetrack Typology D</p>  <p>Racetrack or double corridor</p>	<p>Double corridor access The corridor length becomes a challenge in countries with higher privacy expectations accommodate more patients without increasing the nurses' walking distance. The core area is the nurse station and other shared service and ancillary space.</p>	<p>Typological Analysis, Spatial Analysis Literature Morphological Characteristics AutoCAD</p>	<p>Nominal</p>
		 <p>SECTION UNIVERSITY OF NIGERIA TEACHING HOSPITAL (UNTH)</p>				
<p>5</p>	<p>Ahmadu Bello University Teaching Hospital (ABUTH)</p>	 <p>PLAN AHMADU BELLO UNIVERSITY TEACHING HOSPITAL (ABUTH)</p>	<p>Courtyard Typology E</p>  <p>Courtyard</p>	<p>introduced as an alternative to the traditional racetrack layout one or more courtyards are inserted in the core area of the plan. The service areas are arranged in a circle around the courtyard All the patient rooms are arranged along the external perimeter</p>	<p>Typological Analysis, Spatial Analysis Literature Morphological Characteristics AutoCAD</p>	<p>Nominal</p>
		 <p>SECTION AHMADU BELLO UNIVERSITY TEACHING HOSPITAL (ABUTH)</p>				
<p>6</p>	<p>Abubakar Tafawa Balewa University Teaching hospital</p>	 <p>PLAN ABUBAKAR TAFAWA BALEWA UNIVERSITY TEACHING HOSPITAL</p>	<p>Racetrack Typology D</p>  <p>Racetrack or double corridor</p>	<p>improves visibility from nurse stations to circulations and reduces walking distances Single loading on horizontal access The majority of nurse service functions are located in the central pod Short horizontal access Enclosed courtyard linked at ground level</p>	<p>Typological Analysis, Spatial Analysis Literature Morphological Characteristics AutoCAD</p>	<p>Nominal</p>



Authors Field work

IV. FINDINGS

This typological study revealed an interesting finding: Each hospital ward typology appears to have produced different ward group sizes. In other words, these typologies have implicit implications for social organizations. While some designed small group sizes for care task, others required big groups of nurses to interact with one another. As a result, this typological study clarifies the link between architecture and social and care experience. The analysis also revealed that the service core was the major spatial factor for identifying distinct ward units. This study is useful for designers and evaluators of hospital wards since it indicates that service cores are major factors in determining group sizes in hospital wards. The emergence of wards typologies from this investigation revealed that, as Colquhoun (1967) said, there is an area of free choice in the mental process of design and that several elements impact the choices that the architect takes at this moment. He argued that these factors could include historical precedents, the desire to attach specific interpretations, or the desire to influence conduct. Because the historical precedents confronting the architects were limited (because most of the facilities used in this study were the first in the country), it is likely that the architects communicated varied objectives in altering forms during the design process. One of these aims was most likely to state the 'appropriate' ward space for nurses to perform the care job. The investigation also revealed that most of the hospital wards design were typology A.

Furthermore, most of the older hospital wards were similar to typology A. There are two possible explanations for this outcome. First, because many early hospital wards fit into this category, they became historical precedents and had important effects on the design of many succeeding facilities. Another probable explanation is that the programs offered to architects during the briefing stage contributed to the prevalence of this kind in the early years. These programs inadvertently confined design possibilities to this paradigm.

V. CONCLUSION

This paper attempts to comprehend the architecture of hospital wards in Nigerian university teaching hospital through a typological analysis. Indeed, the buildings have some qualities that distinguish them as a typology. They are responding to external demands. These buildings' architecture can be described as low-rise structures with service cores, corridor accesses, and spatial hierarchies. This study also demonstrated the significance and use of the type concept in architecture. The research demonstrated that the typologies of hospital wards should be abstracted to improve our understanding of the architecture of these facilities. The

typological properties utilized in defining the types indicate the features that architects manipulate during the design process. There are six different types. The effects of these modifications are reminiscent of what is commonly referred to as "architect's intentions." These objectives are rarely made clear, but the investigation revealed that the architects aimed to imply acceptable hybrid ward unit sizes through design. Typological analysis is thus a beneficial tool for understanding the architect's objectives and, as a result, the design process. Finally, each hospital ward typology revealed in this study's analysis serves as an index valuable in building-in-use evaluations. This suggests that rather than judging nurse's hospital wards based on their unique morphological characteristics, the typology would be a more trustworthy and relevant criterion directly related to "architects' intentions." Users will undoubtedly react differently to the types, most likely not only because of their implied social ramifications but also for other reasons. It is possible to discover the most desired typology. As a result, a typological study serves as a link between appraisal and architectural culture. Architects frequently make little or no use of research findings in evaluation studies because they find it difficult to tie research findings to the concerns they frequently manipulate in design. However, typological studies are a useful link in this context.

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