



The Physical Environmental Stressors Mitigating Effective Caregiving in Nigerian General Hospitals : A Case Study of Kaduna State

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ABSTRACT

Stress has been identified to be one of the major challenges of healthcare settings that causes turnover and burnout of caregivers and also a negative consequences on patient recovery. It is a common condition that has a significant negative consequences on the well-being of users of healthcare environment. It has been established that, Healthcare environment have tendencies of aggravating or reducing stress, but very little information is available on its role in relation to stress in Nigeria. In this regard, this research is aimed at examining the mitigating effects of environmental stressors on effective caregiving in General hospitals. A case study of four (4) General Hospitals in Kaduna State (Hajiya Gambo Sawaba, Giwa, Kauru and Sarkin Maska Shehu in Funtua) was carried out to explore the stressors of healthcare environment and their resultant effects. In addition to observation, Twenty-four healthcare personnel comprising of nurses and doctors were selected using purposively sampling and interviewed. The data was analysed using content analysis. Two environmental stressors found in healthcare environment are ambient and facility layout in nature. It was also found that there was less conscious attempt to use stress reducing-measures in minimising stress on the users. Therefore, it becomes pertinent to use design strategies and elements inherent with stress-relieving effects to minimise stress in future designs of general hospitals in the country.

Keywords: Healthcare Environment, Stress and Stressors, Caregiving, General Hospital

INTRODUCTION

The World Health Organization in 1946 defined health as a condition of the whole physical, mental and social well-being, rather than simply the absence of sickness and infirmity (Oloche, 2015) and (Christer, 2013). However, the well-being of the users is undermined in the healthcare settings leading to an unfavourable condition and stressful experience, and this consequently affects the healthcare outcomes.

Stress is one of the major problems experienced in public healthcare settings in Nigeria which causes burnout of caregivers and ultimately affects patient recovery. Ulrich, (2001) stated that problems relating to the

physical environment, work overload, anger formed during interactions with patients or their relatives, being exposed to health and safety hazards, lack of support from hospital administration were identified as stressors. Lack of due considerations in addressing clinical stressors and enhancing the well-being of the users in this intermediate tier of healthcare settings in the country results in frequent referral to the Tertiary Hospitals, which eventually results in over-crowding and generating more stress (Alkali et al., 2014). Despite the fact that stress is known to be contributed by different factors, this

research focussed only on the stressors relating to physical-built-environment.

Caregivers' work environments must be supportive of their profession and responsive to their specific demands, as any insufficiency in the physical environment can contribute to staff discomfort, stress, and burnout, as well as medical errors. So, as Ulrich, (2001). stated, physical environment of a well-designed hospital promotes improved clinical outcomes, boosts safety and decreases stress for both patients and staff.

However, despite the growing evidence on the tendencies of the physical healthcare environment in worsening or reducing stress, very little attention has been paid to the role of the physical healthcare in our local context (Alkali et al., 2014). Although there are researches conducted regarding the staff experiencing stress in other fields of studies like nursing and medical sciences, little emphasis is given to stress reducing strategies in healthcare environment ((Ulrich & Zimring, 2004), and (Christer, 2013).

Therefore, the design of an improved healthcare setting plays an important role in making hospitals less distressing, more healing for patients, and a better working place for staff (Alkali et al., 2018). Thus, a holistic approach from all fields in addressing the stress may decrease the burnout of caregivers in the healthcare sector as well as the patients' long stay while admitted. In summary, this research focused on examining the physical environmental stressors in Nigerian general hospitals to facilitate patient care and the well-being and effectiveness of healthcare personnel.

LITERATURE REVIEW

Stress is defined as a non-specific response of human body to any demand

made upon it (Chhari & Mehta, 2016), (Fink, 2017). Fink (2017) went on to state that stress as an external factor or stimuli causes physical, emotional, or mental discomfort in employees.

Considerations to the physical environment is important as it can cause stress by influencing individual needs (Ulrich et al., 2004). As jobs have changed, many hospital settings have not been rethought, and as a result, hospital design frequently increases staff stress and reduces their effectiveness in providing care(Ulrich et al., 2004). Poor design can undoubtedly cause psychological and physiological discomfort, whereas good design mitigates negative effects (Ulrich, 1991). According to Aziz & Said, (2016) unsafe health facility environments such as unsuitable furniture, poorly designed workstations, lack of ventilation, excessive noise, inappropriate lighting, poor supervisor support, poor workspace, poor communication, poor fire safety measures for emergencies, and a lack of personal protective equipment can reduce employee productivity. They also claim that health workers in such settings are vulnerable to occupational syndromes such as stress, deafness, ergonomic disorders and suffocation.

Similarly, the hospital environment contributes to the stress of both patients and staff. Patients, like staff, have physiological, psychological and psychosocial needs in hospital settings, which if not met to a certain level may cause stress in the patients. Rashid, (2007) developed a conceptual framework illustrating how the physical environment may set in motion a process leading to stress in healthcare and office settings. This is as illustrated in Figure 1.

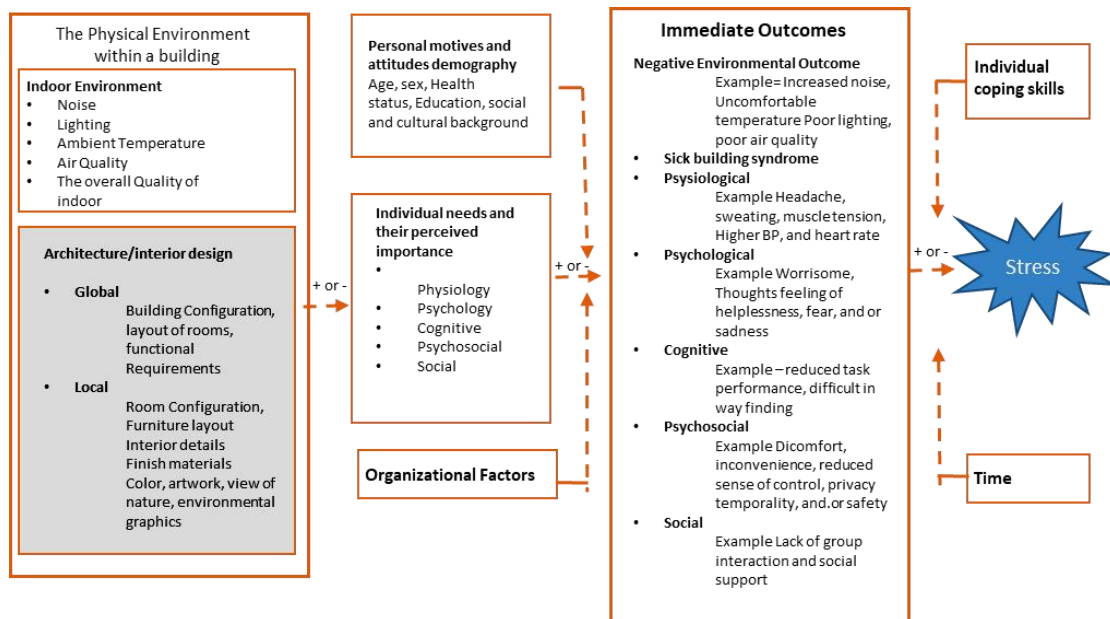


Figure 1: Conceptual Framework on Physical Environment Process Leading to Stress (Source: Rashid & Zimring, 2008)

Ambient Environmental Factors

According to Malkin (2008) environmental factors also known as environmental stressors include noise, glare, lack of privacy and poor air quality among others. These stimuli or factors appear to be determinants of indoor environmental comfort, while discomfort can lead to or contribute to additional stress. Eijkelenboom and Bluysen (2019) stated that these stress reactions may differ between occupants due to demographic differences, duration of exposure, physiological characteristics, social aspects and previous experiences and exposures.

Noise as a stressor

It has been established that noise is one of the pervasive stressors that burden not only patients and their families, but also workers involved in direct patient care. Noise, according to Ulrich et. al. (2006) is a stressful latent environmental condition that increases fatigue and job strain and, in some clinical situations, increases the risk of error for staff. It is also linked to sleep loss and

fragmentation, high blood pressure, a lower rate of recovery from a myocardial infarction, and lower oxygen saturation in neonatal intensive care infants. Noise are generated from different sources which are either from the hospital's internal and external environments, disruptions caused by loud roommates in multi-bed rooms, noise from a busy road, a market near the hospital, and so on.

It has been shown that hospital noise levels around the world are far too high, with decibel intensities far exceeding WHO guideline values (Ulrich et. al., 2006). Some studies that measured noise levels in hospital settings found that background noise levels in hospitals were in the range of 45 dB to 68 dB, with peaks frequently exceeding 85 dB to 90 dB (Joseph, 2006). This is significantly higher than the 35 dB values recommended by World Health Organization guidelines (Berglund, Lindvall and Schwela, 1999). In this regard, it is therefore imperative that healthcare building projects owners should place high priority on creating much quieter environments. Lower noise

levels were associated with a variety of positive effects on employees, including decreased perceived work demands, increased workplace social support, improved patient care quality and improved speech intelligibility (Ulrich et. al., 2004).

Lighting as a Stressor

A study of workers' productivity levels discovered that daylight has a positive effect on work performance in a windowed office environment and is generally recognized as part of a healthy environment (Aripin, 2006). Onosahwo, Chukwumeke and Stephen (2016) affirmed that, the quality of a visual environment has a positive effect on the occupant's sense of well-being in healthcare buildings, which can affect staff performance and patient recovery. Joseph (2006) stated that day lighting has been specifically linked to improved attention and mood, as well as reduced strain, anxiety, tiredness and eyestrain. It is clear from the preceding positive effect of optimal lighting level that its adequacy can never be over emphasized in a hospital setting in reducing stress.

Thermal Discomfort

Thermal discomfort in healthcare facilities is of great concern as it serves as a source of unwanted physiological strain on the body, even though the thermal comfort of patients differs from that of a healthy population (Ackley & Akpan-idiok, 2017). A research in a Belgian healthcare facility found that, a poor thermal healthcare environment can induce physiological strain on patients, which can further induce extra stress to the patient, which is undesirable unless medical treatment requires it (Ackley & Akpan-idiok, 2017). However, because people with different activities must coexist in the same thermal conditions, achieving thermal comfort that is suitable for all becomes extremely difficult

(Ferraro, 2015). As a result, thermal comfort in the healthcare environment must be calibrated by considering two distinct groups of people: patients, who generally have low metabolic rates, and medical staff, who have higher metabolic rates and lower clothing insulations when compared to patients (Ferraro, 2015).

Unit Configuration as Stress Contributor

Walking distance is one of the most stressful tasks performed by healthcare givers, and it affects the expected patients' care. This is influenced by the spatial layout, such as proximity of related functions and ancillary facilities. Internal layout can be designed to increase or decrease the time staff spends going around the ward for medication, materials supply and other ancillary patient care activities. This is supported by Hendrich, Fay, and Sorrells (2004) and Joseph (2006) who confirmed that the efficient unit design reduced walking and supply trips, allowing for a reduction in budgeted staffing care hours while increasing time spent on direct patient-care activities. According to Joseph (2006) bringing staff and supplies physically and visually closer to the patients reduces the amount of time spent walking.

Strategies for Mitigating the Effects of Environmental Stressors

There are scientific evidences confirming how traditional ways of hospitals designed contribute to stress; however, improved physical settings can be an important tool in making hospitals safer, more healing and better places to work (Ulrich et. al., 2004). (Ulrich, 2001) proposed that psychological supportive design can alleviate stress caused by a lack of control, whether the concern is for staff, patients, or visitors, this is by implementing strategies that promote a sense of control. Furthermore, providing

gardens or grounds that are accessible to patients and staff in addition to proper siting of staff workstation are found to be among design strategies that can increase sense of control.

Indoor Environmental Comfort As a Stress Mitigation in Hospitals

The quality of an environment that is comfortable in terms of ambient features is known as indoor environmental comfort. The environmental comfort model states that, a workspace either supports the tasks and activities performed in it or fails to support them and thus slows them down due to uncomfortable condition of stress (Salonen et al., 2013). Different ambient factors such as noise level, temperature level, light, air quality and ventilation influence indoor environmental comfort (Baye et al., 2020). They further argued that psychological and physiological stress can be reduced by reducing the noise level through the use of noise-reducing finishes such as high-performance sound-absorbing ceiling tiles or by architectural features such as single-bed patient rooms and short corridors.

Apart from a shift from an open-bay ward system to a single patient room occupancy system; other acoustical measures also play vital roles in reducing the level of noise as well as sound propagation. A priority should be placed on creating a much quieter environment by separating patients into single rooms, insulating or eliminating noise sources and installing high permanent sound-absorbing materials on ceiling and wall surfaces (Kwon & Siebein, 2007).

Improving natural lighting and ventilation is also important in achieving an indoor environment that is visually and thermally comfortable. According to Yang & Clements-Croome, (2020), spending at least three hours a day in

natural light can reduce stress and increase satisfaction. By providing pleasing and calming views, visual comfort can be improved. In addition to calming views and provision of hospital gardens and family involvement in patient care, hospitals should provide more public spaces that facilitate social interaction, such as lounges, atria and interior streets with shops, etc., that were not previously available in the hospital environment (Alkali et al., 2018)

General Layout, Shape, Size and Accessibility Design to Reduce Stress

The shape of a unit, its layout, as well as the number of interruptions within the spatial relationship impact on the number of interactions and stops due to increased visibility and a higher likelihood of crossing paths with other staff (Alkali et al., 2014). According to Fleba, (2005) more trips were made within the nurses' area than between patients' rooms and interruptions occurred frequently, resulting in additional walking. In a comparative study of intensive care units, it was shown that a circular design provided nurses with greater visibility of patients and less travel in hallways, resulting in greater satisfaction by nursing and surgical staff, as well as patients and their families, than a rectangular shaped design (Fleba, 2005). This was also supported by Seo, Choi and Zimring (2011) that observational studies revealed less walking distance and time in units with global visibility, particularly in a circular and octagonal shape forms when compared to other units without global visibility.

Nigerian Hospital System

The Nigerian health system is based on a three-tiered government structure (Federal, State and Local Government Area), each with significant autonomy (Alkali et al., 2015). Hospitals in the country are also divided into three

types: primary, secondary, and tertiary. Dispensaries, clinics, and primary healthcare centers are examples of Primary Health Care Centers (PHCs), whereas general or district hospitals are examples of secondary healthcare centers. Tertiary Hospitals include Federal Medical Centers (FMCs), Specialist Hospitals (SPs), and University Teaching Hospitals (UTHs). The general hospital is an intermediate tier that serves as a link between PHCs and tertiary hospitals such as FMC and UTHs. It provides health services that are too complex for primary care clinics and refers more complex cases that exceed its capacity to tertiary healthcare institutions (Alkali I. A, 2014).

The architecture of a hospital according to Wakawa, (2015) is divided into several units and departments, with a hierarchy in the relationship between one unit/department and another. The units are related based on the functions they serve and a single unit can have multiple departments. Administrative units, outpatient units, diagnostic and treatment units, inpatient units, services and occasionally research and teaching units are found in teaching or specialist hospitals as well as general hospitals with exception of research and teaching.

The outpatient unit, which is usually for short visits of less than a day consists of outpatient clinics, pharmacies, emergency rooms and bed-related inpatient functions, which are usually required for at least one night's stay in a ward. Laboratories, Radiology and Physical Therapy are part of the diagnostic and therapeutic services division. Internal medical treatment division includes operating rooms, intensive care units, maternity sections and central sterilization departments, whereas inpatient division includes patient wards, nurse wards and inpatient services (Wakawa, 2015).

METHODOLOGY

The study purposively selected four General Hospitals in Kaduna State: Hajiya Gambo Sawaba in Zaria, at Giwa, at Kauru and at Sarkin Maska Shehu in Funtua where the interview and observation was carried out. Tape recording was used to record interview data in the research. The data was then transcribed verbatim for the purpose of analysis. Mixed method involving Semi-structured interview and observation was adopted in this research. The respondents are resident nurses and resident doctors that are in direct care of the patient.

Furthermore through observation, the study was able to appraise the extent to which stress reducing-measures, especially in regards to patients, were implemented in the sampled case studies. The attributes observed include the type of ward layout design as well as its occupancy, internal and external configuration of the units, social support, provision of acoustical measures and other ambient features as they all relates to stress.

The data from interview was transcribed verbatim and analysed using rationale content analysis while that of observation was analysed using conceptual content analysis based on the quantity and presence of the feature/criteria assessed. The results from both the observations and interviews of the case studies were presented in tables.

RESULTS AND DISCUSSION

Ambient features of the physical environment and architectural design features were found to be the major factors causing stress. Noise, insufficient lighting and lack of ventilation were found to be related to ambient features, while walking distance by the clinical staff was found to be the main stressor related to the general layout of hospitals.

This was established by categorising the related codes from the transcribed interview themes. Themes that are related were grouped into one category of themes. The group of categories were further categorised into domains as shown in Table 1.

Table 1: Categories of Stressors Found in Healthcare Settings

S/N	THEMES	CATEGORY
1.	Noise	Stressors related to ambient features
2.	Insufficient lighting and lack of ventilation	
3.	Walking distance	Stressors related to architectural general layout

Stressors Related to Ambient Features

The study identified features that are related to the feeling or mood associated with a particular environment. Noise, lack of air quality (lack of ventilation) and insufficient lighting are the atmospheric features related to the physical environment expressed as stressors by the respondents.

Noise as a stressor

The study revealed that, environmental noise generated from a market and a busy road in close proximity to the hospital is the sources of noise. In addition to the noise generated within the hospital environment, this contributes to environmental stress to the healthcare users. There were times when the noise became alarming, as confessed by one of the doctors: “*When it gets worse sometimes you have to wait till the noise gets less then you continue with your work*”. This can be seen in Table 4.2 where the noise has the highest responses in contributing the stress. All doctors and 93% of the nurses from all case studies were of the view that noise is disturbing and mind distracting while on duty. This has been the popular view of 95.83% of all the clinical staff. The result also indicates that there is no much difference between the nurses and doctors across the four case studies on the perception of noise being a stressor. However, one respondent among the nurses in case study three had a contrary opinion as shown in Table 2.

Table 2: How Noise Contributes to Stress to Healthcare Givers

S/N	CODES	Case study 1	Case study 2	Case study 3	Case study 4	Doctors' % (N=9)	Nurses' % (N=15)	TOTAL % (N=24)
1.	Disturbance and mind distraction	6	6	5	6	9 (100%)	14 (93%)	95.83%
2.	Affects workers efficiency	1	1	1	2	3 (33%)	2 (13%)	20.83%
3.	Affects patients' mood and trigger their ailment	3	2		1	2 (22%)	4 (27%)	25.00%
4.	Medication error	2	1		1		4 (27%)	16.67%

The percentages of staff whose efficiency was affected by noise were 13% for nurses and 33% for doctors. This shows that noise causes disturbance which can lead to delay in discharging their duties due to interruption. Furthermore, 16.67% of the respondents were of the view that

noise causes mind distraction leading to medication error.

Users satisfaction with lighting and ventilation

Lighting and ventilation are among the variables used in building performance evaluation to measure the users' satisfaction as a determinant to the

visual and thermal comfort (Ali, 2020). The inadequacy of these attributes contributes to stress to the occupants (Verheyen, 2011 and Aripin, 2006). The levels of satisfaction with natural lighting and ventilation in the

respective workplaces of the respondents were 87.50% and 79.17% for natural lighting and natural ventilation respectively as depicted in Table 3.

Table 3: Users Satisfaction with Lighting and Ventilation

S/N	CODES	Case study 1	Case study 2	Case study 3	Case study 4	Doctors' % (N=9)	Nurses' % (N=15)	TOTAL % (N=24)
1.	Satisfied with natural lighting	4	6	6	5	7 (78%)	14 (93%)	87.50%
2.	Satisfied with artificial lighting	2	0	3	5	5 (55%)	5 (33%)	41.67%
3.	Satisfied with natural ventilation	3	6	6	5	5 (55%)	14 (93.5%)	79.17%
4.	Satisfied with artificial ventilation	2	0	3	5	5 (55%)	5 (33%)	41.67%

There was a general dissatisfaction among the respondents as only 41.16% expressed satisfaction with both artificial lighting and ventilation, as shown in Table 4.3. 55% of the doctors were satisfied with artificial lighting and ventilation but only 33% of the nurses were satisfied with them. Although there was the use of alternative sources of electricity (solar installations and active-standby generators) in all the case studies, they were however dedicated to certain units of the hospitals such as OPD and laboratories. This might be the reason why majority of those found satisfied with artificial lighting and ventilation were respondents working in those units.

Architectural Design Stress-Related Features

Architectural design features are also important factors affecting the behaviour and comfort level of hospital users. This research explored how the internal and external layout of the hospitals add up to clinical staff stress.

The result indicates that the architectural layouts of the hospitals add up to the clinical stress. The distance covered by staff is determined by the architectural layout or design of the hospitals, so, the spatial layout can lengthen or shorten the distance they cover. Therefore, it is the view of the clinical staff that distances they cover add up to their stress, and this is further discussed below.

Walking distance

Frequent movements that healthcare personnel get involved in, either within the ward or between the units, add up to their stress. This is as narrated by one of the respondents that "... *but here the nurses' station is not together with the ward, so you have to go down to attend to patients, that movement is very stressful. It will be better if we can have things in close proximity*". The result shown in Table 4 indicates that 54.17% of the respondents were of the view that such movement is stressful.

Table 4: Respondents' View on Walking Distance on Stress

S/N	CODES	Case study 1	Case study 2	Case study 3	Case study 4	Doctors' % (N=9)	Nurses' % (N=15)	TOTAL % (N=24)
1.	Depends on the layout and unit of the work	3	0	0	0	1 (11%)	2 (13%)	12.50%
2.	The movement to patients' areas, supplies, and other units is stressful	1	5	4	3	3 (33%)	10 (67%)	54.17%
3.	Movement not stressful	2	1	2	3	5 (56%)	3 (20%)	33.33%

It is evident that 12.50% of the respondents were of the view that the stress on staff is a factor of the layout and unit of their work place. This was deduced to be the view of those that had the experience of other wards/units or had the experience of other hospitals, and surprisingly 33.33% did not see such movement as stressful. 56% of those having the opinion that such movement was not stressful were doctors, while 11% of them were of the view that it depends on the unit layout. This may be due to the fact that doctors spend most of their time at OPD having consultations with outpatients, or at the inpatient unit during the ward-round. On the other hand, 67% of nurses were of the view that such

movement was stressful and 20% of them opted otherwise. Therefore, it can be deduced that such movement was more stressful to the nurses than doctors, implying that nurses are subjected to more walking than doctors in our hospital settings.

Stress Affecting Clinical Staff's Productivity and Wellbeing

The result of the interview indicated that the effects of stress on clinical staff are in categories. Some of the effects were concerned with the patient care, while others were related to workers' wellbeing. The results further show that the workers employ various ways to cope with stress, as illustrated in Table 5.

Table 5: Categories of Stress Effects on Clinical Staff

S/N	THEMES (effects)	Category
1.	Stress affects workers' performance and efficiency	Effects on patient care
2.	Causes medication error	
3.	Affects workers attitude and mood	Effects on workers wellbeing
4.	Affects workers health	
5.	Increases tiredness and exhaustion	
6.	Affects me but I am adapted to it	Coping mechanism

Effects of Stress on Patients' Care

One of the doctors made the following statement while responding to how stress affects his productivity and wellbeing; *"Well, it is a normal thing for every human being, the more stressful you are the less productive you will be and of course it affects one's wellbeing and health status"*. This summarizes the way stress affects clinical staff's productivity

and wellbeing. The result from Table 6 indicates that clinical staff perceived stress as disturbing in terms of their performance and efficiency. 60% of nurses and 55% of doctors were of the opinion that stress was affecting their performance and efficiency. Even though unpopular, the result shows that 22% of the doctors and 7% of the nurses were of the view that stress causes medication error.

Table 6: Effects of Stress on Patients’ Care

S/N	CODES	Case study 1	Case study 2	Case study 3	Case study 4	Doctors’ % (N=9)	Nurses’ % (N=15)	TOTAL % (N=24)
1.	Stress affects workers’ performance and efficiency	2	3	5	4	5 (55%)	9 (60%)	58.33%
2.	Causes medication error	0	0	2	1	2 (22%)	1 (7%)	12.50%

Effects of Stress on Workers’ Wellbeing

The study further found out that staff’s wellbeing was affected in different ways due to the stress they experience; leading to tiredness and exhaustion, thus affecting their attitude and mood as well as their health condition. 54.17% of the respondents had the view that tiredness and exhaustion affect wellbeing, with nurses having more of such experience than doctors. This is as shown in Table 7.

Furthermore, stress was also found to affect the health conditions of healthcare workers, as 41.67% of the staff agreed with this view, that they experienced headache, leg pain, back pain, or lethargy. The result indicates that nurses complain more about health issues than doctors. Similarly, even though unpopular, the result indicates that only 8.17% of the respondents complained that stress affects their attitude and mood and this concerned only doctors in case studies 1 and 4, as depicted in Table 7.

Table 7: Stress Effects on Patient Care

S/N	CODES	Case study 1	Case study 2	Case study 3	Case study 4	Doctors’ % (N=9)	Nurses’ % (N=15)	TOTAL % (N=24)
1.	Stress affects workers attitude and mood	1	0	0	1	2 (22%)		8.17%
2.	Affects workers health	1	2	5	3	3 (33%)	7 (47%)	41.67%
3.	Increases tiredness and exhaustion	3	4	3	3	4 (44%)	9 (60%)	54.17%

Stress Coping Mechanisms

The strategy used by the healthcare staff in coping with stress is referred to as coping mechanism. One of the respondents confessed that the main strategies they employed in coping with the stress was that; “It affects me, but the reality is you have to learn to try and adapt to it”. From this confession, it can be deduced that adaptation is the major method of coping with the stress by healthcare personnel. This implies the need for other alternative approaches/strategies that will help them in relieving and coping with the stress.

SUMMARY AND CONCLUSION

This study reviewed relevant literature and collected data through semi-structured interview and non-participatory observation in four purposively selected general hospitals in Kaduna State. The study found out that environmental stressors that have direct bearing in healthcare settings are of two categories; the ambient and those related to spatial layout. Noise, insufficient lighting and lack of ventilation are the major attributes related to ambient features that add to clinical stress in Nigerian healthcare settings, with noise causing more disturbance and mind

distraction. While walking distance especially by nurses was the main way in which architectural spatial layout of the hospital and its units added up to stress despite the fact that the level of stress it induced might depend on the layout and unit of the work.

The research has further found out that stress has effects on patients' care and staff wellbeing in the healthcare settings. This is by affecting workers' productivity and wellbeing as well as causing medication error which adversely affect patients' care. While workers' wellbeing is affected by causing tiredness and exhaustion, affecting workers' attitude and mood in addition to health effects. This consequently affects the workers' productivity in discharging their duties. The study also found out that adaptation was the main strategy adopted by clinical staff in coping with stress, however, a conducive and comfortable environment, a view of nature and having a short break for relaxation were found to be effective strategies for stress mitigation. Design strategies such as reducing the number of occupants per room, to single occupancy room, were not found, but the open-bay ward system was mostly used in the general hospitals. Similarly, a single corridor system is used instead of a radial ward layout system. In contrast, an acoustical measure of not linking the main circulation with a high sound traffic was found to be used to some extent. However, staff-patient supporting facilities such as space for patient family, social area, garden, common room, etc. that are known to have stress-relieving effect, were inadequately provided.

Therefore, it can be concluded that there are features of a physical environment that add up to clinical stress which need to be addressed so as to improve the productivity and wellbeing of the healthcare givers and quicken healing in patients.

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