

## SUSTAINABLE THERAPEUTIC ENVIRONMENT; IMPACTS OF THE INDOOR ENVIRONMENT ON USERS' PERCEPTION OF WELLBEING IN PUBLIC HEALTHCARE FACILITIES IN CALABAR MUNICIPALITY, NIGERIA

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### ABSTRACT

The design of a healthcare facility could have a significant influence on its users. This research provides evidence of the impact of the indoor environment on the wellbeing of both patients and healthcare professionals. The study was a descriptive cross sectional survey. A simple random sampling technique was used to select a sample of 200 patients aged 18<sup>+</sup> years with a minimum of 7 days' length of stay (LOS) in the health care facility, and 110 nurses and doctors. A 25-item researcher developed and validated questionnaire was used to gather the perspectives of patients, doctors and nurses in two public healthcare facilities in Calabar Municipality, Nigeria. Data analysis involved descriptive and inferential statistics (frequency count, simple percentages). The basic ethical principles of the Helsinki Declaration applied in research involving human subjects was strictly adhered to. The respondents consisted of more females 194 (62.5%) than males 116 (37.5%). The majority of the respondents were aged 35 to 49 years, 155 (50%); attained tertiary education 175 (56.5%); and Christians 270 (87.1%). The study findings revealed that, patient respondents were found to be more perceptive about factors related to sound, light, thermal comfort and art on their wellbeing, while staff were less sensitive to these factors - due to environmental resilience, self-efficacy and adaptation. The study had a good correspondence with previous healthcare research on users' wellbeing and environmental psychology. The study concludes that, a sustainable therapeutic environment should promote design elements that encourage patient control towards recovery and efficient staff delivery of services for optimum healthcare productivity in Calabar municipality, Nigeria.

**KEYWORDS:** Sustainable, Therapeutic environment, Indoor environment, Users' Perception, Wellbeing, Healthcare facilities.

### INTRODUCTION

A sustainable therapeutic environment is conceptualised as the entirety of the indoor and external conditions and influences affecting an individual in the illness situation. These embody the tangible physical factors in the situation in terms of architectural features, furnishings, decoration, lighting, ventilation and the psychological forces exerted on the patient. The latter includes less tangible "feeling tones" created by the customs, routines, cultural values, interpersonal relationships, prevailing concepts of the appropriate roles and behaviours of the patient and healthcare provider (Burton 2005). A therapeutic environment can be likened to certain architectural characteristics of an environment which aids patient's recovery (Altimier, 2004). Watkins, (2010) defines a sustainable therapeutic environment as an environment that supports clinical excellence in the treatment of the physical body, the psycho-social and spiritual needs of the patient, family, and staff and

produces measurable positive effects on patient's clinical outcomes and staff effectiveness. This has been supported through research into people's experiences and emotional responses to their healthcare (Burton, 2005). The word "therapeutic environment" refers to the healing environment.

The theory of sustainable therapeutic environment emanates from the fields of environmental psychology (the psycho-social effects of the environment), psychoneuroimmunology (the effects of environment on the immune system) and neuroscience (how the brain perceives architecture). Patients do feel afraid and uncertain about their health, their safety, and their isolation from normal social relationships. The hospital environment is stress-evoking. Stress and burnout perceptions are immune system suppressors which can dampen patients' emotional and spiritual resources, impeding recovery and wellbeing (Watkins, 2010).

Nevertheless, interventions that eliminate facility environmental stressors, provision of positive distractions enabling social support and giving a sense of control to patients can measurably improve patient's wellbeing. Researchers (Ulrich & Zimring, 2004; Ulrich, et al., 2008; Watkins, 2010) have suggested that, noise reduction, same-handed patient rooms, access to daylight, appropriate lighting, providing "offstage" areas for respite, proximity to other staff, appropriate use of technology, decentralized observation and chatting can offer satisfaction and promote positive wellbeing. The benefits accrued to caregivers from these environmental factors are likely to impact the quality of care patient's experience. The sustainable therapeutic environment has been found to be cost-effective by improving the patient's wellbeing, reducing length of stay, enhancing caregivers' satisfaction, recruitment, and retention of staff.

Over the years, it is believed that patient health outcomes are adversely affected by various conditions of the physical health care settings. For instance, Florence Nightingale, the mother of nursing suggested that "patients would recover more quickly if they were cared for in an environment that had natural light, ventilation, cleanliness and basic sanitation" (Altimer, 2004). Many studies have indicated that healthcare physical environments are linked to staff wellbeing, productivity and satisfaction (Mourshed & Zhao, 2012). Researchers have suggested that there is a strong correlation between health outcomes and the therapeutic environment in which a person lives or receives treatment (Ulrich, et al., 2008, Mourshed & Zhao, 2012). It is therefore evident that the design of healthcare environment can affect patient health outcomes, staff recruitment and retention, and even the effective provision of care. (Ulrich & Zimring, 2004).

Therefore, there is a need to promote a sustainable therapeutic environment to provide safe, effective and high-quality places that can adapt to changing care delivery patterns in developing countries like Nigeria. There is abundant of related literature about the positive physical healthcare environment, especially in the western world, but very little regarding this in developing nations like Nigeria. To bridge this gap, this study assesses and how the indoor environment impacts on users' perceptions of wellbeing in two public healthcare facilities in Calabar Municipality, Nigeria.

### **Purpose of the Research**

- ❖ To assess the impacts of the hospital's indoor environment on the wellbeing of both patients and healthcare professionals in the setting of a developing country.

### **Specific Objectives- The specific objectives are to**

1. Determine the impact of the indoor environment (noise, lighting, thermal comfort, furnishings,

decoration art and psychological forces) on the patients' wellbeing.

2. Determine the impact of the indoor environment (noise, lighting, thermal comfort, furnishings, decoration art and psychological forces) on the wellbeing of healthcare professionals-nurses and doctors.
3. Determine health care providers' perception of safety measures available for use (use of protective equipment's- Fire doors/assembly point/alarms) in the hospital setting of a developing country.

### **Statement of Problem**

There is no neutral environment, therefore, the design of a healthcare facility could have either positive or negative influence on the healthcare consumer and their care providers alike. Studies (Aiken, et al., 2011; Taylor, S.E, 1979; Verderber & Fine, 2000) suggest that, the planning and designing of the healthcare facility has failed to add value to the healthcare users (patients and professionals); and there is distortion in the performance of a patients' customary tasks within the hospital care settings. The loss of control and depersonalization perceptions of patients in the hospital implies that these patients are categorized into good, the complaint one or bad patient. The good patient category may be in a state of anxiety and helplessness, with the bad patient in a state of anger and resistance against the removal of freedom, and evoke reactions by the healthcare professionals. These have undesirable consequences for treatment and recovery (Taylor, S.E, 1979; Verderber & Fine, 2000). If the indoor environment of the hospital setting does not promote harmony within the healthcare facility users (patients and professionals); it could create additional discomfort to patients' wellbeing coupled with the stress of illness.

Aiken, et al., (2011) observed that poor indoor environments in hospitals were rampant and were associated with negative healthcare providers' outcomes and poor quality of care. The indoor environment also affects healthcare providers turnover, which is a growing risk in developed countries (Mourshed & Zhao, 2012). Administrative duties are also influenced by the indoor environment (Cummings, et al., 2010). Therefore, it is important to improve and humanise healthcare environments in order to enhance users' wellbeing which will promote "User-centered" healthcare delivery (Gesler, Bell, et al, 2004).

Hence, creating a good indoor environment in terms of colours, good lighting quality, acoustic, outlook, art, air quality, temperature and individual control over the hospital environment could promote a sustainable therapeutic environment. Do patients want/wish to have control over the hospital environment?

What are the impacts of the indoor environment on the wellbeing of both the patient and the healthcare providers? Considering the limited studies that assess the

conditions of the hospital environment in developing countries, the above questions are answered by this study.

## LITERATURE REVIEW

Literature was reviewed under the following sub-headings

### Concept of a sustainable therapeutic environment

There is a growing recognition that architecture is a tool in the healing process (Ampt, Harris, & Maxwell, 2008). In this context a "Sustainable therapeutic environment" refers to an all-round care setting that incorporates certain architectural design and enhances patients', doctors and nurses wellbeing. Burton, (2005) supports this assertion by stipulating that, people's experiences and emotional response emanates from their healthcare environment. A well designed hospital environment has the potential to increase healthcare providers effectiveness, satisfaction, reduce medical errors and hospital acquired infections, decrease burn-out stress and injuries (Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004; Trinkoff, Johantgen, Muntaner, & Le, 2005; Mourshed & Zhao, 2012). Therefore, when considering a sustainable therapeutic environment, variables such as daylighting, indoor air quality, noise and thermal comfort should be considered.

A therapeutic indoor environment with natural ventilation is more likely to dilute odour, with better health quality unlike a fully air conditioned ward (De Dear, 2004). For both patients and care providers, indoor air temperature, metabolism, clothing insulation, ability to modify/control the indoor environment are considered as the physical and psychophysiological determinants of thermal comfort. In the Nigerian setting, which is typical of many developing countries, these determinants appear are to be lacking in their hospital settings, illumination and daylight availability are grossly inadequate. There is also a dearth of information about promoting the merits of a sustainable therapeutic environment.

### Impacts of the indoor environment on users' wellbeing in healthcare facilities

The various constituents of the physical environment have been found to have various effects and influences on users' wellbeing in healthcare facilities. Noise, lighting and thermal comfort and art have been identified to be key elements of the physical environment that have a significant influence on the wellbeing of patients and staff in healthcare facilities. This section of the literature review appraises the impacts of noise, lighting and thermal comfort on users' wellbeing as follows.

#### Noise

Many studies, (Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004; Joseph & Ulrich, 2007) have identified noise as a major element of the physical environment that affects the recovery process of patients

and delivery of healthcare by healthcare professionals. Generally, trolleys, moving of bedrails up and down, alarms, people conversing, laughter, and footsteps, telephones and movement of medical equipment are major sources of noise in healthcare facilities (Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004). External noise sources from moving vehicles and the movement of people along the corridors also contribute to noise sources heard within healthcare facilities.

To patients, the effects of noise include stress response and sleep disturbance, pain tolerance decreased oxygen saturation as well as elevated blood pressure in neonates. This is evident in a study carried out by Ulrich, Zimring, Quan, Joseph, & Choudhary, (2004) which states that, noise affects neonates by causing abrupt fluctuations in heart and respiratory rates, apnoea and poorer sleep quality. Studies by (Delvin & Arneill, 2003; Van de Glind, Roode, & al, 2007; Cunha & Silva, 2012) suggest that noise has effects in chronic mental and physical health and produces an undesired psychological and physiological response in patients. Noise disturbs sleep, and has the potential to affect the recovery and healing process of patients. To the healthcare professional, noise increases the stress of staff, burnout, emotional exhaustion and error generation, as well as well as communication difficulties for staff (Ampt, Harris, & Maxwell, 2008).

#### Lighting

Light plays an important role in the health environment. It is needed for the visual delivery of task as well as to power medical equipment's. For the patients, studies (Joseph, 2006; Lorenz, 2007) have shown that lighting influences mood, morbidity and mortality as well as behaviour. Ampt, Harris, & Maxwell, (2008) states that, excessively bright light, especially the morning daylight will significantly assist in mood elevation, reduction in mortality as well as reduced need for analgesia. Lighting has effects on agitation levels for patients with Alzheimer's diseases. For the healthcare professionals, a study by Mroczek & Mikitarian, (2005) shows that, about seventy percent of staff interviewed rated daylighting as having a positive effect on their work life. Bright light to staff helps in the decrease of errors and enhances performance (Ampt, Harris, & Maxwell, 2008).

In healthcare facilities, lighting can affect patient recovery rates, improving the quality and overall experience of patients, staff and visitors (Lorenz, 2007). Ulrich, et al, (2004); Lorenz, (2007) state that, an enhanced visual environment has produced improved faster recovery rates by as much as 10%. This they strongly believe have been attributed to the improvements to the particular elements of the visual environment; this include, the use of appropriate colour in interior design, display of certain types of artwork and the provision of sunlight and attractive views out (Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004). In recent years, daylight has been found to maximize occupant

comfort, and provide more pleasant and attractive therapeutic environment with higher performance and productivity. It can reduce energy use and its associated environmental emissions, and it is also important and useful in terms of visual comfort and energy-efficient building design. On the healthcare provider's perception of the therapeutic environment, Mourshed & Zhao, (2012) suggest that, healthcare providers' are key stakeholders and vital informants in the process of design and refurbishment of healthcare facilities. Their perception of therapeutic environment features is dependent on their observation of and interaction with hospital spaces over their working life. Hence, their environment and maintenance design factors are positive predictors of patients and staff wellbeing than architectural design aspects in the healthcare facilities. Hence, this review has provided an insight into the role of noise, lighting and thermal comfort in improving the quality of the therapeutic environment in healthcare buildings. But, most these findings come from the healthcare setting of the developed countries.

### **Thermal Comfort**

Thermal comfort in healthcare facilities is very important because, it can be a source of undesired physiological strain on the body. Therefore, knowing how patients perceive the thermal environment is very necessary. Thermal comfort of patients can be different from that of the healthy population, because the nature of the physical disability will affect thermophysiology, thermal sensation, metabolism, and blood flow. It can also affect regulatory response, such as vasomotor control of body skin temperature or the ability to sweat (Verheyen, 2011). A Research carried out by Verheyen, (2011) in a Belgian healthcare facility states that; a poor thermal healthcare environment can induce physiological strain on patients, which can further induce extra stress on top of stress related to the disease or injury to the patient, which is undesired unless medical treatment requires so.

In healthcare facilities, the prediction of mean thermal comfort perception of patients and staff is necessary to formulate requirements for the architectural and building systems design and control, and for establishing guidelines for the use of clothing and bedding systems (Verheyen, 2011). Considering that people with different activities must coexist in the same thermal conditions, it becomes very difficult to achieve a thermal comfort which is suitable for all (Ferraro, et al, 2015). Hence, comfort in a healthcare thermal environment must be calibrated by considering two different groups of people' on one hand the patients, who generally have a low metabolic rate (Skoog, et al, 2005); due to their immobility, that is, lying in bed and, in some cases, an increase of clothing insulation. On the other hand, is the medical staff, with a higher metabolic rate and a lower clothing insulation when compared to patients (Ferraro, et al, 2015). Medical staff and patients' thermal comfort must be considered as two separate groups with different needs (Ferraro, et al, 2015). Hence, Parsons, (2002)

suggests that, working in comfortable conditions increases both productivity and performance which can be very challenging to maintain in a healthcare building.

## **METHODOLOGY**

### **Research Design**

The research adopted a descriptive cross-sectional survey design which is pertinent in explaining, discussing and interpreting phenomenon as they naturally occur (Polite and Berk, 2008).

### **Research Setting**

The setting for the study was in Calabar and the Study site was in two public hospitals in Calabar Municipality, Cross River State, Nigeria. These hospitals were selected because, they have relatively a higher number of healthcare users' (Patient, Nurses and Doctors) and an increased average length of stay for patient's hospital admission. Calabar is an important city in the history of Nigeria because, it prides itself as the first capital of Nigeria and it is the country's tourism destination. It is in the tropical region of South-South geo-political zone Nigeria. Calabar (4o 5700' N, 8o1930' E) is the capital of Cross River State in Nigeria with an area of 406 km<sup>2</sup> and a population of 371,022 persons at the 2006 census (Ering, 2010). It is bounded in the South with Cameroun/Equatorial Guinea, in the west to the Oron Local Government Area of Akwa Ibom State, in the east to the Akpabuyo Local Government Area of Cross River State and in the north with Odukpani Local Government Area, all in Cross River State. The University of Calabar Teaching Hospital (UCTH), Calabar is the only tertiary referral hospital in Cross River State that receives patients from all hospitals and clinics within the state (Figure.1).

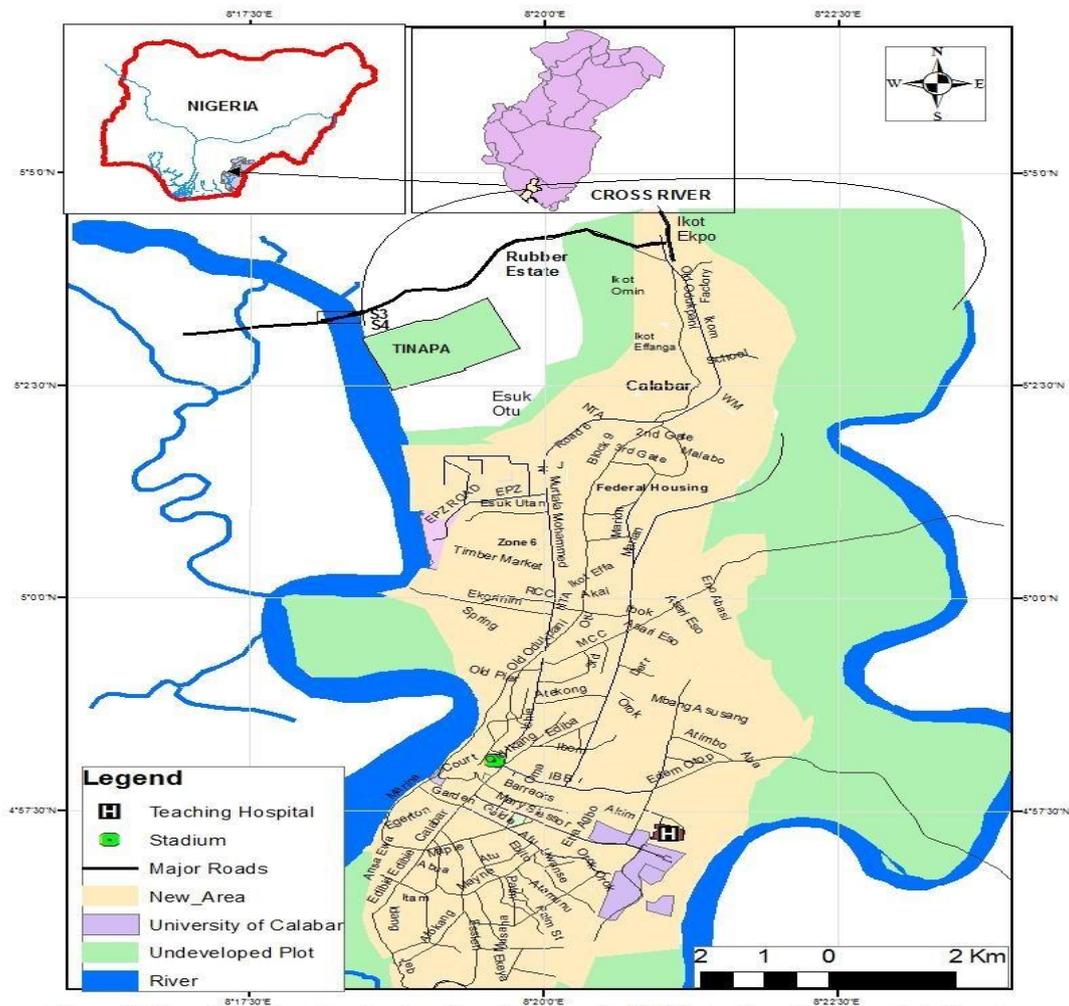


Figure 1: Map of Calabar showing location of University Of Calabar Teaching Hospital, Nigeria

### Study population

The study population consisted of all in patients with an average length of stay of seven days, registered nurses and doctors with at least two years working experience in the two public hospitals in Calabar.

### Sample/Sampling Technique

Samples of 200 patients, 110 doctors and nurses making a total of 310 respondents were purposively selected from an assessable population of 2500 healthcare users in the two public hospitals.

### Ethical consideration

Due ethical approval was obtained from the University of Calabar Teaching Hospital's ethical committee and all the research participants gave informed consents. The purpose of the study was explained to all the participants. Anonymity was ensured by not including the participant's names on the questionnaire. The participant willingly completed and returned copies of the questionnaire without any form of coercion.

### Instrument and statistical analysis

Data were collected using validated researcher developed questionnaire with a reliability coefficient of 0.085 to 0.96. Data was analysed with the aid of SPSS (18.0) and were presented using simple percentages and frequency tables.

### RESULTS

The Socio-demographic data of respondents (health care facilities' users) (n=310)

As shown in table 1, many respondents were females 62.5% (n=194), between the ages of 35 to 49 years 50% (n=155), married 61.3% (n=190), and Christians 87.1% (n=270). Majority of respondents were civil servants 61.3% (n=190) and 56.5% (n=175) attended tertiary education while 96.1% (n=298) were Nigerians.

### Patients' Perception of the Impacts of the Indoor Environment on their Wellbeing

In assessing the impacts of the indoor environment on patient's wellbeing, the four environmental variables (noise, light, thermal environs and art) which the

literature review identified to have a significant impacts on the patients' wellbeing were investigated. From table 2 below, it is evident that, the majority of patients identified noise, especially from moving vehicles 89% (n=178) around the healthcare facility as sources of discomfort. Intermittent power supply 99% (n=198),

poor lighting in spaces 73.55 (n=147), damaged cooling facilities 94.5% (n=189), limited television and radio programs 67.5% (n=135), and poor decoration and art work in spaces 56.5 (n=133) were sources that had a significant Impact on their wellbeing in the therapeutic environment.

**Table 1: Socio-demographic data of Respondents n=310.**

Items		Frequency	Percentage (%)	
1	<b>Sex:</b>	Male	116	37.5
		Female	194	62.5
2	<b>Age:</b>	20-34	70	22.5
		35-49	155	50
		50-64	50	16.1
		65 and Above	30	9.7
3	<b>Religion:</b>	Christianity	270	87.1
		Islam	15	4.8
		Eckist	10	3.2
		Others	15	4.8
4	<b>Marital Status:</b>	Single	40	12.9
		Married	190	61.3
		Divorced	40	12.9
		Widow	25	8.1
		Widower	10	3.2
5	<b>Occupation:</b>	Farmer	25	8.1
		House Wife	15	4.8
		Trader	80	25.8
		Civil Servant	190	61.3
6	<b>Educational qualifications:</b>	Primary	32	10.3
		Secondary	103	33.2
		Tertiary	175	56.5
7	<b>Nationality:</b>	Nigerian	298	96.1
		Foreigner	12	3.9
		<b>310</b>	<b>100</b>	

**Table 2: Indoor Environmental Factors That Impacted the Patients' Wellbeing.**

S/N	Indoor Environmental Elements	n-200	%
<b>Noise</b>			
1.	Noise from moving vehicles around the healthcare facility	178	89
2.	Noise from ringing telephone/alarms	98	49
3.	Noise from nearby patients who is mourning or snoring	70	35
4.	Noise from hospital equipment, e.g moving trolleys	67	33.5
5.	Noise from high volume television set	60	30
6.	Noise from nurses and doctor's conversations	40	20
<b>Lighting</b>			
1.	Intermittent power supply	198	99
2.	Poor lighting in most of the spaces (corridors, passages, etc.)	147	73.5
3.	Excessive daylighting in some spaces	109	54.5
3.	High solar radiation entering the building during the day	120	60
<b>Thermal Comfort</b>			
1.	Too warm especially during the day	158	79
2.	Poor cooling system (damaged fan and no Air conditioning system)	189	94.5
3.	Naturally cold at night on most days	106	53
<b>Art</b>			
1.	Poor decorations within the spaces	113	56.5
2.	Absence of lively art works	89	44.5

3.	Limitations on Television and radio programs	135	67.5
4.	Poor indoor colours on walls	124	62

When patients were asked how the factors in table 2 above impacts their health and wellbeing, the majority of the respondent stated that:

- “Excessive noise disturbs my sleep and rest”
- “Excessive noise sometimes increases my pain”
- “Excessive noise gives me negative physiological changes”
- “Excessive noise makes communication difficult”
- “Shortage of power makes the place to be too warm”
- “Power shortage affects meal preparation and other power related task”
- “I don’t get to view channels of my preferred television programs”
- “I am not comfortable with the general hygiene of the hospital Environment because of this, I do not wish to spend a long time here”

### Healthcare Professionals-Nurses and Doctors Perception of the Impacts of the Indoor Environment on their Wellbeing

In assessing the impacts of the indoor environment on staff wellbeing, four environmental factors of noise, light, thermal environs and art were also investigated. From table 3 below, it is evident that, majority of staff also identified noise, especially from moving vehicles 83.6% (n=92) around the healthcare as sources of discomfort. Intermittent power supply 93.6% (n=103), poor lighting in carrying out task 79.1 (n=87), and poor and damaged cooling facilities 98.20% (n=108), were sources that had a significant influence on the wellbeing of staff in the therapeutic environment.

**Table 3: Indoor Environmental Elements That Impacts Staff Wellbeing.**

S/N	Indoor Environmental Elements	n-110	%
<b>Noise</b>			
1.	Noise from moving vehicles around the healthcare facility	92	83.6
2.	Noise from ringing telephone/alarms	65	59.1
4.	Noise from hospital equipment, e.g. moving trolleys	45	40.9
<b>Lighting</b>			
1.	Intermittent power supply	103	93.6
2.	Poor lighting in carrying out task in most of the spaces	87	79.1
3.	Excessive daylighting in most spaces during the day	67	60.9
<b>Thermal Comfort</b>			
1.	Too warm especially during the day	89	80.9
2.	Poor cooling system (damaged fan and no Air conditioning system)	108	98.2
3.	Naturally cold at night on most days	58	52.7
<b>Art</b>			
1.	Limitations on Television and radio programs	54	49.0
2.	unattractive indoor colours on walls	45	40.9

When staff were asked how the factors on table 3 above influences their health and wellbeing, majority of the respondent stated that; though they were now receptive to many of these factors but;

- “Excessive noise increases their stress levels”
- “Excessive noise makes them feel burned out and emotionally exhausted”
- “Excessive noise and high solar radiation penetration into the spaces sometimes give them headache”
- “Noise makes communication difficult”
- “Poor lighting and power shortage affects effective and efficient delivery of clinical task”

**Table 4: Healthcare Providers' Safety Concerns.**

S/N	Safety Concerns	n-110	%
<b>Noise</b>			
1.	Lack of adequately marked out fire doors/exist	109	99.9
2.	Poor maintenance of fire doors and fire extinguishers	105	95.5
3.	Lack of fire blankets	107	97.3
4.	Poor knowledge of fire assembly points/action plan	109	99.9
5.	Non-functional fire alarms	104	94.5
6.	Limited fire extinguishers	67	60.9
5.	Shortage of personal protective materials (e.g. hand gloves, surgical masks, etc.)	69	62.7
6.	Poor emergency preparedness (E.g. During the Ebola outbreaks, haemorrhagic fever, etc.)	70	63.6
7.	Shortage of reagents (e.g. Sterilizing reagents)	47	42.7
8.	Poor response time to emergency	72	65.5
10.	Lack of contamination containment facility	98	89.1
11.	Limited knowledge of using medical equipment	60	54.5
12.	Poor maintenance of medical equipment leading to increase failure rate with attendant risk	99	90.0
13.	Inadequate capacity building (periodic fire training)	55	50.0
14.	Poor illumination to carry out task	86	78.2
14.	Inconsistent sewage disposal	38	34.5

**Health care providers' perception of safety measures**

As shown in Table 4 below, lack of adequately marked out fire doors/exist 99.9% (n=110), lack of fire blankets 97.3% (n=107), poor maintenance of medical equipment leading to increase failure rate with attendant risk 90% (n=99) and lack of contamination containment facility 89.1% (n=98) was identified as key among the healthcare provider's perception of safety concerns.

On respondents' perception of the exterior natural environmental factors that impacts their wellbeing, majority stated that;

- "I like the landscape; I like to sit out in the evenings there because it makes me relax and connects me to nature"
- "I like to take some fresh air seating outside because of the heat inside"
- "I like to watch the movement of cars and people outside; this makes me relaxed and lively"
- "I like to admire the trees, shrubs and flowers outside, it makes me not to think of my problems"
- "I appreciate the good landscape, but am not pleased with unavailability of parking spaces which usually makes me stressed at the beginning of the day when searching for park space".

Respondents were asked about the environmental elements improvements they will recommend. The Majority of respondents called for an improvement to the various factors influencing their wellbeing as stated in table 2, 3 and 4 respectively. They also wished to have a healthcare environment where they are in control of their facilities.

**DISCUSSION**

It is evident from the findings of this study that noise, lighting, thermal environs and art are key indoor

environmental factors that influence the wellbeing of patients and staff in the therapeutic environment. Many respondents identified that, excessive noise caused various negative physiological changes and disturbed their sleep. They identified noise from moving vehicles around their environment as a major source of noise pollution within their healthcare facility. The World Health Organization (WHO) suggest that, a sound level of 35Db is recommended continuously for indoor noise in patient's rooms in healthcare facilities, with 40Db as the maximum limits during night-time peaks. Ulrich, et, al (2004), states that, many studies have demonstrated noise levels far exceeding these guidelines with various ranges cited from 45 to 90Db. This study reveals that, noise significantly causes stress, sleep and rest disturbance, and pain tolerance, which influences the wellbeing of patients in the study location. This implies that, noise can potentially affect the healing process, health and patient recovery. From the perspective of staff, excessive noise was found to significantly interfere with the delivery of healthcare and causes stress and burn out. This view concurs with a study carried out by Huisman, Morales, Hoofa, & Kort, (2012) it was found that, excessive noise was sufficiently high to interfere with staff work and to affect patient comfort, and recovery.

Many respondents (Patient and Staff) identified intermittent power supply, poor lighting in most of the spaces (corridors, passages, etc.), excessive daylighting in some spaces and high solar radiation entering the building during the day as lighting factors that influences users' wellbeing. When there is a power shortage, there is bound to be discomfort because, cooling appliances and all other power dependent facilities will be off. When there are also high solar radiation entering the building during the day, there is also issues of being too warm, glare, stress, etc. Poor lighting on the other hand is

depressing, it can impact mood, rates of medical errors and safety (Ampt, Harris, & Maxwell, 2008). Staff associated poor illumination with errors in dispensing medications. Hence, in as much as different lighting is needed for different situations, there is a need for the provision of different lighting options with the flexibility of its usage.

Furthermore, the majority of respondents (patient/staff) admitted that, due to the damage of cooling facilities the spaces are always too warm. Studies have revealed that patients had a shorter hospital stay when staying in an excessively warm space. The patients admitted that, when they feel warm, they get agitated adding additional stress, which affects their health and wellbeing. To the staff it causes quick fatigue, depression and further stress. About the availability of artwork and its influences on wellbeing, most of the patients and staff were not pleased with the absence of lively art works, poor decorations within the spaces and limitations on television and radio programs they could tune to. A patient said "when I am stressed, I have a favourite channel I usually tune to, to keep me refreshed, but for the two weeks I have been in this healthcare facility I have not watched my favourite channel". Ulrich & Giplin, (2003) states that, the availability of artwork which depicts images such as flowers, gardens, natural landscapes, and waterscapes, as well as figurative art such as facial expressions and positive gestures can reduce stress and improve outcomes such as pain relief.

The study also reveals that, there are many safety concerns that needs addressing. The perception of staff about safety showed that, there is no clear fire action plans set out and the users of the healthcare facilities are not adequately intimated on what to do or expect in the emergency of a fire occurrence. Also, the majority of staff complained of lack of personal protective materials, equipment's and poor illumination to carry out the task. This they said exposes the healthcare worker to easily be infected and make errors. This study has clearly determined the different safety concerns and interventions that the healthcare authorities need to apply or has access to increase the safety and security of their staff and patients. One of the main safety concerns of patients was the fear of being subjected to human errors by the medical professionals in the healthcare facility.

It is evident from the study that, developing countries need to consciously switch to adopting sustainable therapeutic environmental measures. Such measures are opined by the responses of the respondents who called for an improvement to all the factors influencing their wellbeing as revealed in the study findings. They proposed to have a healthcare environment where they are in control of their facilities. In environmental psychology, giving a patient a choice and control appears to be a key element. Ulrich, et al (2004) suggests that, the patient's lack of control is a major problem in hospital settings, this promotes stress and anxiety in

patients. Today, there is a growing trend among some healthcare facilities to give patients more "control" over their environments and promote person centred care (Douglas & Douglas, 2005). When patients have some control, they tend to have a feeling of normality which promotes psychological wellbeing. Delvin & Arneill, (2003) suggest that, reduced immune function, increase in blood pressure and depression are associated with lack of control. Also, there is an association between nature and positive health outcomes (Ampt, et al, 2008). As acknowledged by the patients, they were pleased about their exterior and surrounding external environment. They appreciated the grasses, flowers, trees, and other natural features which provided contact with nature and could help in maintaining a sustainable therapeutic environment.

Finally, this study has certain limitations. For example, the therapeutic environmental factors and elements considered were focused only on noise, lighting, thermal environs and art. Some other relevant physical environmental elements were not considered. Furthermore, the study strategy was focused on only patients, nurses and doctors and did not consider other healthcare professionals and users'. This study has shown the need for improvements in the indoor conditions of the healthcare setting of a developing country as well as the need to promote patient control of their environment. Thus, this study recommends a further longitudinal based research to have an indebt evaluation on the merits of promoting a sustainable therapeutic healthcare environment.

## CONCLUSION

In the design and construction of healthcare facilities today, addressing the impacts of the environment on the wellbeing of patients and staff has become increasingly important. The study findings reveal that, to create a sustainable therapeutic environment, it is essential and important to incorporate the users' control and healthcare provider's perspective during the design of healthcare facilities. The key findings from this study suggest that, the indoor environment impacts on the health and wellbeing of patients and staff. It also suggests that, a sustainable therapeutic environment can contribute to enhancing patient control, reduce errors caused by staff, infections and improve patient's privacy and comfort.

The research determined that, noise, lighting, thermal environs and art significantly influences the wellbeing of patients and staff. The study findings revealed that, patient respondents were found to be more perceptive about factors related to sound, light, thermal comfort, and art on their wellbeing, while most healthcare professionals were less sensitive to these factors - due to environmental resilience, self-efficacy and adaptation. The study had a good correspondence with previous research on patient and staff wellbeing and environmental psychology. This study concludes that, a

sustainable therapeutic healthcare environment should promote design elements that encourage patient control towards recovery and efficient staff delivery of services for optimum healthcare productivity in Calabar Municipality, Nigeria. Further longitudinal based research is needed to determine how other elements of the environment influences, patients and staff and contributes to the healing process.

### RECOMMENDATIONS

Considering that a sense of normalcy in a healthcare facility is key to sustaining a good therapeutic environment and considering the various findings of this study the following are therefore recommended:

- ❖ To minimize the influences of noise on patients and staff wellbeing, options such as the flexibility to close doors, windows, adjustment of television and radio volumes, etc. should be encouraged. Noise absorbing building materials should be used.
- ❖ There should be flexibility in the control of light where possible by individual, e.g. flexibility in controlling light switches, adjustment of window curtains and blinds when there is a high penetration of solar radiation, etc. In patient rooms, residential style lighting should also be encouraged.
- ❖ Periodic maintenance of cooling facilities such as air conditioning system, fans, etc. should be practiced. Power shortage should be addressed. Adequate power supply can be achieved using renewable energy strategies such as installation of solar panels that will harness the potentials of high solar radiation in this region (Nigeria-tropical region) to provide a sustainable means of powering appliances and equipment's.
- ❖ The flexibility of patients bringing in their art works such as choice pictures, images and decorations should be encouraged. The healthcare facility public spaces should also have lively art works that promotes a sense of wellbeing. A variety of television and radio programmes should be made accessible to users'.
- ❖ There should be an overhaul of the fire action plan to make fire emergency preparedness more active and known by every user. Fire doors, blankets and alarms should be maintained, and fire exits clearly marked. There should be availability of personal protective materials to avoid the risk of infection transfer to staff.
- ❖ Patients should be encouraged to effectively use the pleasant exterior views, and the beautiful outside landscape and environment to reconnect to nature and enhance their wellbeing.
- ❖ To promote a high level of individual patient control over their environment, the design and use of single rooms where possible should be encouraged by health architects. Delvin & Arneill, (2003) state that, when patients are in single rooms, they have the greatest control over their environment.

### REFERENCES

1. Aiken, I. H., Sloane, D. M., Clarkes, S., Poghosyan, L., Cho, E., You, L., Aunguroch, Y. Importance of Work Environment on Hospital Outcomes in Nine Countries. *International Journal of Quality in Healthcare*, 2011; 357-364.
2. Altimer, L. B. *Healing Environment for Patients and Providers*. Nweborn and Infant Nursing Reviews, 2004; 89-92.
3. Ampt, A., Harris, P., & Maxwell, M. *The Health Impacts of the Design of Hospital Facilities on Patient Recovery and Wellbeing, and Staff Wellbeing: A rEview of the Literature*. Sydney: University of New South Wales, 2008.
4. ASHRAE. *Standard, Thermal Environmental Conditions for Human Occupancy* American Society of Heating, Refrigeration and Air-conditioning Engineers, Atlanta, Georgia, USA: American Society of Heating, Refrigerating and Air Conditioning Engineers, 2010; 55-10.
5. *Building Bulletin, Lighting Design for Schools*. London: The Stationary Office, 1999; 90.
6. Burton, A. *Building to Make People Better*. *Lancet PNCology*, 2005; 456-457.
7. Cummings, G. G., MacGregor, T., Davey, M., Leo, H., Wong, G., Lo, E., Stafford, E. *Leasership Styles and Outcome Patterns for the Nursing Workforce and Work Environment: A Systematic Review*. *International Journal of Nursing Studies*, 2010; 363348.
8. Cunha, M., & Silva, N. *Hospital Noise and Patient Wellbeing*. *Social and Behavioural Science*, 2012; 171: 246-251.
9. De Dear, R. *Thermal Comfort in Practice*. *Journal Indoor Air*, 2004; 32-39.
10. Dean, E. *Daylight Designs in Libraries*. *Libris Design Project*, 2005; 2-23.
11. Delvin, A., & Arneill, A. *Healthcare Environments and Patients Outcomes: A Review of the Literature*. *Environment and Behaviour*, 2003; 35: 665-694.
12. Douglas, Y., & Douglas, M. R. *Patients centered improvements in health-care built environments: perspectives and design indicators*. *Health Expectations*, 2005; 264-276.
13. Ferraro, S, et al. *A field study on thermal comfort in an Italian hospital considering differences in gender and age*. *Applied Ergonomics*, 2015; 177-184.
14. Gesler, W., Bell, M., & al, e. *Therapy by Design: Evaluating the UK Hospital Building Program*. *Health and Place*, 2004; 117-128.
15. HSE. *HSE - Thermal Comfort: Homepage*, 2015, July 8. Retrieved from [www.hse.gov.uk/temperature/thermal/](http://www.hse.gov.uk/temperature/thermal/); [www.hse.gov.uk/temperature/thermal/](http://www.hse.gov.uk/temperature/thermal/).
16. Huisman, E., Morales, E., Hoofa, J. V., & Kort, H. *Healing environment: A review of the impact of physical environmental factors on users*. *Building and Environment*, 2012; 58: 70-80.

17. Joseph, A. (2006). The Role of the Physical and Social Environment in Promoting Health, Safety, and Effectiveness in the Healthcare Workplace, Retrieved August 5, 2016, from The Center for Health Design: <http://www.healthdesign.org/research/reports/light.ph>
18. Joseph, A., & Ulrich, A. (2007). Sound Control for Improved Outcomes in Healthcare Settings. Retrieved August 5, 2016, from Center for Health Design: <http://www.healthdesign.org/research/reports/light.ph>
19. Lorenz, S. The Potential of the Patient Room to Promote Healing and Wellbeing in Patients and Nurses: an integrative review of the research. *Holistic Nursing Practice*, 2007; 21: 263-277.
20. Mourshed, M., & Zhao, Y. Healthcare Providers' Perception of Design Factors Related to Physical Environment in Hospitals. *Journal of Environmental Psychology*, 2012; 362-370.
21. Mroczek, J., & Mikitarian, G. Hospital design and staff perceptions: an exploratory analysis. *Healthcare Manager*, 2005; 24: 233-244.
22. Othman A. R, Mazli M. A. Influences of Daylighting towards Readers' Satisfaction at Raja Tun Uda Public Library, Shah Alam. *Procedia of Social and Behaviourial Sciences*, 2012; 244-257.
23. Parsons K.C. The effects of gender, acclimation state, the opportunity to adjust clothing and physical disability on requirements for thermal comfort. *Energy and Buildings*, 2002; 34(6): 593-599.
24. Polit, D. F. and Beck, C. T. *Nursing Research, Generating and assessing evidence for nursing practice*. 8th ed. Philadelphia Wotters/ lippincott: William and Wilkins. 2008.
25. Skoog, A., et al. Spring distribution of dissolved organic matter in a system encompassing the Northeast Water Polynya: Implications for early-season sources and sinks, *Mar. Chem.*, 2005; 94, 175-188.
26. Taylor, S.E. Hospital Patient Behaviour, Reactance, Helplessness or Control. *Journal of Social Issues*, 1979; 156-184.
27. Trinkoff, A., Johantgen, M., Muntaner, C., & Le, R. Staffing and Worker Injury in Nursing Homes. *Journal of Public Health*, 2005; 1220-1225.
28. Ulrich, R., & Giplin, L. Healing arts: nutrition for the soul., In *Putting patients first: designing and practicing patient centered care*, San Francisco: Jossey-Bass, 2003; 117-146.
29. Ulrich, R., Zimring, C., Quan, X., Joseph, A., & Choudhary, R. The Role of the Physical Environment in the Hospital of 21st Century: A Once in a lifetime Opportunity. *The Center for Health dESIGN*, 2004.
30. Van de Glind, I., Roode, S., & al, e. Do Patients in Hospitals Benefit from Single Rooms? A Literature Review. *Health Policy*, 2007; 153-161.
31. Verderber, S., & Fine, D. J. *Healthcare Architecture in an Era of Radical Transformation*. New Haven: Yale University Press, 2000.
32. Verheyen. Thermal comfort of patients: Objective and subjective measurements in patient rooms of a Belgian healthcare facility. *Building and Environment*, 2011; 46: 1195-1204.
33. Watkins, N. *Therapeutic Environments*. National Institute of Building Sciences, 2010.