EXPLORING PRINCIPLES OF ORGANIC ARCHITECTURE TO FACILITATE HEALING OF DRUG ADDICTS IN THE DESIGN OF REHABILITATION CENTRE, KADUNA.

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DECLARATION

I, ABDUL-ONE SALMAN, declare that the work in this Thesis titled *Exploring Principles of Organic Architecture to Facilitate Healing of Drug Addicts in the Design of Rehabilitation Centre, Kaduna*, has been carried out by me in the Department of Architecture, in partial fulfilment of the requirement for the award of Master of Science (M.Sc) in Architecture, Ahmadu Bello University Zaria. And to the best of my knowledge has not been submitted elsewhere for the award of any degree. All literature consulted are duly acknowledged.

ABDUL-ONE SALMAN.	…….	……
Name of Student	Signature	Date

CERTIFICATION

This project Thesis entitled EXPLORING PRINCIPLES OF ORGANIC ARCHITECTURE TO FACILITATE HEALING OF DRUG ADDICTS IN THE DESIGN OF REHABILITATION CENTRE, KADUNA, by Salman Abdul-One meets the regulations governing the award of the degree of M.Sc Architecture of Ahmadu Bello University, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

I dedicate this project to my late parents, Maj.Gen Abdu-One Mohammed (RTD) and Hajiya Rabi Abdu-One, for the sacrifices they made to give me a wonderful education. May Allah reward you both with Jannatul Firdaus. Amin. And to my wonderful wife Farida Bala Muhammad for always helping me get back on my feet. May Allah put Baraka in all we do. Amin.

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ABSTRACT

Drug addiction is a serious menace to our society that has afflicted a large majority of youth in Kaduna State, Nigeria, and the world at large. Though not an active preventive measure, rehabilitation is an integral part of the fight against drug addiction. Unfortunately, the rehabilitation centres in Kaduna serve more as detention centres. This problem is beyond the practice of the process of rehabilitation, but it even extends to the buildings used to house and administer the necessary treatment of this menacing element of our society. This research reviewed relevant literature on the topic, which revealed that Architecture plays an important role in the healing of patients, a concept known as Healing Architecture. Healing Architecture is a subset of a larger and more established concept called Organic Architecture. Organic Architecture has principles that provide design elements that influence healing of Drug Addicts in a Rehabilitation Centre. These design elements such as Indoor Temperature, Humidity, Sound Intensity and more were analysed using a combination of qualitative and quantitative methods. The results of the analysis revealed that the buildings used for Drug Addict Rehabilitation in Kaduna lack the necessary design considerations that enhance the healing process. It was also established through various interviews that patients in the rehabilitation centres would prefer improvements in their buildings such as brighter coloured rooms, access to gardens and cool temperature in their interior spaces. This would be a reflection of the use of principles of Organic Architecture in the design of their facilities. This study posits that the Government and relevant authorities should consider factors that encourage the use of Healing Architecture in the design and construction of Drug Addict's Rehabilitation Centres. The proposed rehabilitation centre demonstrates the design considerations that could facilitate the healing process of drug addict rehabilitation.

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CHAPTER ONE: INTRODUCTION.

1.1 Background.

The process of rehabilitation is that of correction and rejuvenation. This implies that scientific approaches must be employed to achieve the above-mentioned goals. To rehabilitate is to help someone return to normal life. According to Griffiths (2012), "The design of hospitals or other public services where people seek help or support requires a particularly sensitive approach to minimise the sense of anxiety that they can invoke and instead offer a welcoming and hassle-free place for people to deal with their problems." This should prompt the Nigerian architect to find out if the rehabilitation centres in this country are up to the above stated requirements or not.

As defined by National Institute of Drug Abuse (Treatment Approaches for Drug Addiction, 2014), drug addiction is a complex illness characterized by intense and, at times, uncontrollable drug craving, along with compulsive drug seeking and use that persist even in the face of devastating consequences. According to Roxane (2014) “Drug abuse, also called substance abuse or chemical abuse, is a disorder that is characterized by a destructive pattern of using a substance that leads to significant problems or distress.” People experiment with drugs for many different reasons. Many first try drugs out of curiosity, to have a good time, peer pressure, or to improve athletic performance or ease another problem, such as stress, anxiety, or depression. A publication on Al-Jazeera by Ogene (2013), revealed that, a 28 year old drug addict, apprehended by the National Drug Law Enforcement Agency (N.D.L.E.A) said that “I have been smoking cannabis for 6 years. When I took it, I used to feel free. I used to feel happy in my mind.”

The reason why I started smoking is because I wasn't employed…....” Initially, the use does not automatically lead to abuse, and there is no specific level at which drug use moves from casual to problematic, it varies by individual, as extrapolated from (Ogene, 2013). Drug abuse and addiction is less about the amount of substance consumed or the frequency, and more to do with the consequences of drug use. No matter how often or how little is consumed, if the use of drugs is causing problems in someone's life, at work, school, home, or in their relationships, they likely have a drug abuse or addiction problem.

Treatment and rehabilitation gives drug dependent persons a sense of belonging, that he is not rejected by the society and that he can be helped. More so, a treated drug dependent person will not recruit others into drugs; hence treatment is needed for prevention. As obtained from the N.D.L.E.A official website, (http://www.ndlea.gov.ng) N.D.L.E.A carries out treatment and rehabilitation of drug dependent persons in their national headquarters and all the 36 state commands including FCT-Abuja. The treatment process adopted by the agency is as follows;

1. Evaluation, Assessment/Diagnosis.
2. Detoxification/ Stabilization.
3. Counselling.
4. Psychotherapy.
5. Combination Therapy.
6. Family Therapy.
7. Drug Education.
8. Teaching and Coping Skills.
9. Rehabilitation/ Reintegration.
10. Relapse Prevention.

1. Evaluation, Assessment/Diagnosis:

   This is the first point of action when an addict first makes contact with a treatment staff. This implies that special consideration must be made to allow for questioning, chemical testing, a physical examination and urine sample submission. These are the activities carried out at this stage. This space is preferably located at the entrance to the private zones of the centre, that way, a record of the patient's state at reception is taken and the patient can now go for detoxification.

2. Detoxification/Stabilization.

   According to Gallanter & Klebber (2008), "the detoxification and/or stabilization phase of treatment is for people who frank withdrawal symptoms or significant physiological or emotional instability after a period of prolonged abuse of drugs." The activities carried out at this phase as stated by Gallanter & Klebber (2008) include; issuing Medications, rest and motivational therapy. Resting space and medical administration must be provided.

3. Counselling.

   This makes the early phase of rehabilitation, where words of advice and motivation are systematically offered to the patients. It may be Individual or group. Gallanter & Klebber (2008), brought to light the fact that "there are very few studies that have shown positive effects from group drug counselling.

Indeed, in one large trial among cocaine-dependent patients, it was only individual counselling and not group counselling that was associated with positive outcomes." Consequently, a counselling unit where individual counselling was rendered to the patients.

4. Psychotherapy.

   This is the application of psychological methods to treat the illness of the patient. This is carried out on recommendation by the therapist.

5. Combination therapy.

   This is a more general application of solutions where the patient is recommended for psychotherapy, nature-therapy, family therapy and other solution. This usually symbolizes the complexity of the patient's case.

6. Family Therapy.

   This is an important part of the rehabilitation process that involves loved ones coming to the centre for therapy sessions.

In a publication by Tedesco (2014) he stated that "……..family members can discuss pain caused by their loved one's addiction and their desire to see that person live a healthy life. Family therapy can help to resolve issues so the family can serve as a pillar of support once their loved one leaves the rehabilitation facility." Hence, space must be provided within the facility to provide for the therapy sessions.

7. Drug Education.

   This is where the patients are introduced to the knowledge of the dangers of drugs and drug misuse and abuse. This is usually done in a classroom or at least in a suitable learning setting and environment.

8. Teaching on Coping Skills

   Drug Education, Teaching coping skills, even psychotherapy are all important parts of the rehabilitation process that can be carried out in multipurpose halls, classrooms, even outdoor spaces designed for knowledge acquisition.

9. Rehabilitation/Reintegration.

   This is a combination of all the steps after detoxification.

10. Relapse Prevention (Aftercare/Follow up).

    According to a publication by (Dual Diagnostics 2014). “The primary goal of aftercare is to prevent a relapse into drug or alcohol use. By providing continuing counselling, group sessions and other schedule meetings, aftercare programs provide an extra level of accountability that helps insure that the individual has not fallen back on old habit.” This implies that the facility should give room for after care. Spaces for teaching and therapy can be used for this purpose.

Several scholars have established that drug addiction is a serious problem afflicting the youth of Northern Nigeria, and the world at large. This research has provided an ideal solution to this problem using Healing architecture Principles that enhance the healing of drug addicts in rehabilitation centres.

1.2 Aim and Objectives.

This thesis is aimed at employing the natural healing methods provided by healing architecture to aid the success rate of drug addict's rehabilitation centres in Nigeria, through the following objectives.

- To understand the requirements for healing of the drug addicts in the rehabilitation centres.
- To identify the positive contributions healing architecture has to offer to drug addict's rehabilitation centres in Nigeria.
- To identify principles of healing architecture that facilitate the healing of drug addicts in a rehabilitation centre.
- To assess the effect of healing architecture on healing in drug addict rehabilitation centres across the globe.
- To apply architectural solutions in the special requirements of the rehabilitation centre for drug addicts in Kaduna, Nigeria.

1.3 Research Questions.

- What are the requirements for healing of the drug addicts in a rehabilitation centre?
- What are the positive contributions healing architecture has to offer to drug addict's rehabilitation centres in Nigeria?
- What are the principles of healing architecture that facilitate the healing of drug addicts in a rehabilitation centre?
- What are the effects of healing architecture on healing in drug addict rehabilitation centres across the globe?

- How can architectural solutions be applied in the special requirements of the rehabilitation centre for drug addicts in Nigeria?

1.4 Scope and Delimitations.

This study is making a case for Kaduna state, Nigeria. As such, all primary data collection methods and investigations were limited to drug addict's rehabilitation centres in Northern Nigeria only. However, some delimitations that were encountered include;

- Limited Scope: The current insecurity problems in Nigeria made it difficult to move freely around the country. Hence, this research was limited to the northern part of Nigeria.
- Withholding information: Due to so many acts of malpractice and mismanagement, the informants and interviewed personnel withheld some information which could have been important to this research.
- Insecurity: Some informants were reluctant towards sharing certain information and even the drawings for the case studies due to security reasons.

1.5 Methodology.

The method to be adopted for this research will assume the following process. Primary and secondary data was collected for this research in the form of literature review and interview responses respectively, with the aid of the following tools:

- Desk study
- Interviews

Literature Review; Secondary data was initially obtained and reviewed from sources, books and previous works of relevance to this topic. Relevant data bases such as information provided by World Health Organization (W.H.O), The United Nations (U.N) and N.D.L.E.A, and also using research engines Google Scholar, Ask, Yahoo and Elsevier.

Data analysis; A statistical analysis was established in form of graphs and tables converting the data collected into information about the healing progress of the patients of a rehabilitation centre for drug addicts as a result of architectural support to the healing process.

1.6 Justification.

This research is of great importance to the Nigerian community as it aims at exploring and elaborating solutions that will control and possibly lead to the extinction of the serious drug addiction problem that has become widespread among Nigerian citizens. The National Population Commission (N.P.C) has estimated that as at 2013 Nigeria had a population of 174,504,539 (Nigeria People , 2014).

As obtained from Ngozi Okonjo Iwela (N.O.I) polls in 2013, where the opinion of people were sampled on a likert scale, and the result of the poll indicated that 44% of the people that gave responses strongly agree that 47% of the Northern Nigerian Population abuse drugs, and 43% of the Southern Nigerian population abuse drugs, (Socio-eonomic Polls, 2014). This is an alarming discovery, which poses a threat to the productivity of the Nigerian population, further posing a threat to the economy of the country.

Given National Population Commission (N.P.C) statistics, it can be deduced along with the above stated facts is that about 48.5 million Nigerians abuse drugs and substance (out of a population of 174,504,539).

Hence, Architecture in its own way has a lot of potential to contribute to the solution of this problem. This point is the reason why this project intends to research explore and discover concepts of healing architecture that will help in achieving the above stated aim of the research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Drug Addiction as a Problem in Northern Nigeria.

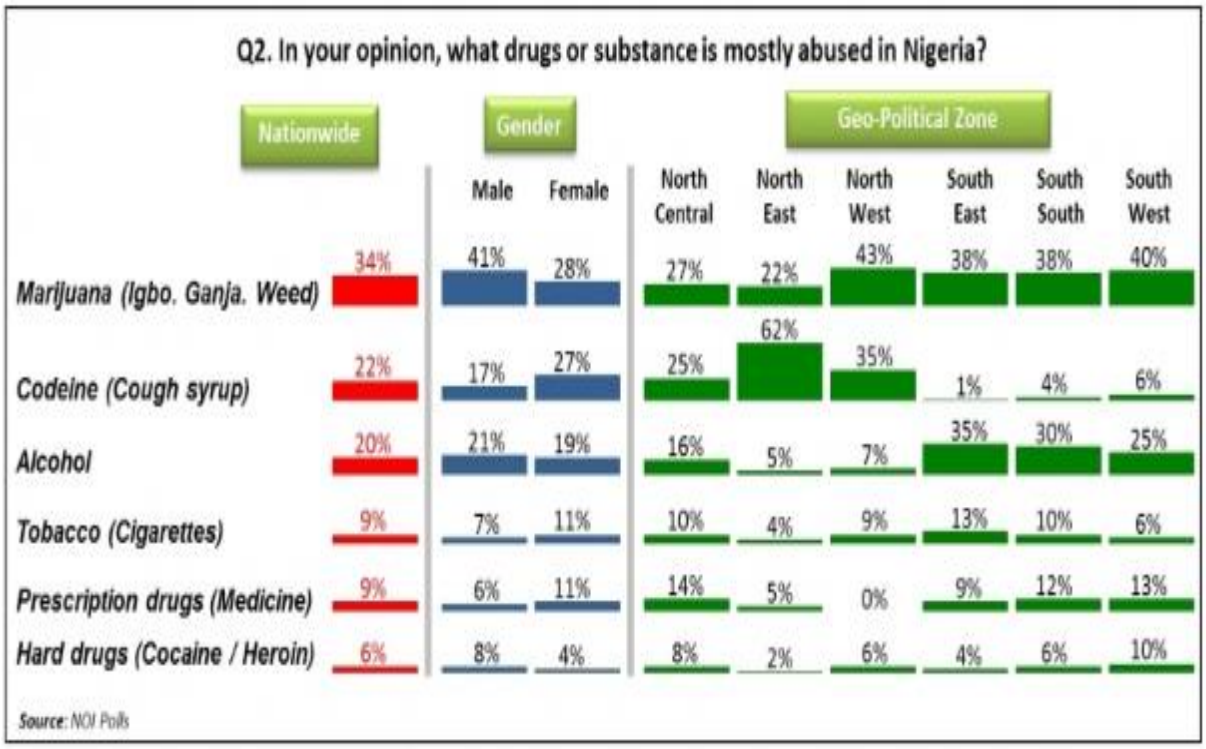
Moving from macro to micro, which is looking at the world at large and narrowing down to Northern Nigeria, considering the problem of drug addiction, it is necessary to note that, (Vimont 2012), reported that "The UN estimates that about 230 million people, or 5 percent of the world's population, used illegal drugs at least once in 2010." In Nigeria, statistics obtained from the National Drug Law Enforcement Agency (N.D.L.E.A) records indicate that 2008 was the year of bumper drug abuse, as the use and trade with arrests of drug offenders were totalling up to 335,534, and a total of 7,042 drug offenders were arrested in 2009, (Emewu 2010). Despite efforts by N.D.L.E.A operatives towards fighting the menace of illicit drugs, such as numerous arrests of drug dealers, like the arrest of the auto parts dealer in Lagos International airport, where Lagos state commander of the N.D.L.E.A, said that "… ken tested positive for drug ingestion during the outward screening of Air France passengers at the departure hall. While he was under observation, he excreted fifty-two wraps of substances that tested positive for cocaine with a weight of 900 grams." (Abdallah, 2014), Drug abuse and addiction remains a menace to the Nigerian society.

Another case is the confiscation of a dried fish consignment imported from Thailand, which also took place at the Lagos International Airport. The Commander's comment on the issue was that "The drugs recovered by the NDLEA during the search operation include 24 packs of morphine injections weighing 14.960kg, 24 packs of pethidine injections weighing 10.820kg and 157 packs of apresoline injections weighing 3.505kg. In all a total of 29.285kg was seized and a customs licensed agent who handled the clearance of the shipment had also been apprehended."

So many other arrests and investigations across the nation, as well as security measures set up by this agency is what qualified Nigeria as the highest cannabis (Marijuana) seizure in Africa, (Abdallah, 2014). In his keynote address, The Commander of N.D.L.E.A stressed that the Agency will continue to intensify its cannabis control mandate geared towards ensuring a crime free society and peaceful election in 2015. He said “Cannabis is the common drug of abuse in Nigeria and as the election year 2015 draws nearer, we are fine tuning our strategies to cut off supply and ensure a crime-free election and a healthy society for all” (N.D.L.E.A 2014). However, cannabis is not the only drug problem in Nigeria, and people are worried as “the production, circulation, marketing and consumption, more people are being recruited daily by drug barons to serve as couriers just as many more, especially youths are increasingly becoming addicted to assorted drugs” (Adam Michael 2012).

A poll conducted by Ngozi Okonjo Iwela (NOI) Polls in July 2013, indicated that cannabis accounts for 34% of the drugs widely abused across Nigeria, whereas codeine, alcohol and tobacco makeup 51% of abused drugs in Nigeria, as illustrated in Table 2.1.

Table 2.1. The mostly abused drugs in Nigeria.



Source: (http://www.noi-polls.com)

Table 2.1 has revealed that 34% of the respondents believe that one out of four people in the north abuse codeine. This is a threatening menace to the society, and if Architects have a role to play in solving this problem, then that role should be well defined and Nigerian Architects should assume the task. Olutola (2007) wrote that, "drug abuse is a social problem that has spread and increased rapidly in recent decades across diverse segments of countries of the world, constituting a threat to the effective functioning and survival of the society." Hence, we have to strengthen our security and provide through our design, a lasting solution to this problem, thereby increasing the efficiency and success rates of the related rehabilitation centres.

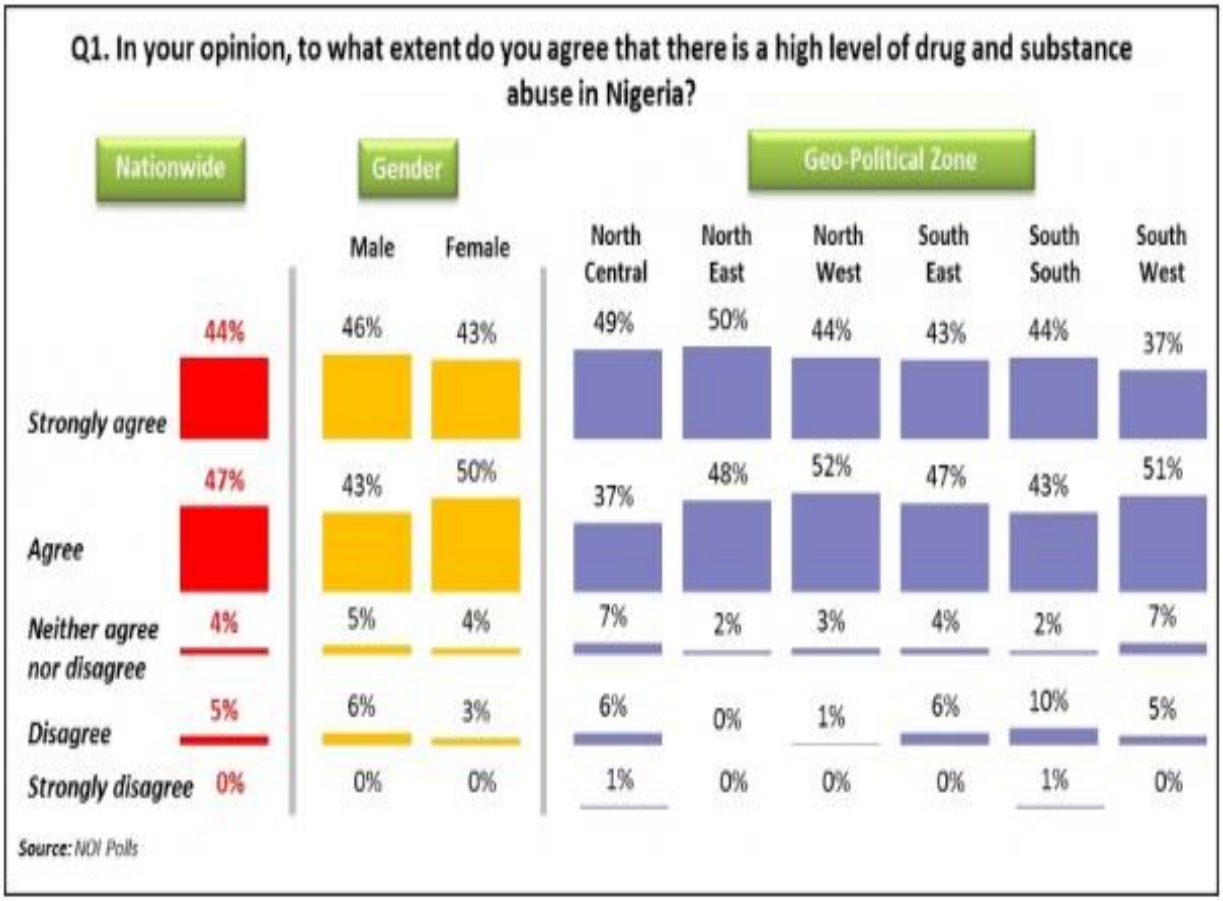
Looking at northern Nigeria as whole, The Nigerian Drug Law Enforcement Agency (N.D.L.E.A), in a publication titled; *North Worst in Drug Case*, by Oyelere, (2008), on 4th September 2008, through its chairman, said that "the number of drug offenders is higher in the north than in the southern part of Nigeria". In another publication, on 14th November 2008, titled; *Nigerian Drug Statistics by Zone*, by Akannam, (2008), revealed that the Jigawa state commandant of N.D.L.E.A, declared that North-West geo-political zone of the country has the highest case of drug addicts. Saying "3 million bottles of Benylin cough syrup are being consumed in Jigawa and Kano States alone". He, the commandant, further explained that "from the record of drug abuse, the North-West has a statistics of 755 drug abusers, which is 37.47 % of drug victims in the country, while the South-West has 347 drug abusers, which is about 17.32 %, and South-East is being rated third with 263, estimated at 13.5%, North-Central has 236, representing 11.71 %, while the North-East zone has 172, which is 8.54 % of drug abusers in the country." The Commandant then disclosed that the Agency had arrested 50 drug barons, seized over one ton of different illicit drugs, mainly cannabis sativa (Indian hemp), adding that about 1.2 million metric tons of cannabis sativa, which is about 80 % are produced from Edo, Delta, Ondo, Ekiti and Osun States yearly.

This indicates that, though the North has higher cases of drug offenders, the south has higher cases of drug traffickers. The publication by Oyelere, (2008), referred to above stated that, "Going by statistics, the NDLEA boss said it was glaring that the North had more people with drugs problem than the South, though the drugs were not produced in the North." NOI Polls conducted its latest poll on drugs and substance abuse in Nigeria in July 2013. The poll was aimed at exploring the awareness of Nigerians regarding the issue.

Respondents to the poll were asked five specific questions. The first question sought

to determine the opinion of Nigerians towards the level of drugs and substance abuse in Nigeria. This research intends only to single out the first question. This is because it is the only question of relevance at this instance. The question asked and the responses are illustrated in Table 2.2.

Table 2.2. The level of drug abuse in Nigeria.



Source: (http://www.noi-polls.com)

2.2 Drug Addict's Rehabilitation Centres.

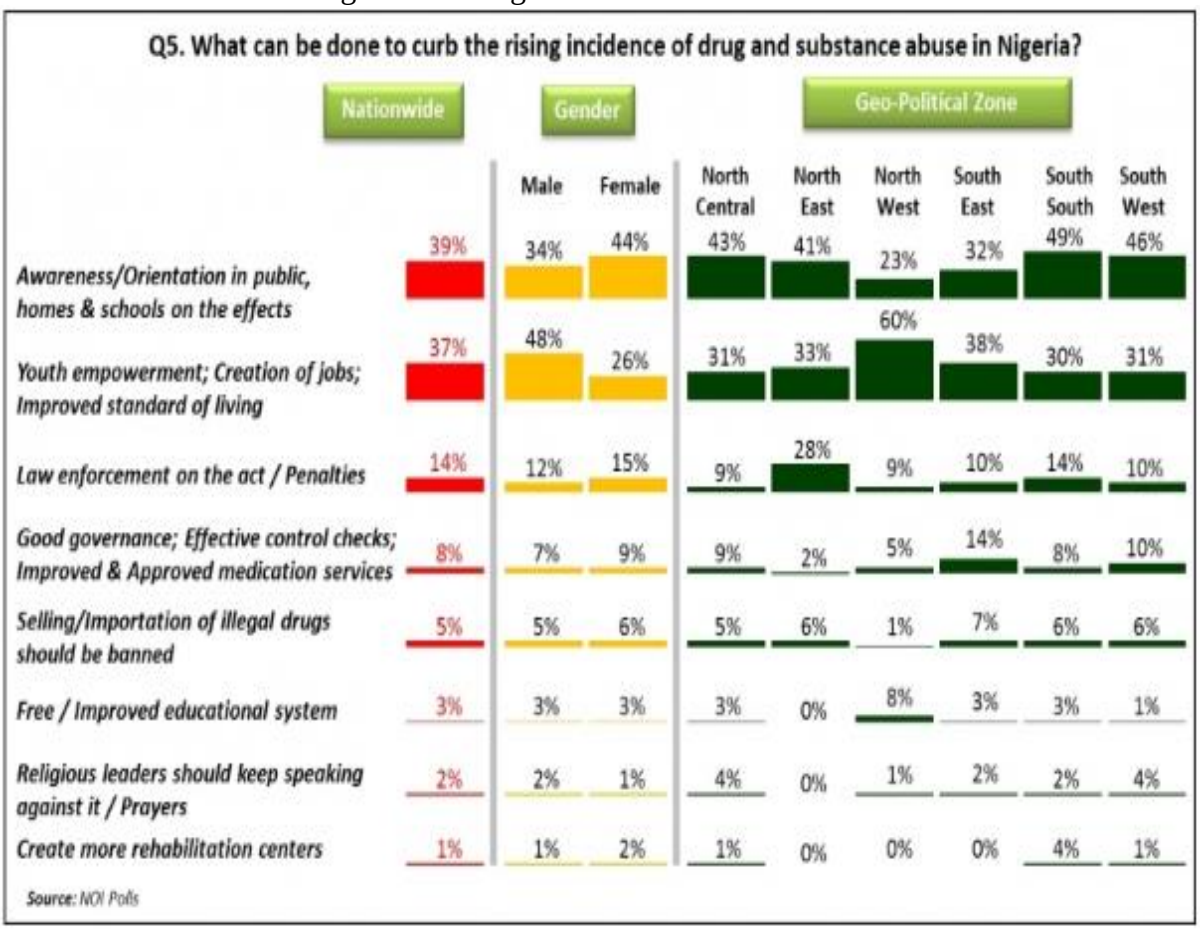
Drug addict's rehabilitation as defined by Ogene (2013) "is a process of improving the residual functional capacity of a drug dependent person such that the individual can resume his or her expected role within the society.

Due to the adverse effects of drug abuse on the dependent user, rehabilitation assists the treated individual to recover those diminished or lost capacities caused by drug dependency" (Abdallah, 2014). Summarily, rehabilitation aims at assisting the drug dependent individual reintegrate into the community as a productive person. The most important point to notice regarding these people is that they are sick people not criminals, hence a befitting attitude should be shown to them.

Nigeria has a couple of drug rehabilitation centres but most of which treat the addicts as criminals, and are not designed to foster healing rather to increase loneliness and confinement. Statistics obtained from N.D.L.E.A's official website indicates that Nigeria has 21 rehabilitation centres for drug addicts most of which are involved in drug abuse prevention education, and a few render counselling and treatment. According to a publication by the Centre for Health design in America, in 2004, "noise reduction, improved sleep, reduced spacial disorientation, globalization of the structure, provision of nature and a positive distraction, gardens, social support and improved communication through special integration, will reduce and improve outcome of patients" (Ulrich, Zimring, Quan, Joseph, & Choudhary, 2004). This shows clearly that the three steps employed by Nigerian rehabs as mentioned above alone is not enough to completely deliver health care to drug addicts.

The awareness as to the importance rehabilitation centres have on curbing the drug problem in Nigeria is so little it is close to nothing. A poll carried out by NOI Polls form the 1st to the 4th of July 2013 indicates that only 1% of the respondents believe that creating more rehabilitation centres will curb the rising incidence of drug abuse in Nigeria. This is represented Table 2.3.

Table 2.3. Solutions to drug abuse in Nigeria.



Source: (http://www.noi-polls.com)

Consequently, of the 1% who believe in the power of rehabilitation, only a few may be aware that the Architecture of the environment plays a great role in the healing process. This research intends to create awareness of the situation by depicting role model rehabilitation centres that have employed designing the building and its surrounding to help in the healing process.

2.2.1 Factors Affecting the Healing of Patients in Drug Addict Rehabilitation Centres.

Different rehabilitation centres employ different approaches to proffering cure to patients of drug addiction, in the long term, they are all aimed at achieving the same goal of rehabilitating the patients.

According to a publication by Mira (2014), these are the major factors affecting the healing of patients in a drug addict rehab centre; (as earlier explained in chapter 1.1)

- Medically assisted detoxification
- Identification and treatment of co-occurring mental health and medical issues
- Cognitive behavioural therapy (CBT)
- Family participation in treatment

All these factors need to be in an environment that allows for optimum exploitation of these factors. “The rehabilitation environment is a work environment for the staff, a healing environment for patients and families, a business environment for the provision of healthcare, and a cultural environment for the organization to fulfil its mission and vision. In order to realize these environments, facility designs must be linked to the organization’s goals and objectives” (Kellert, 2005).

“Cognitive psychologists have identified the physical environment as having a significant impact on safety and human performance” (Reiling, Hughes, & Murphy, 2014). This is bringing to light the quality and impact of care rendered to the patients, implying that the care givers and nurses and other related staff are also affected by the space within which they are working.

Hence, it is incumbent that architectural considerations to facilitate the efficiency of their work and prevent accidents be put in place. “Organizational/system factors that can potentially create the conditions conducive for errors are called latent conditions…A specific example of a latent condition effecting patient safety would be the impact of low lighting levels in the medication dispensing areas that are associated with some medication errors but not others” (Reiling, Hughes, & Murphy, 2014).

2.2.2 The Impact of Architecture on the Performance of Drug Addict’s Rehabilitation Centres.

This research gave emphasis to the effect the building has on its users. It is important to note that, “the building itself can help to reduce the stress experienced by patients, their families, and the teams caring for them.” (Schaller, 2012). A book titled Patient Safety and Quality, shows that “cognitive psychologists have identified the physical environment as having a significant impact on safety and human performance” (Reiling, Hughes, & Murphy, 2014). According to Ermina (2011), “If drug addiction rehabilitation is mostly about bringing positive feelings to the fore and helping to build a new identity for members of therapeutic communities, then architectural design, is perhaps the most decisive of factors in how space is utilized, both in practical terms and landscape wise, to uplift the spirit and provide the necessary environment in which community daily life and activities can become most effective.” There are so many factors that must be considered in the therapy of patients.

Ermina (2011) mentions a few saying “Colour, the way they are able to move within

the building, staircases, connections between rooms, surrounding nature can all play a role, as was analysed, not just in underpinning the mood of the residents, but also whether they feel welcome in the building, whether it forms a connection to their emotions and physical presence and by extension if it provides a motivation for them to follow the programme."

Clearly, a building balance or imbalance, whether be it colour, the light in a building, design or even the length of a corridor can affect the way in which patients in a drug addict's rehabilitation centre react to the energy of the space and can relax and release themselves.

According to Ziada (2012), "utilizing the model of the ritual space of Muslim mosques and Soviet assemblies, argues that building spaces for collective activities, much like therapeutic communities, can through their design, produce a positive sense of kinaesthetic sensations in individuals… For people in drug reformation this can be said to be highly relevant, as they need to adapt to their new tasks and responsibilities and learn new skills that can change their mobility in a positive manner." Underhil (2015) defines the word kinaesthetic as **"**relating to the use of sense organs in your muscles and other body parts to feel the position and movements of your body.**"**

Light and particularly the life-giving rays of the sun, have been well documented as a major determinant of vitality and wellbeing, more so in therapeutic environments where such positive natural stimulants can go a long way towards developing the desired attitude to individual change. Ermina (2011) in his journal, stated that "…In therapeutic architecture therefore, the way sunlight is utilized is one of the factors in creating a healthy environment and psychological motivation."

The way the corridors are lit, the way the windows are placed throughout the building to reflect warmth and how light and shadow appears in the space, can affect the balance or imbalance of rooms, always in conjunction with colour, shape, interior design and landscape features."

The needs of patients must be addressed in an environment designed to foster a holistic restoration of the body, mind and spirit. This will provide an opportunity for the patients to break the cycle of addiction and enjoy healthy, contented, serene and productive lives. A rehab centre for drug addicted women in America called The Orchid Treatment Centre has put this into consideration. They posted on their web site. "The Orchid Centre is built according to the Planetary Model of healthcare facility design. In this model, the physical space around the client is a part of the treatment.
The Orchid Centre's choice of colours and textures encourage feelings of calm and well-being. Spaces for solitude and reflection coexist with gathering spaces that encourage socialization and networking." This is the kind of attitude and approach we need to adopt and adapt in Nigerian rehabilitation Centres.

Groot Klimmendaal Rehabilitation Revalidation Centre-Arnhem Netherlands, considers the magnificence of therapeutic glass where the sunlight is ever-present, bringing residents as close to nature as they might ever hope to be. The overarching characteristic of this two-storey glass rehabilitation centre is direct contact with nature, a landscaping decision that places this building in an idyllic forest environment, but not at a great distance from the city of Arnhem, as the sports facilities of the centre are also used by the community, as a means of encouraging addicts to feel a sense of belonging.



Plate 2.1 The Rehabilitation Centre During the Day.
Source: *(*www.klimmendal.nl*)*

Plate 2.1 illustrates the effect of the lighting on the glazing of the building and the shade created by the trees.



Plate 2.2. The Rehabilitation Centre at night.
Source: (www.klimmendal.nl)

The plates 2.1, 2.2 and 2.3 demonstrate a conscious effort by the Rehabilitation centre in creating harmony between the interior and exterior spaces as well as considerations for lighting and the natural environment. Improving positive kinesthesis is clearly the concept guiding the continuity between exterior and interior, through an innovative height glazing along the central area of the community that connects the internal aspects of the building in a subtle but importantly practical design, which ensures that residents do not feel enclosed, cut off. The brightly lit facade of the restaurant establishes warm emotions during day meals, with the hall windows virtually touching the surrounding forest in a welcoming environment.



Plate 2.3. The interior space giving a feeling of the outdoor.
Source: (www.dezeen.com)

All recreation, fitness and other common use spaces such as the gym, swimming pool, restaurant and theatre are located in close proximity at entrance level. The facilities are also used by residents' families' as well as members of the local community.

The philosophy behind facilities being used by locals is that the patient, who is placed at the centre of the community gradually, begins to feel re-integrated. The concept behind the design is first and foremost, care and therapy not through detachment and negative seclusion, but designing the building and its spaces to become part of the surroundings and the community. A centre designed to encourage the self-awareness of the residents about their problems and enhance their degree of responsibility in overcoming their problems through their own personal involvement, but also interaction with the group. The open environment of the interior design is set to promote self-confidence, with great emphasis also placed on recreational activities and therapy through arts expression. Architect Koen Van Velsen, the designer of this project, made sure no part of the building is detached by creating a direct route between the different floors, as well as alternative routes to reach different areas. This brings about both a positive sense of physical movement, as well as a community spirit. The interplay between light and shadows is also evident, in combination to other psychologically boosting effects, such as colour and shapes. This rehabilitation centre was among the six projects short listed for the Mies Van der Rohe award in 2011, (http://www.dezeen.com. Retrieved 27th September 2014).

2.3 Architecture and the Healing Process.

At this stage, a question should be hovering around the readers mind. Does architecture actually contribute to healing? And if so, how? “Healing by design is a central theme in the architectural scheme of modern health care facilities. Committed to designing health care environments that are non-hostile and less clinical…” (Woods, 2014).

Another interesting concept about the healing power of design and architecture, as brought to light by Jonsson & Nielsen, (2010), is that "the concept of healing architecture is founded on the evidence based design method, meaning the design of health care environments is increasingly guided by research linking the physical environment to healthcare outcomes." A publication by Woods (2014), gives a more practical opinion stating that "Architecture acts as a catalyst for the healing process. The mind and the body respond to their direct environment, perceiving and reacting to both their physical and emotional surroundings."

Stark (2012), in his book titled buildings that heal, took a more holistic approach to healing architecture. He looked at several aspects of architecture in relation to healing, such as;

- Site Planning: Stark (2012) stated that "The healing potential of a site is finite ... so architectural development must learn to respect the processes that preserve the natural healing potential of a site." Similarly, Verderber (2010) complements this point, rooting for "the provision of site planning and building form principles attuned with the therapeutic amenity in nature and natural landscapes including gardens and walkable pedestrian scaled communities, as opposed to care settings the preclude connections to nature."
- Sustainability: "Sustainability has spiritual as well as technological dimensions. Buildings hold a responsibility to nature … A healing structure holds responsibility to … Nature: to preserve and care for all of life and its material resources, Spirit: to exalt all that is highest in human aspiration and intellect," (Stark, 2012).

It is important to note that Verderber (2010) supports this points as he advocates for "the provision of health care environments built with locally available materials, methods of construction … versus dependence on geographically far-flung resources."

- Topography: According to Stark (2012), "Sites located in the middle of a slope … have an advantage over sites on the top or bottom." This is looked into from a more holistic view by (Hooper, 2007) in his book "Landscape Architectural Graphic Standards", where he explains that "recognisable place-making promotes independence, reduces stress, and enhances the healing garden as a unique, identifiable and special space."
- Orientation: "The placement of a structure on the site must consider its orientation in relation to land masses, river systems and building form. The configuration of land or building masses is most important: a site should be protected from behind by higher ground or higher buildings. Lower protection should also be present from left and right. The site should also enjoy a focal point in the distance" (Stark, 2012).
- The Building Form: "Excellence in architecture is of primary importance in helping to foster health and healing…Clarity of layout and form have an impact on the healing potential of the structure ... The goal is to create an anthropo-cosmos, a structure that is a living participant in the role of healing" Stark (2012).
- Interior Design: "Good interior design helps to reduce stress levels and increases satisfaction and recuperation. To achieve this, interior layout must encourage smooth flow of vital energy ... Lobbies and foyers need to be cheerful and welcoming and should be generously proportioned ...

  Lobbies should always include symbolic or metaphorical recognitions of the

healing process: waterfalls, fountains, sculpture, fireplaces, or gardens…"Stark (2012).

- Land Energy: here Stark (2012) stated that "The life force on this planet is the result of cosmic energy streaming into our planet from the sky and its interaction with the biosphere. This vast complex of energies that cross over the surface of the globe is fundamental to life, healing, and recuperation. This array of vibrations is so fundamental to life that without it life is impossible."
- The Healing Power of Water: "Water is symbolic of the vitality in life and is key to the sacredness of a healing site. Water can be metaphorical of peace, tranquillity and calm. Conversely, it is also associated with vitality, fertility, abundance, fluidity and movement. Water opens up the contemplative nature of the soul and helps to elicit memories and a sense of belonging. ... This force can be tapped by enhancing naturally occurring water in site planning of by introducing it into the site or the structure in gardens, water features, and vistas…" Stark (2012). Surface and Underground water have different functions but they all contribute to healing. (Verderber, 2010), in his book "Innovations in hospital Architecture", advocated for "the provision of water as a therapeutic and aesthetic amenity, and as a means to achieve personal hygiene and public health, as opposed to unsanitary care settings devoid of clean water for personal, aesthetic and other related civic uses."
- The Healing Power of Gardens: Stark (2012) said "A healing garden is a micro cosmos of the larger world. Each feature in the garden has the power to represent a larger feature in the landscape: mountains, rivers, lakes.

- It is through this holistic modelling that a healing garden can stimulate the senses, improve vitality, and promote recuperation from physical, emotional, mental and spiritual illness."

2.4 Principles of Healing architecture.

Sonmez (2006) posited that "Healing architecture is also a vernacular architecture. It is architecture designed to harmonize with its environment and the needs of the people living in it. This means that one building designed by a particular architect using the philosophies of Healing architecture may be very different from another building designed by another architect in another place." This implies that healing architecture is a philosophy of architecture which promotes harmony between human habitation and the natural world through design approaches so sympathetic and well integrated with its site, that buildings, furnishings, and surroundings become part of a unified, interrelated composition.

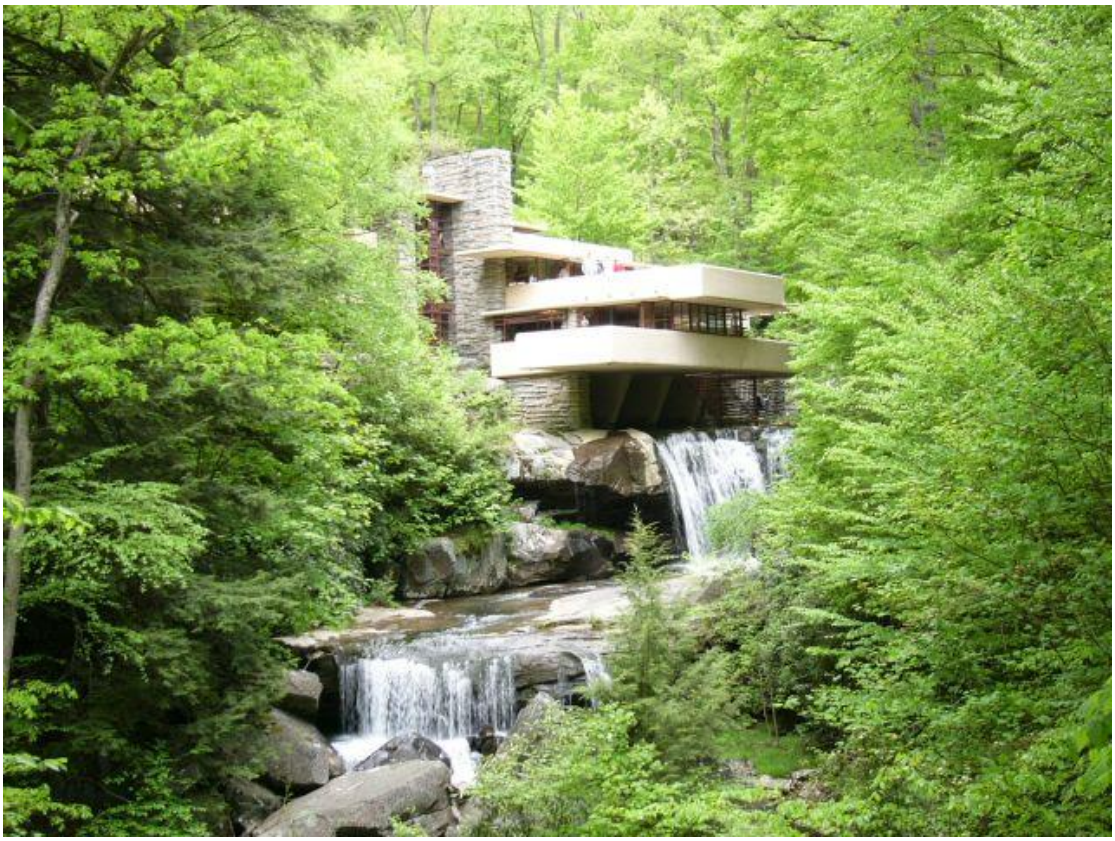
A publication by Pearson (2014) revealed that "Architect and planner David Pearson proposed a list of rules towards the design of healing architecture…Let the design:

- Be inspired by nature and be sustainable, healthy, conserving, and diverse.
- Unfold, like an organism, from the seed within.
- Exist in the "continuous present" and "begin again and again".
- Follow the flows and be flexible and adaptable.
- Satisfy social, physical, and spiritual needs.
- Grow out of the site" and be unique.

- Celebrate the spirit of youth, play and surprise.
- Express the rhythm of music and the power of dance."

A well-known example of healing architecture is the Falling Water, the residence Frank Lloyd Wright designed for the Kaufmann family in rural Pennsylvania. "Wright had many choices to locate a home on this large site but chose to place the home directly over the waterfall and creek creating a close, yet noisy dialog with the rushing water and the steep site. The horizontal striations of stone masonry with daring cantilevers of coloured beige concrete blend with native rock outcroppings and the wooded environment." (Elman, 2014).

2.5 Healing architecture and the Healing Process.



Although the word organic in common usage refers to something which has the characteristics of animals or plants, Frank Lloyd Wright, one of the masters of architecture of all time, and the founder of the concept of healing architecture

believed that this branch of architecture is not a style of imitation, because he did not claim to be building forms which were representative of nature. Instead, healing architecture is a reinterpretation of nature's principles as they had been filtered through the intelligent minds of men and women who could then build forms which are more natural than nature itself.

Healing architecture involves a respect for the properties of the materials, and a respect for the harmonious relationship between the form/design and the function of the building. "Wright rejected the idea of making a bank look like a Greek temple. Healing architecture is also an attempt to integrate the spaces into a coherent whole. A marriage between the site and the structure and a union between the context and the structure" (Elman, 2014). "A building is a product of its place and its time, intimately connected to a particular moment and site, never the result of an imposed style" (Elman, 2014). Healing architecture strives to integrate space into a unified whole. In the latter half of the twentieth century, Modernist architects took the concept of healing architecture to new heights. By using new forms of concrete and cantilever trusses, architects could create swooping arches without visible beams or pillars.

Modern organic buildings are never linear or rigidly geometric. Instead, wavy lines and curved shapes suggest natural forms. Pearson, (2001) in his book said "the form of a building should follow the flow of energy, and be created by it." Something he called form follows flow.

What it simply means is that architecture needs to flow with nature and not against it. Plate 2.7 below shows how the form of the fountain follows the flow of the water.



Plate 2.5. Form Follows Flow. (www.slideshare.net).

Pearson, (2001) also said “organic forms spring from the qualities of the materials chosen. The properties of the material dictate the ideal and optimum form and shape of the structure… But today, materials need also to be healthy, ecologically sound and resource efficient.” He brought to light the spiritual healing powers healing architecture affords through use of material.

2.6 Case Study: Groot Klimmendaal Rehabilitation Centre, Arnhem.

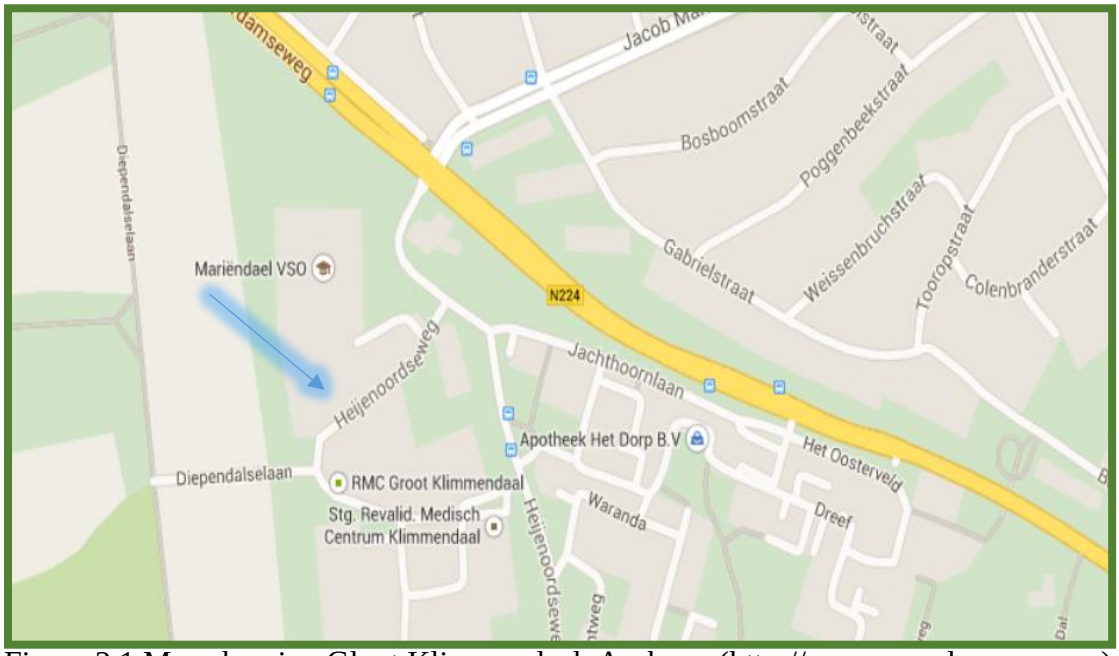


Figure 2.1 Map showing Gloot Klimmendaal, Arnhem. (http://www.googlemaps.com)

This Institution is located at Heijenoordseweg 5, Arnhem, Netherlands. The building was designed by architect Koen Van-Velsen in 2010. Rehabilitation Centre Groot Klimmendaal was awarded Building of the Year 2010 by the Dutch Association of Architects, winner of the first Hedy d'Ancona Award 2010 for excellent healthcare architecture, winner of the Arnhem Heuvelink Award 2010 and winner of the Dutch Design Award 2010 public award and category commercial interior.

2.6.1 Site Considerations.



Plate 2.6 Site Layout of Gloot Klimmendaal. Source: (http://www.googlemaps.com)

Gloot Klimmendaal Rehabilitation centre was designed to take advantage of the trees on site, as illustrated below.

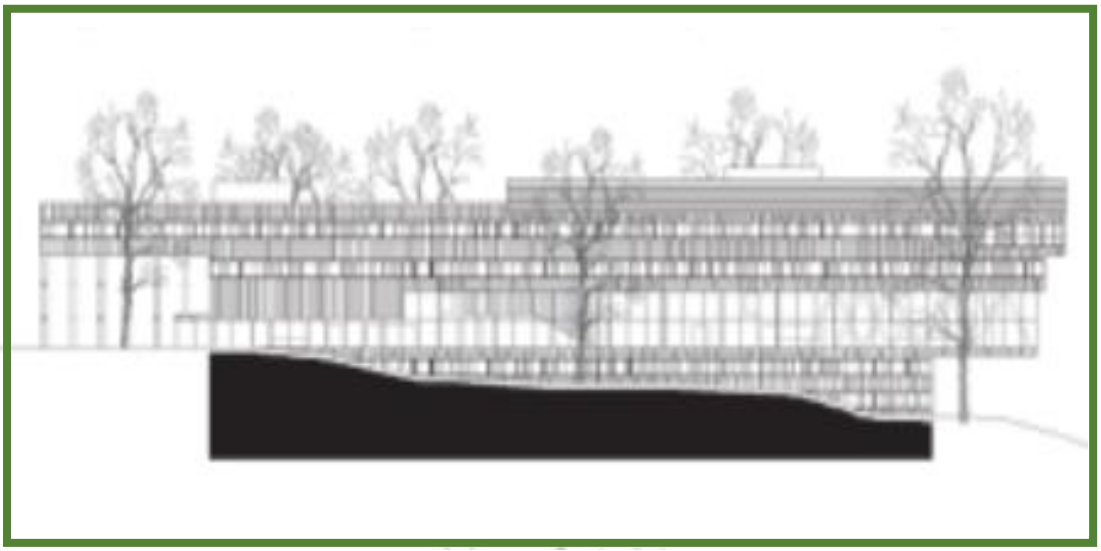


Figure 2.2 Minimum Footprint. Source: (http://static.dezeen.com).

Figure 2.2 above shows that the building has not disturbed the natural topography of the site too much. This was achieved by maintaining a minimum footprint.

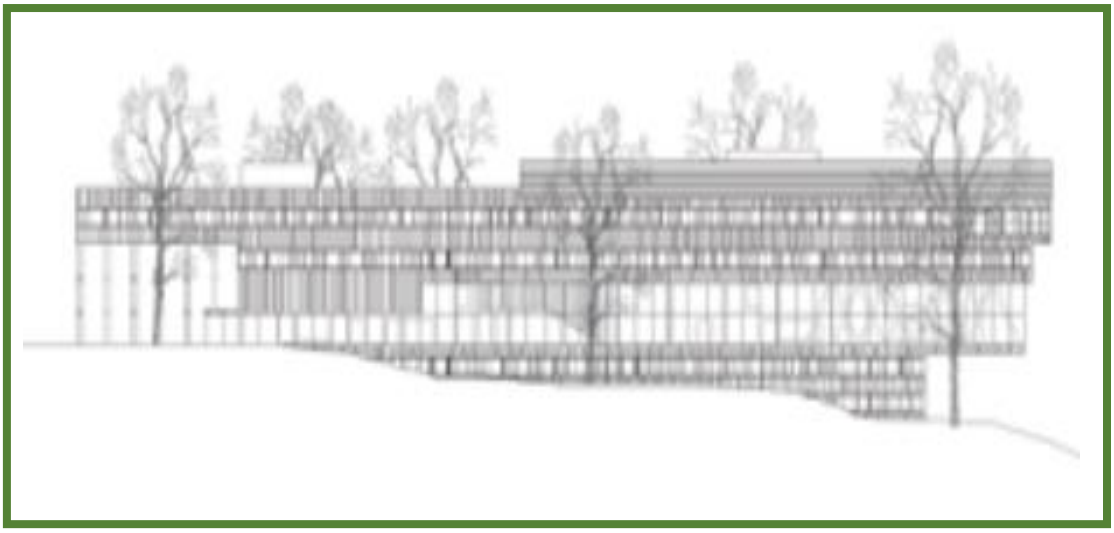


Figure 2.3 The Façade and its Surrounding. Source: (http://static.dezeen.com).

Figure 2.3 shows that there is a relationship between the façade and its surrounding. This enables the building to blend with its surrounding, thereby maintaining the natural healing powers of the site.

2.6.2 Lighting Considerations.



Plate 2.7 Study Area. Source: (http://static.dezeen.com).

The plate on the previous page shows full height glazing along the central space connecting the various different internal elements of the building ensures an almost seamless continuity between interior and exterior.

The meandering facade in the restaurant results in a building in between trees and invites the forest inside the building. The surrounding nature has a strong visual and tangible presence everywhere in the building; it allows the user to revalidate whilst walking.

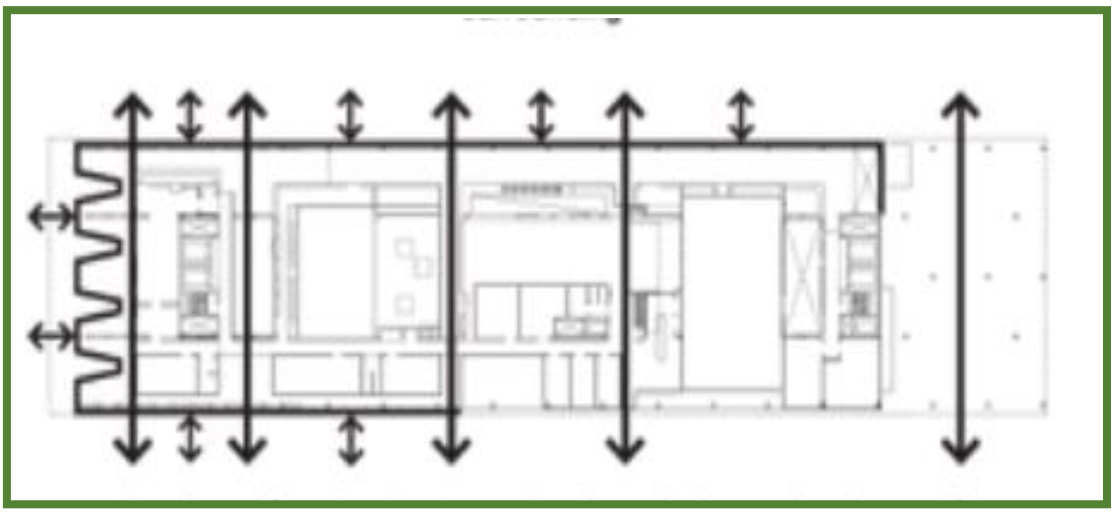


Figure 2.4 Natural lighting. Source :(http://static.dezeen.com)

Figure 2.4 above illustrates how the glazed façade at the entrance level produces a healthy amount of natural daylighting and transparency.

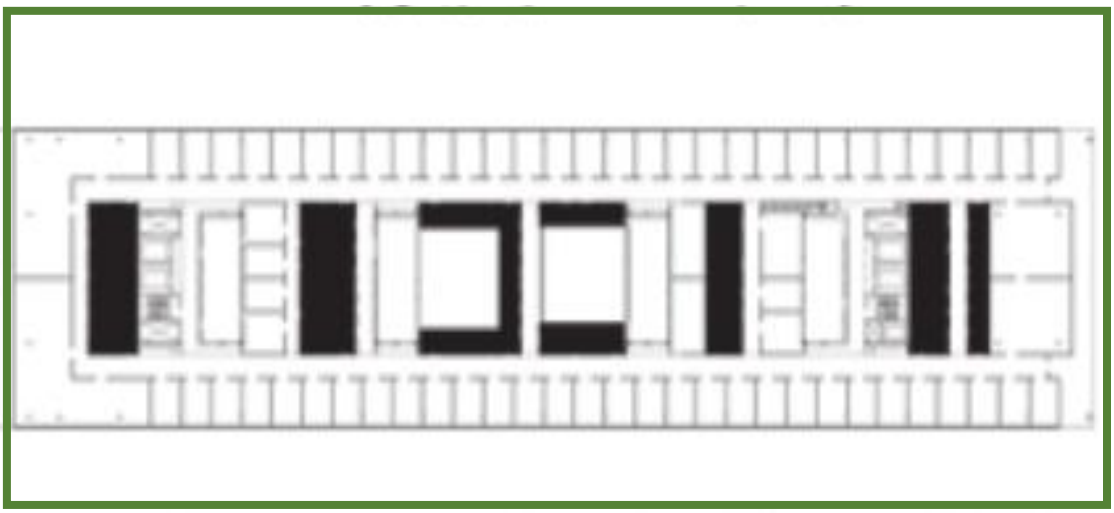


Figure 2.5 Light wells. Source :(http://static.dezeen.com)

The highlighted areas in the figure above shows the light wells in the building.



Figure 2.6 Light wells from roof to ground. Source :(http://static.dezeen.com)

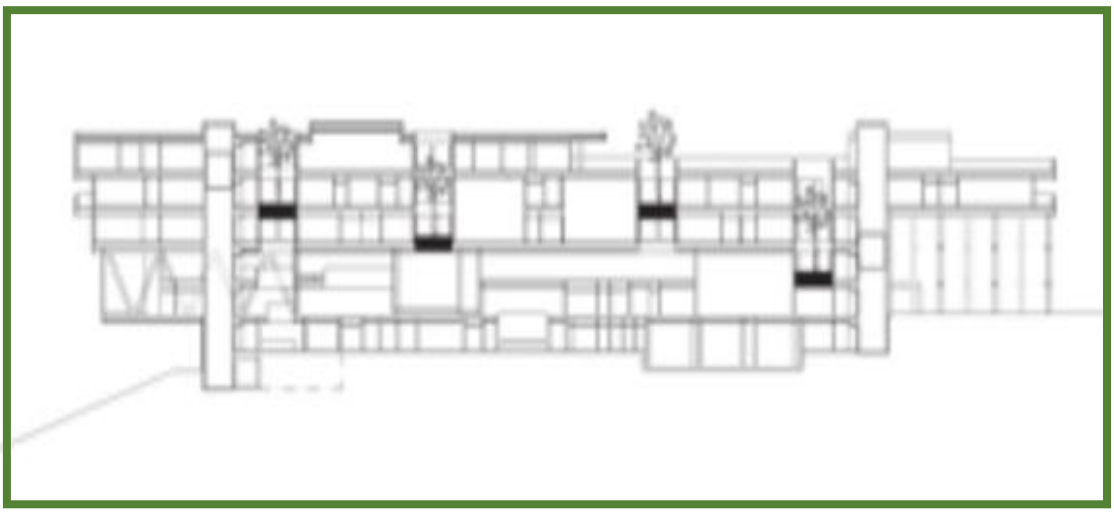


Figure 2.7 Light wells contains plants and trees. Source: (http://static.dezeen.com)

Figure 2.7 above shows “a combination of large and small voids and light wells ensure a spatial connection between different levels and allow natural daylight deep in the heart of the 30metres wide building. Interplay of striking but subtle colours and direct and indirect (artificial) lighting enlivens the interior.” (Gloot Klimmendaal by Architect Koen Van Velsen, 2015)

2.6.3 Continuity.

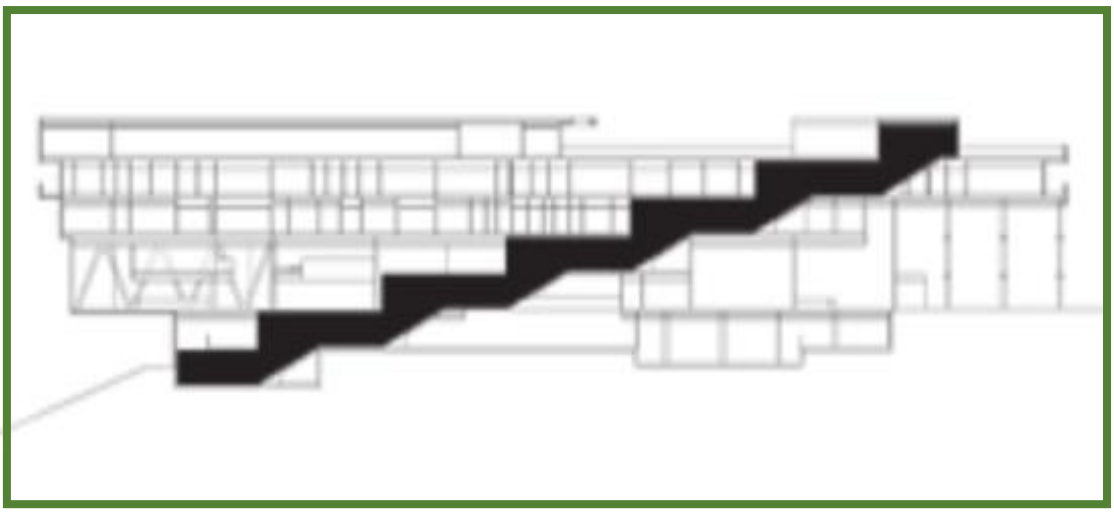


Figure 2.8 Continuous staircase. Source: (http://static.dezeen.com)

The figure above show the continuous staircase that enables visual relation from the roof garden into the valley.

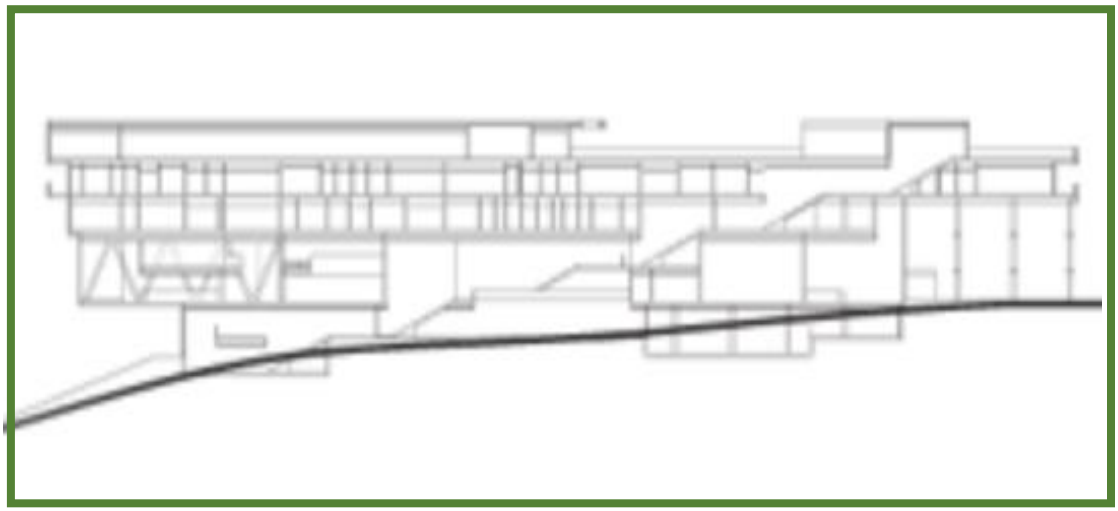


Figure 2.9 the terrain and the building. Source: (http://static.dezeen.com)

The figure above shows that the building has impacted a minimum footprint on the original terrain of the site, there by maintaining it in its natural form.

2.6.4 Special Considerations.

1. Diversity

The arrangement of the programme is clear. Below are offices, above are the clinical area's and on the roof is located a fun House with its own identity. The double-height ground floor at entrance level facilitates the special elements of the programme such as a sports facility, fitness, swimming pool, restaurant and theatre. Not only patients but also family members and members of the local community (schools, theatre groups etc.) use these facilities on a regular basis. As a result, both patient and building are placed at the centre of the community.

2. Healthcare

The care concept is based on the idea that a positive and stimulating environment increases the well-being of patients and has a beneficial effect on their revalidation process. The design ambition was not to create a centre with the appearance of a health building but a building as a part of its surroundings and the community.

3. Sustainability

The use of energy is amongst others reduced by the compact design of the building and the design of the mechanical and electrical installations. Most notably the thermal storage (heat and cold storage) contributes to the reduction of energy consumption. The choice of selecting sustainable building materials and materials requiring little maintenance for floor finishes, ceilings and facade cladding result in a building which can be easily maintained and with a long lifespan.

2.6.5 The Building and Healing.

1. Daylight Intensity.



Plate 2.10 Glazing. Source: (www.google.co.uk)

Improved daylight intensity is introduced as a result of the glazed façade.

This reduces depression in the patients that live in the building.

2. Views to Nature.



Plate 2.11 Transparency. Source: (www.google.co.uk)

The large glazed windows give a very good interior relationship to nature, thereby bringing the outside, inside. This reduces pain in the body.

3. Art



Plate 2.12 Hall Way Source: (www.google.co.uk)

In plate 2.12, the colours and forms on the corridor give it a lively feeling, instigating excitement in the patients.

4. Noise reduction.

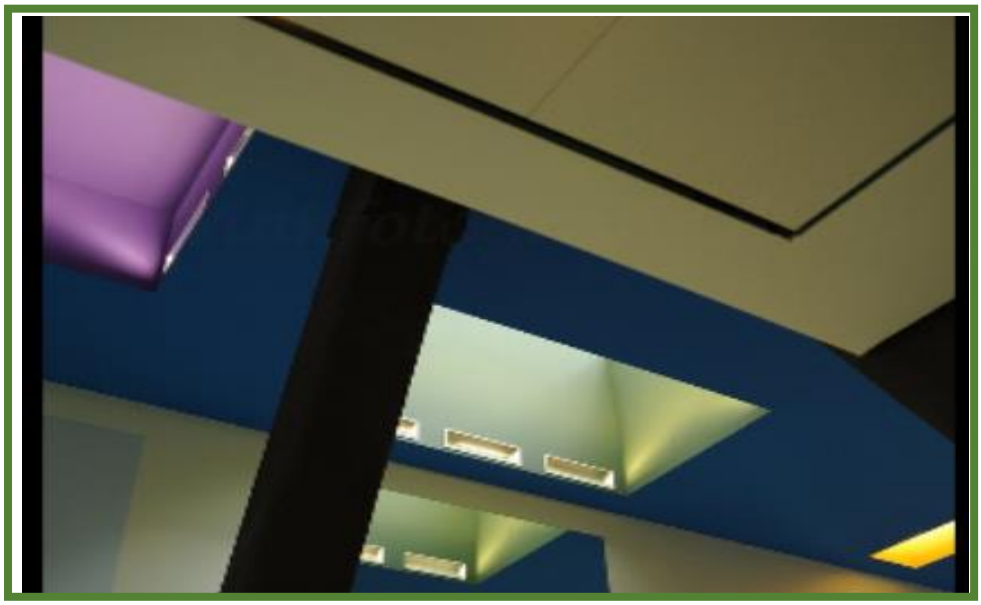


Plate 2.11 Low Reverberation. Source: (www.google.co.uk)

Plate 2.11 shows how the spaces are designed to minimise noise and reverberation, with the aim of reducing stress levels.

5. Outdoor Spaces



Plate 2.12 Lawn. Source: (www.google.co.uk)

Plate2.12 shows the proximity of the lawn to the building, encouraging outdoor activities.

6. Social Space



Plate 2.13 Interactions. Source: (www.google.co.uk)

Plate 2.13 shows how Social spaces have been designed with consideration to foster interrelationship and family participation.

2.7 Conclusion.

This Centre is a wonderful example of what healing architecture has to offer and the different ways the building can be designed to facilitate the healing of drug addicts in a rehab centre.

CHAPTER THREE: METHODOLOGY

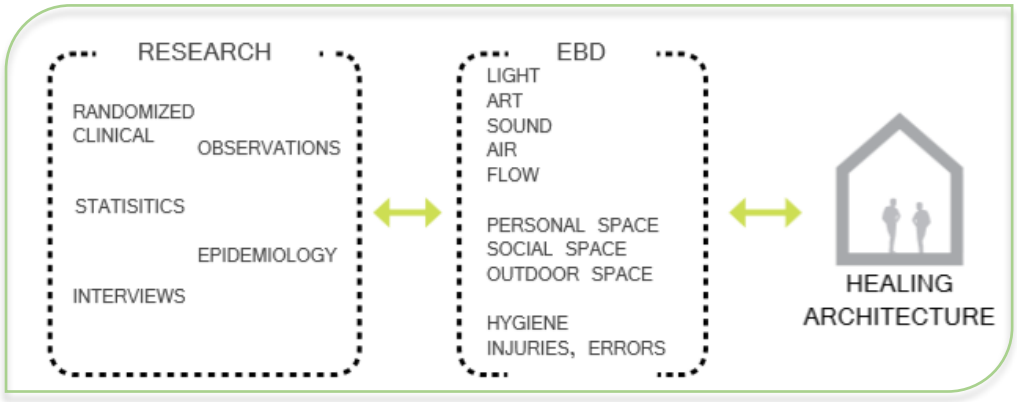
3.1 Background

The research done within the field of healing architecture is of various qualities, done by different professions and disciplines, and "not all can be described as generally credible empirical evidence, as it is not generated through randomized clinical trials or experiments, and was defined merely as quasi-experimental research, epidemiological investigations or as observational studies" (Ulrich, 2009). This implies that a research of this nature needs to establish a measurable link between architecture and healing. As a result, this research adopts an architectural concept called evidence based design, which according to Jonsson & Nielsen (2010), describes a method for qualifying and developing qualitative architecture based on scientifically proved knowledge that has come out of many different investigations, analyses and statistics." To further buttress this point and provide a credible solution to the problem stated by Ulrich (2009) is that, "Evidence based design does not only comprise a design concept but also includes the measurable effect of the built environment." It is important to note that "Architecture is difficult to measure, as it affects the human being on multiple levels, through multiple senses, empirically and phenomenologically."

Hence, evidence based design suggests a method of providing qualitative healing

architecture through measuring certain aspects of architecture that affect healing as illustrated in Table 3.1 below.

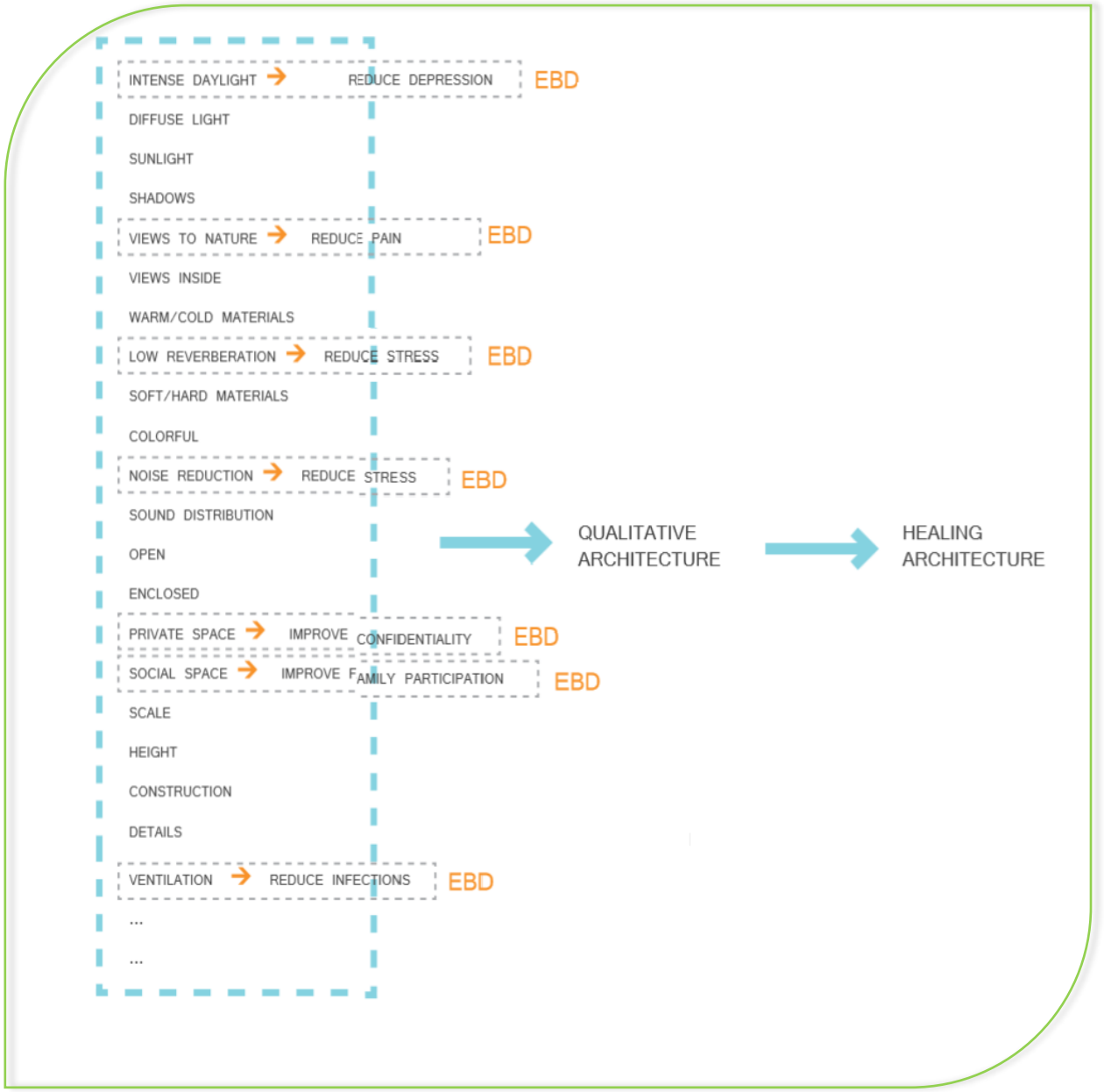
Table 3.1. The Concept of Evidence Based Design (E.B.D)



Source: (Jonsson & Nielsen, 2010).

The Table above illustrates that, "Different research of various disciplines form a joint pattern of evidence that certain architectural elements can improve health care outcomes. Evidence Based Design form the base of healing architecture." (Jonsson & Nielsen, 2010). Table 3.2 illustrates how evidence based design integrates certain architectural elements and form the base for healing architecture.

Table 3.2. Evidence Based Design.



Source: (Jonsson & Nielsen, 2010).

Taking into consideration, the complications involved in the application of evidence based design. A major issue arises regarding acquisition of empirical data from the translation of the effect of tools of EBD such as intensive daylight or ventilation on human related factors such as depression and infections, respectively.

Ultimately the scale of work required to achieve the data as explained above is too large for a project at this level, as it will require conducting an observational exercise comparing several cases under the same circumstances. Hence, the use of the likert scale system was adopted. A Likert scale is a psychometric response scale primarily employed in questionnaires to obtain preferences or the degree of agreement with a statement or set of statements, (Betram, 2007). The scale was used for the structured interview of the staff and patients of existing drug addicts in rehabilitation centres in Northern Nigeria.

3.2 Case Study Design

This research will adopt the following methodologies for these various aspects;

- Literature review: Review of existing literature such as;

  (1).Government policy documents. This shall affect the choice of site and locating the building, as well as sensitive architectural requirements for the design of a rehabilitation centre for drug addicts in Nigeria.

  (2). Architectural journals. This will shed light on issues of contemporary construction techniques and use of materials as well as current sustainable practices related to the topic in question.

  (3). Architectural data books. This will provide design guides, functional flows, and space requirements.

  (4). Related thesis projects in the research area. This is aimed at reviewing contributions of other researchers on the topic.

3.3 Data collection and sampling.

Several drug addict's rehabilitation centres was visited for case studies, the architecture of the facility and its relevance to healing was examined, and some randomly selected care takers and patients was interviewed.

The interview was carefully structured to obtain the best answers required to illustrate the effect of the architecture of the visited cases to the healing of the patients as assisted by evidence based design. According to Calmorin & Calmorin (2008), the formula for determining sample size due to a large population is:

$$Ss = Nv + \left(\frac{(Se)^2 \; x \; (1-P)}{NSe+[V^2 \; x \; P(1-P)]}\right)$$

This was used to obtain the number of people that was interviewed as,

Ss = Sample Size.

N = Total Number of Population

V = Standard Value (2.58) at 1% level of probability with 0.99 reliability

Se = Sampling Error (0.01)

P = Largest Possible Proportion (0.50)

3.4 Data Analysis.

Numerical and statistical date was analysed and translated into information with the aid of tools like the Ms excel spread sheet, graphs and charts, all aimed at providing measurable evidence to the importance of architecture in the healing process of drug addicts in a rehabilitation centre.

The Data collected includes:

1. Responses from interviewed care givers in:
    a. Synapse Services Abuja
    b. Federal Neuro Psychiatric Hospital Abuja
2. Architectural Design elements that influence healing:
    a. Room Temperature
    b. Humidity
    c. Light Intensity
    d. Sound Intensity
    e. Interaction with Nature

The Data was analysed using the key indicators identified in chapter two. The Information indicates that a drastic improvement in the design of drug addict's Rehabilitation Centres in required.

CHAPTER FOUR: DATA PRESENTATION AND ANALYSIS

4.1 Introduction.

This chapter is giving a documentation of data collected as inspired by the methods and the strategies put forth in the previous chapter, and also using various tool of converting data into information to depict the analysis and inferences of the data collected. As stated in the scope and delimitations section of chapter one, this research could only cover two credible rehabilitation centres worthy of field studies in this part of the country, namely;

- Synapse Services located in the Federal Capital Territory Abuja.
- Federal Neuropsychiatric Hospital located in Kaduna, Kaduna State Capital.

4.2 Case Study I: Synapse Services.



Plate 4.1: Site Location Map of Synapse Services (Source: Google Earth)

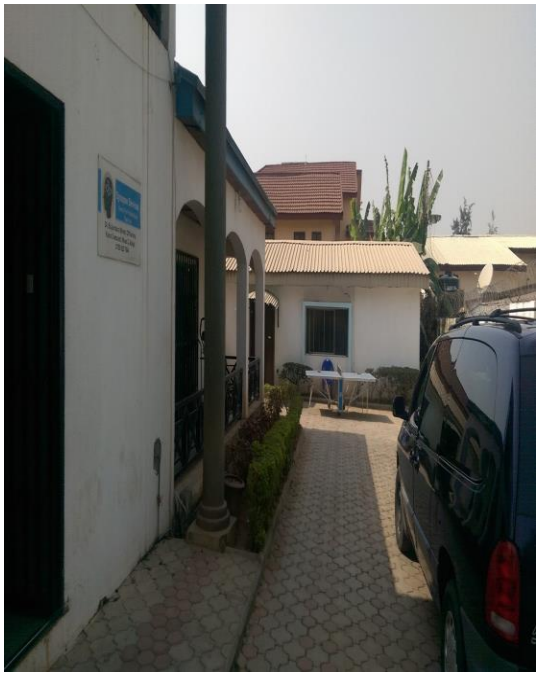


Plate 4.2 Synapse Services



Plate 4.3. Synapse Services Entrance

Synapse services is a private rehabilitation centre for drug addicts located at no 24, Bujumbura Street, Wuse II, Abuja. It is located amidst a neighbourhood of residential buildings, and the building itself was designed for residential purposes and was later modified into a facility for rehabilitation by the company. Their staff consist of; Doctors, Nurses, Clinical Psychologists, Social Workers and Clinical Supervisors.

They have a maximum space capacity of 20 patients with a male to female ratio of 5:1. The ages of the patients ranges from 16 to 30, all with fairly good literacy.

They pride themselves with an 80% rate of success as documented by the company itself, which has been achieved by the application of a sustainable system.

4.2.1 The 12 Step Recovery Process.

According to American Psychological Association A.P.A (2014), there are 12 steps of drug addiction recovery, which include;

1. We admitted we were powerless over alcohol that our lives had become unmanageable.
2. Came to believe that a Power greater than ourselves could restore us to sanity.
3. Made a decision to turn our will and our lives over to the care of God as we understood Him.
4. Made a searching and fearless moral inventory of ourselves.
5. Admitted to God, to ourselves, and to another human being the exact nature of our wrongs.
6. Were entirely ready to have God remove all these defects of character.
7. Humbly asked Him to remove our shortcomings.
8. Made a list of all persons we had harmed, and became willing to make amends to them all.
9. Made direct amends to such people wherever possible, except when to do so would injure them or others.
10. Continued to take personal inventory, and when we were wrong, promptly admitted it.
11. Sought through prayer and meditation to improve our conscious contact with God as we understood Him, praying only for knowledge of His will for us and the power to carry that out.

12. Having had a spiritual awakening as the result of these steps, we tried to carry this message to alcoholics, and to practice these principles in all our affairs.

Synapse Services makes its patients go through this system, which plays a very important role in the foundation of the rehabilitation of drug addicts.

4.2.3 Safety measures.

Synapse services prides itself in the implementation of safety measures that make the facility safe for its occupants. The measures help the efficiency of activities by all the people within the facility, be it the staff, patients and even the visitors. These measures include:

- Furniture Arrangement; the furniture is fixed to the ground and no movable parts are allowed.
- The table sitting arrangement; this is done in such a way that the chair of the staff is closest to the door.
- No ligature points; the fans don't have hooks, and there are no hanging out metals or pipes.
- No source of weaponry; all potentially dangerous objects are prohibited.
- The doors are double swing.
- All desks have panic alarm buttons.
- Railings for stair case and balconies have no space underneath.
- Male should be separated from female.
- And a designated ward for psychotic cases.

Due to the patient confidentiality policy of the Institution, this research could not cover pictures and readings for light intensity, reverberation, exposure to nature and

other key factors required for the assessment of the environment where the patients live in relation to their response to these existing factors.

A floor plan could not be obtained or reproduced either, rather sketch bubble diagrams showing special relationship on the ground and first floors are presented below.

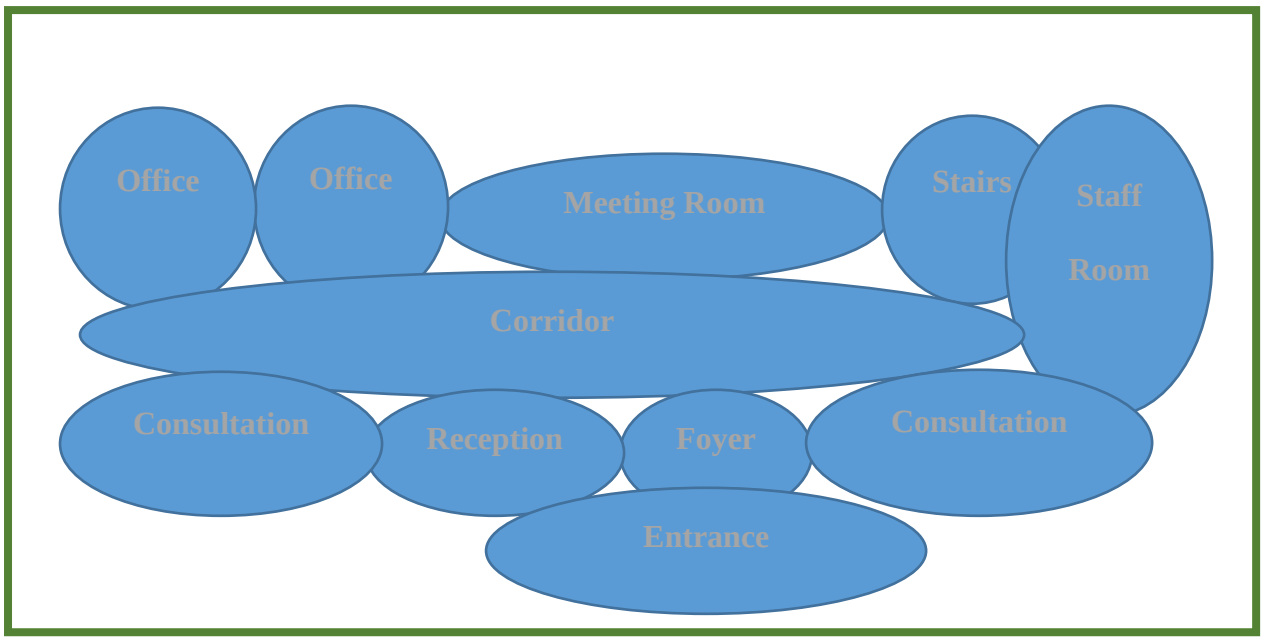


Figure 4.1. Bubble diagram of spatial relationship of Synapse Services Ground Floor.
Source: Researcher.

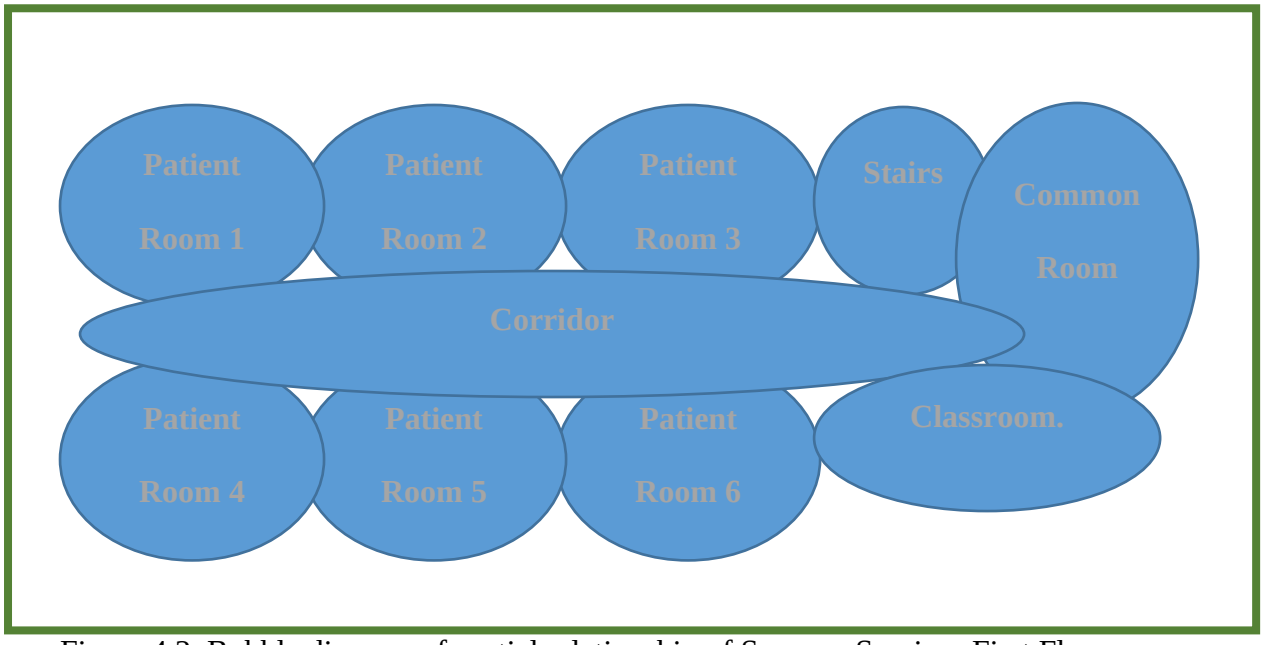


Figure 4.2. Bubble diagram of spatial relationship of Synapse Services First Floor.
Source: Researcher.

4.2.4 Presentation of Data Collected.

An interview was carried out with the aim of observing the relationship between the variables of this research (Room Temperature, Humidity, Amount of light, Sound Intensity, Interaction with nature, Interior Wall Colour, and Interior wall shape), and the responses from the interviewees.

This data was compared to constants established by evidence based design as either effective or hazardous to the healing of the patients.

The constants stated above include;

1. Room Temperature. This directly affects the comfort levels of the patients. According to Olgyay (2015), "optimum effective temperature lies at 66º F (i.e 19º C), with a range of 63º F-71º F (i.e 17.2º C - 21.7º C) for both men and women."
2. Humidity. "Humidity affects both thermal comfort and indoor air quality" (Passive Design, 2015). The same article clarified that "generally, most people was comfortable in a humidity range of 30–80% if the air temperature is in a range of 18–24ºC." (Passive Design, 2015).
3. Light Intensity. Fig 2.5 in Chapter 3 (page 35), shows that light intensity affects anxiety levels. According to Illuminance (2015) "100-500 lux is the range of light required for spaces such as a health care facility."
4. Sound Intensity. As illustrated in page 35, Sound intensity directly affects the stress levels of an individual. According to schroder (2011), in her book titled *the book of audacity*, "the comfortable listening range (i.e sound in a quiet room) is between 20db – 30db."

5. Proximity to Nature. “Viewing nature can result in physiological changes such as reduced blood pressure and heart activity” Resources (2006), the provision of regular access to nature is adequate, but there hasn’t been any records of and required amount of exposure.
6. Ventilation. Proper ventilation of a space directly affects spreading of diseases

Table 4.1 below, summarises the points established on the previous page.

Table 4.1. The research variables and their requirements.

S/N	VARIABLE	REQUIREMENT
1	Room Temperature	17º to 22º Celsius
2	Humidity	30% to 80%
3	Light Intensity	100 to 500 lux
4	Sound Intensity	20db to 30 db.
5	Proximity to Nature	Provision of access
6	Ventilation	Proper Ventilation.

Source: (Jonsson & Nielsen, 2010)

Using the constants established in Table 4.1, these research variables were cross examined with the relative data collected from the Synapse Services.

Table 4.2 A Checklist showing the application of the research variables by Synapse Services. Abuja.

S/N	Variables	Checklist	Level of application					Remark
			1	2	3	4	5	
1	Room Temperature	-Patient Room 1. - Patient Room 2. - Patient Room 3. -Common Room. -Class Room.			✓ ✓ ✓			27º C 27 º C 27.4 º C 26.7 º C 27.2 º C
2	Humidity	-Patient Room 1. - Patient Room 2. - Patient Room 3. -Common Room. -Class Room.					✓ ✓ ✓ ✓ ✓	50% 50% 50.1% 53% 51%
3	Light Intensity.	-Patient Room 1. - Patient Room 2. - Patient Room 3. -Common Room. -Class Room.				✓ ✓ ✓ ✓	 ✓	125 lux. 120 lux 122 lux 112 lux 145 lux
Key rating for the above table 5-Execellent; 4-Very good; 3-Good; 2-Fairly good; 1-Poor								

Table 4.2 A Checklist showing the application of the research variables by Synapse Services. Abuja.

4	Sound Intensity	-Patient Room 1. - Patient Room 2. - Patient Room 3. -Common Room. -Class Room.		✓	✓ ✓ ✓			38db 37db 38db 40db 42db
5	Interaction with Nature.	-Patient Room 1. - Patient Room 2. - Patient Room 3. -Common Room. -Class Room.	✓ ✓ ✓ ✓ ✓					Not Provided Not Provided Not Provided Not Provided Not Provided
Key rating for the above table 5-Execellent; 4-Very good; 3-Good; 2-Fairly good; 1-Poor								

Source: Researcher.

The Chart below shows responses from 9 Patients Interviewed

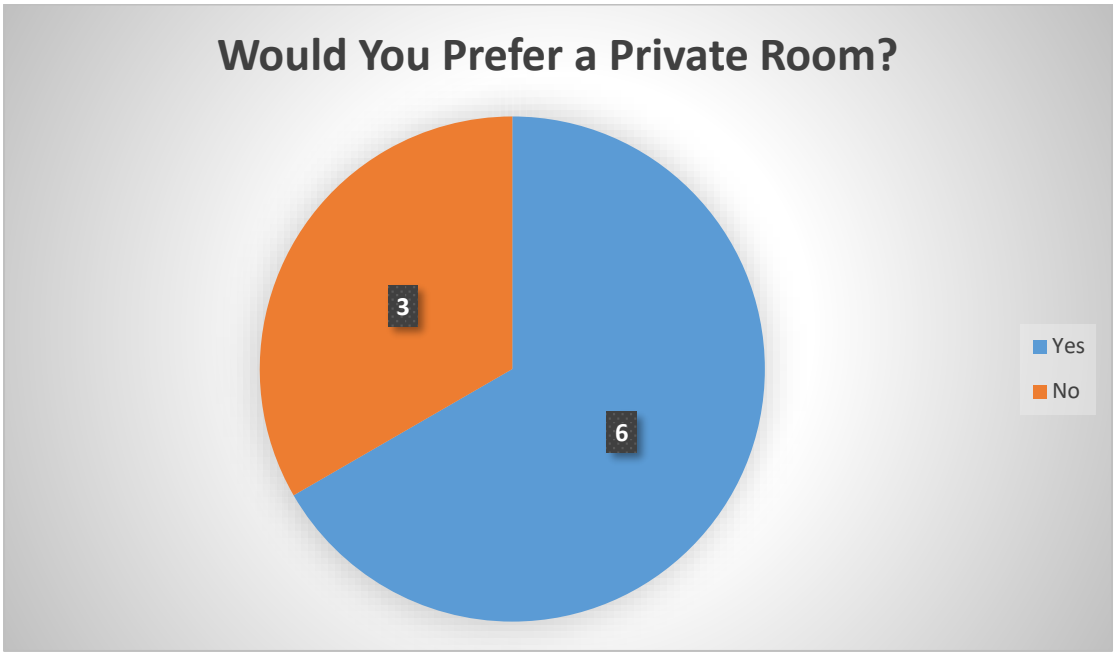


Figure 4.3. Showing preference to Private Room. Source: Researcher

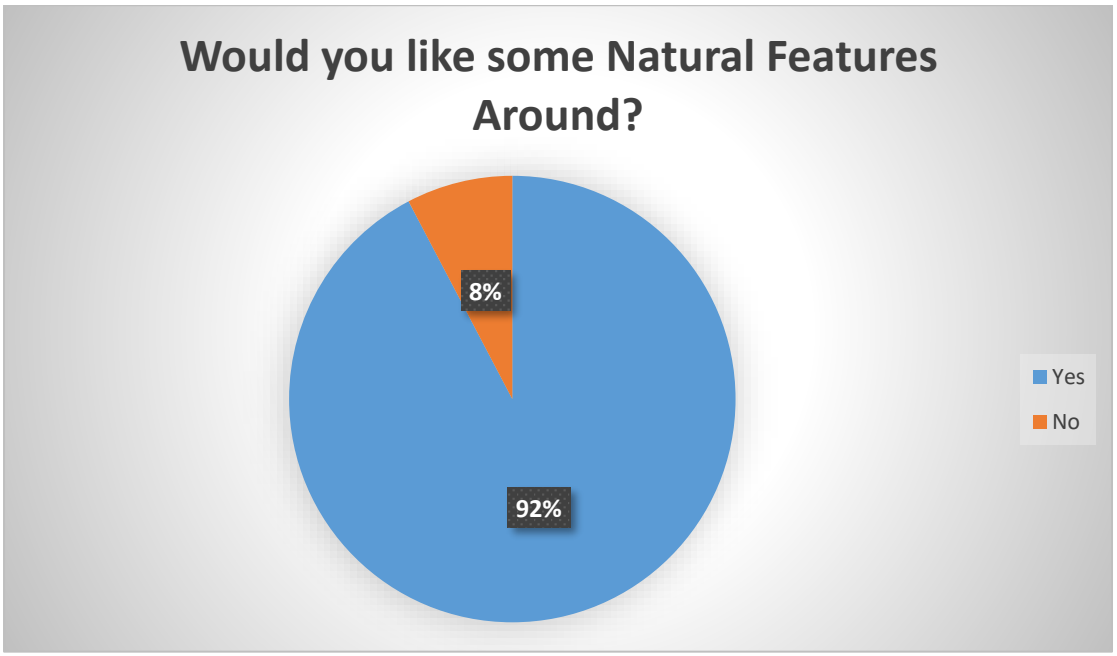


Figure 4.4. Showing preference to Natural Features. Source: Researcher

Figures 4.3 & 4.4 (above) indicate the preferences of the patients of Synapse Services Abuja.

The chart below is showing the response of 9 patients to their environment.

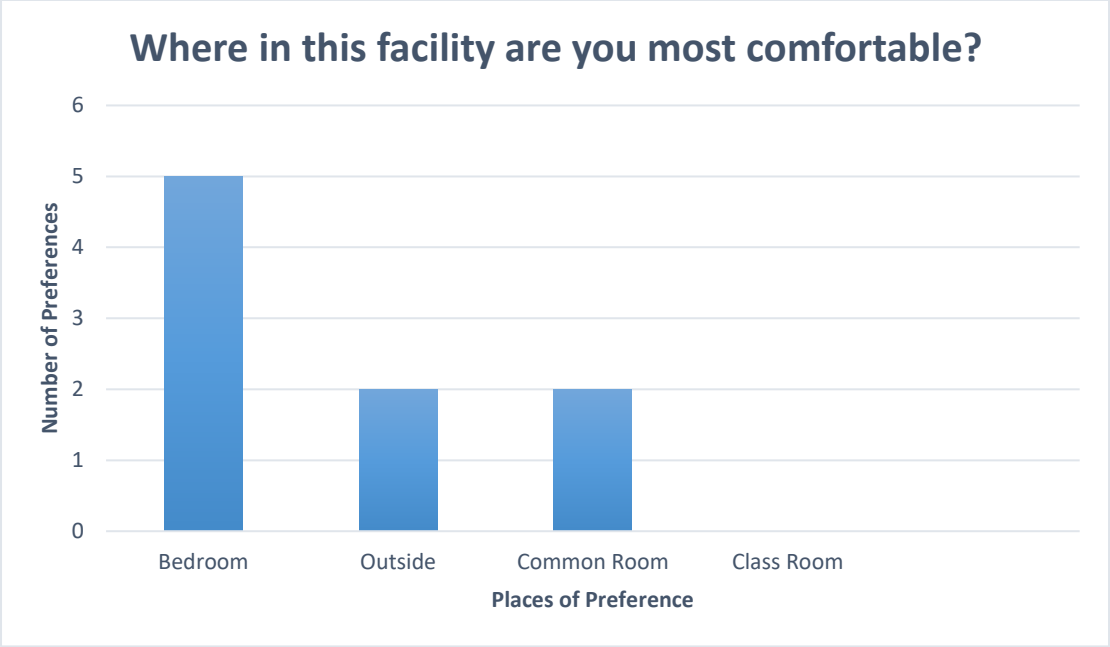


Figure 4.5. Showing most preferred space in Synapse services Source: Researcher.

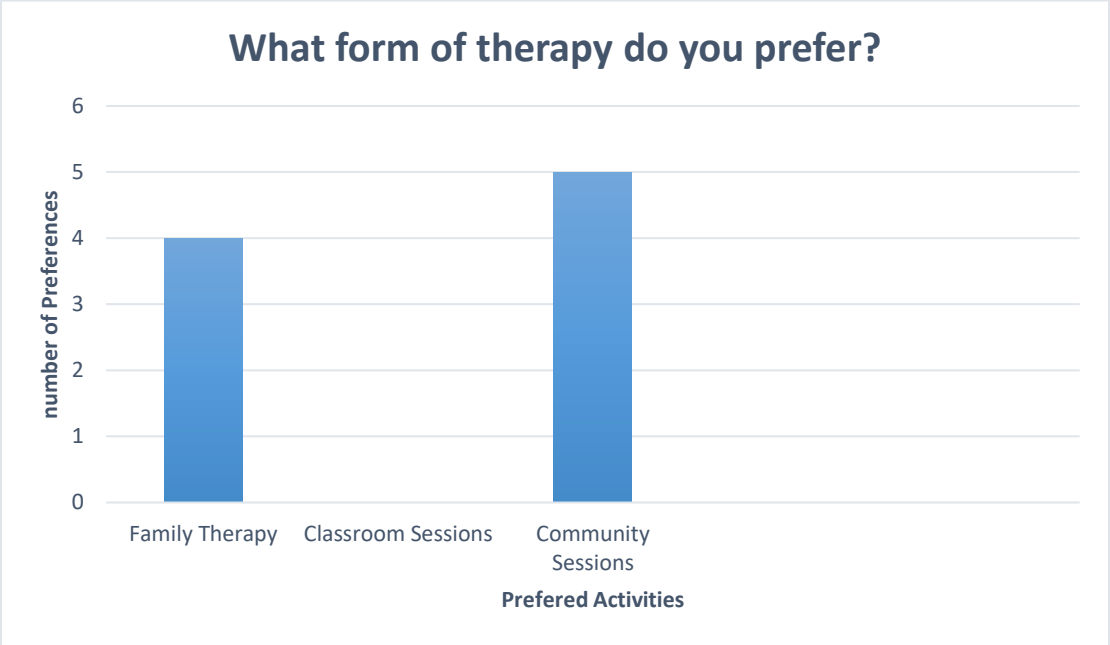


Figure 4.6. Showing preferred form of therapy by the patients. Source: Researcher

Figures 4.5 and 4.6 are responses by the patients of Synapse Services showing their preferences within the rehabilitation centre.

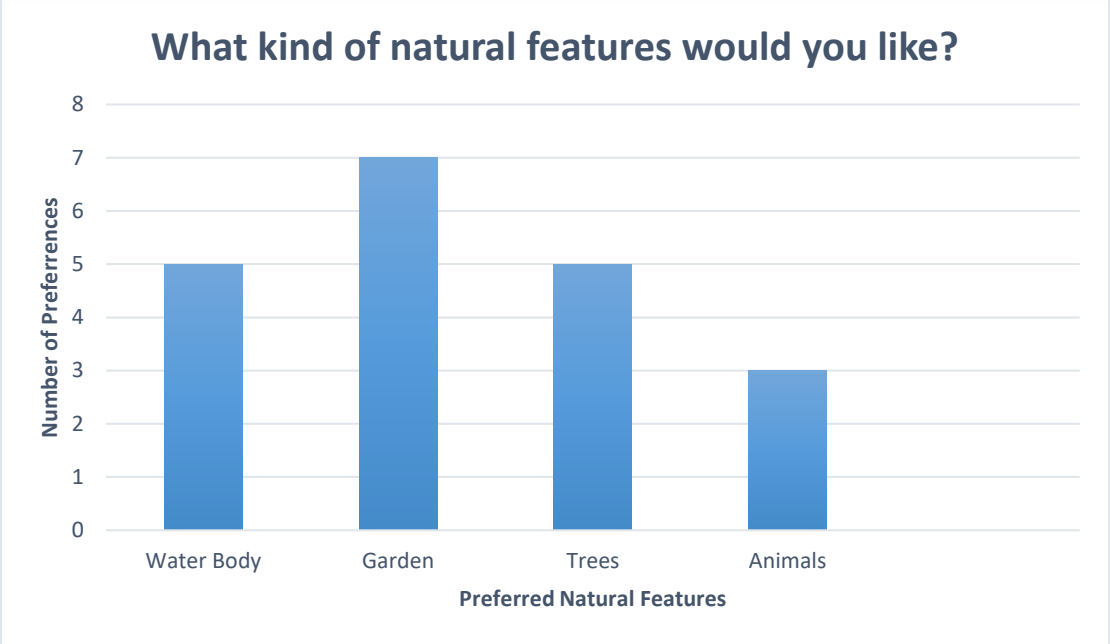


Figure 4.7. Showing the most preferred natural Feature. Source: Researcher

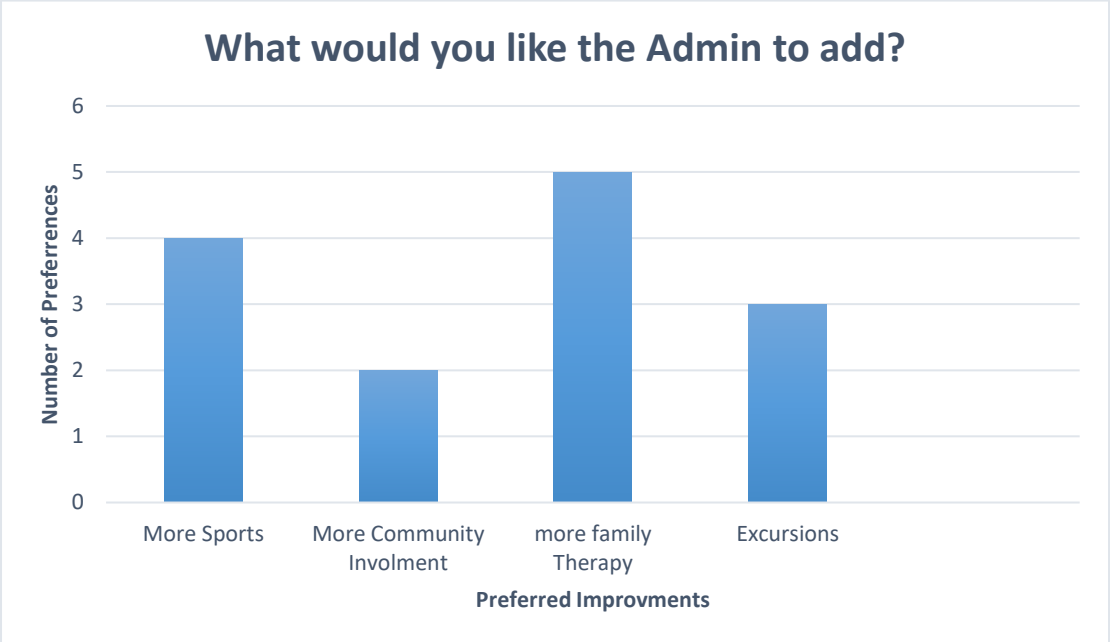


Figure 4.8. Showing the aspects the Admin should improve on. Source: Researcher

Figures 4.7 and 4.8 conclude the work done on this case study.

4.2.2 The Phases of Treatment.

Phase one of treatment in this facility is the intake and introduction. Here the patients either come to the facility voluntarily, or are picked up from their home involuntarily. After intake the patients are then introduced to the rehabilitation process and are put through the 12 step recovery system.

Phase two is the detoxification process. Unlike most rehabilitation centres, this facility does not offer medication for detoxification. It simply subjects the patient to abstinence, and subsequently treats the symptoms of withdrawal such as fever, headaches, body pains, and so on.

Phase three is the longest phase, the rehabilitation. During this period the patient goes through a number of programmes and processes including; Psychological therapy (Patient interactions with counsellor, patient interactions with each other, sport activities and other recreational activities.), family therapy, and occasional clinical checks, all strategically designed to successfully deliver the patient in a better place in their lives at the end of the process.

Phase Four is the after care. This is when the patients come to the centre for clinical test, and discussions with the clinical psychologist. The patients are also given surprise visits in their homes, and are invited for group seminars.

4.3 Case Study II: Federal Neuro-Psychiatric Hospital Kaduna.



Plate 4.4 Logo of F.N.P.H



Plate 4.5 Areal Map of Barnawa Source: Google Maps.

This Institution is a tertiary mental health institution, under The Federal Ministry of Health, situated along Barnawa Road, opposite Shagari Federal Low Cost Houses Barnawa, Kaduna South. It was founded in 1975, with a bed capacity of 100. "The Hospital is accredited by both the National and West African College of Physicians, and the Nursing and Midwifery Council of Nigeria for residency training of doctors and post-basic psychiatric nurses" (Commonwealth Health Online, 2015) . Federal Neuro-Psychiatric Hospital Barnawa, Kaduna has a current bed capacity of 154, and is expected to increase by 298 bed capacity on completion of male/female acute wards B and drug ward B.

4.3.1 Clinics and Services.

The centre has various clinics which all in their own field offer various services which come together to support and proffer solutions to the psychiatric and other psycho-related patients admitted into the facility.

Subspecialty Clinics.

- Child and Adolescent
- Forensic Psychiatry
- General Adult Psychiatry
- Geriatric Psychiatry
- Psychotherapy
- Sexual Dysfunction
- Neurology
- Substance Abuse

Services.

- 24-hours emergency care
- Out-patient
- In-patient
- Drug and alcohol rehabilitation
- Consultation liaison psychiatry
- Community psychiatry
- Therapeutic day care for children with psychological disorders
- Medical laboratory
- Clinical psychology
- Electroencephalogram

4.3.2 Drug Alcohol Treatment and Rehabilitation.

The hospital has a division that renders drug addicts rehabilitation and that is the Drug Alcohol Treatment and Rehabilitation (DATER) ward.



Plate 4.6 Drug Alcohol Treatment and Rehabilitation (DATER) Ward Entrance. Source: Researcher

Drug Alcohol Treatment and Rehabilitation (DATER) ward was commissioned on the 26th of April 2012, by Governor Ahmed Makarfi, with the aim of undertaking the task of rehabilitation of drug and alcohol addicts, as well as cases requiring rehabilitation from the Psyche ward. The rehabilitation programme is a four months programme, and on admission, they carry out intake assessment, which can be referred to as diagnosis.



Plate 4.7 Male Dormitory. Source: Researcher

The ward has a bed capacity to accommodate 35, and it admits both male and female, even though the male to female ratio is about 5:1. Plate 4.7 on the previous page is one of the two male dormitories with a bed capacity of 14. The female dormitory accommodates 7.

The programme is very strict and interesting at the same time as it allows for male and female social interaction, sporting and other outdoor activities, a weekly session called morning meeting which lasts from 9am-4pm with lunch breaks and relaxation time in-between. During the morning meeting patients are encouraged to speak about topics of interest and their contributions are discussed by the other patients. Therapy sessions and skills acquisition are all incorporated in the session. This fluid system is maintained by a secure special design that allows for observing the patients, as shown in figure 4.9



Figure 4.9 Sketch Plan of DATER Ward. Source: Researcher

The figure 4.9 shows that there is only one entrance and that same point is the exit point which makes security and monitoring easy. The programme allows for Family Therapy which is broken down into three visits during the four months of the programme. Just two weeks before the end of the programme, the residents otherwise known as the patients by the warders, are evaluated to ensure that they are ready for discharge.

4.3.3 Presentation of Data Collected.

Using the constants established in Table 4.1, the research variables were cross examined with the relative data collected from the Federal Neuropsychiatric Hospital, Kaduna.

Table 4.3. A Checklist showing the application of the research variables by Federal Neuropsychiatric Hospital, Kaduna.

S/N	Variables	Checklist	Level of application					Remark
			1	2	3	4	5	
1	Room Temperature	-Male Dorm Room1. -Male Dorm Room2. -Female Dorm Room. -Dining Room. -Class Room. -Gym. -Lounge.			✓ ✓ ✓ ✓ ✓	 ✓ ✓		26º C 25.8º C 24.6º C 26.1 º C 26.2 º C 26.1º C 24.5 º C
2	Humidity	-Male Dorm Room1. -Male Dorm Room2. -Female Dorm Room. -Dining Room. -Class Room -Gym. -Lounge.					✓ ✓ ✓ ✓ ✓ ✓ ✓	65% 65% 61% 67% 68% 68% 60%

3	Light Intensity.	-Male Dorm Room1. -Male Dorm Room2. -Female Dorm Room. -Dining Room. -Class Room -Gym. -Lounge.		✓	✓ ✓ ✓ ✓		✓ ✓	89 lux 85 lux 102 lux 79 lux 82 lux 81 lux 101 lux
4	Sound Intensity	-Male Dorm Room1. -Male Dorm Room2. -Female Dorm Room. -Dining Room. -Class Room -Gym. -Lounge.		✓ ✓ ✓ ✓ ✓ ✓	✓			42 db. 44 db. 40 db. 46 db. 48 db. 45 db. 43 db.
5	Interaction with Nature.	-Male Dorm Room1. -Male Dorm Room2. -Female Dorm Room. -Dining Room. -Class Room -Gym. -Lounge.	✓ ✓ ✓ ✓ ✓ ✓ ✓					Not Provided Not Provided Not Provided Not Provided Not Provided Not Provided Not Provided

Table 4.3. A Checklist showing the application of the research variables by Federal Neuropsychiatric Hospital, Kaduna.

Key rating for the above table 5-Excellent; 4-Very good; 3-Good; 2-Fairly good; 1-Poor

Source: Researcher.

The Table below shows the responses of 13 Patients interviewed.

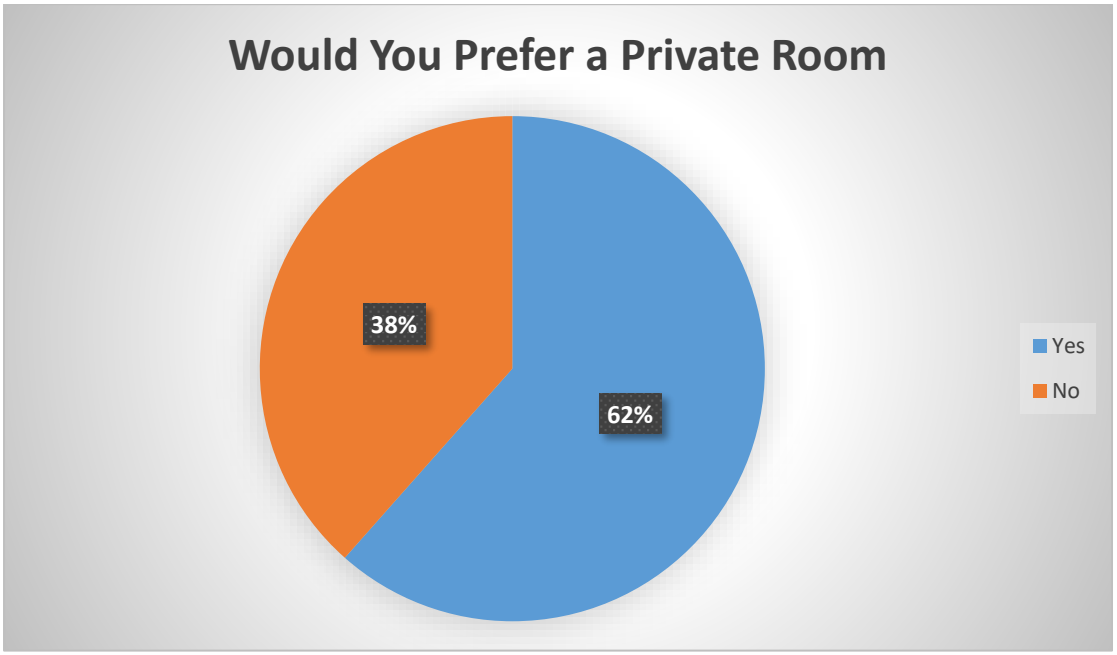


Figure 4.10 Preference to Private Room. Source: Researcher

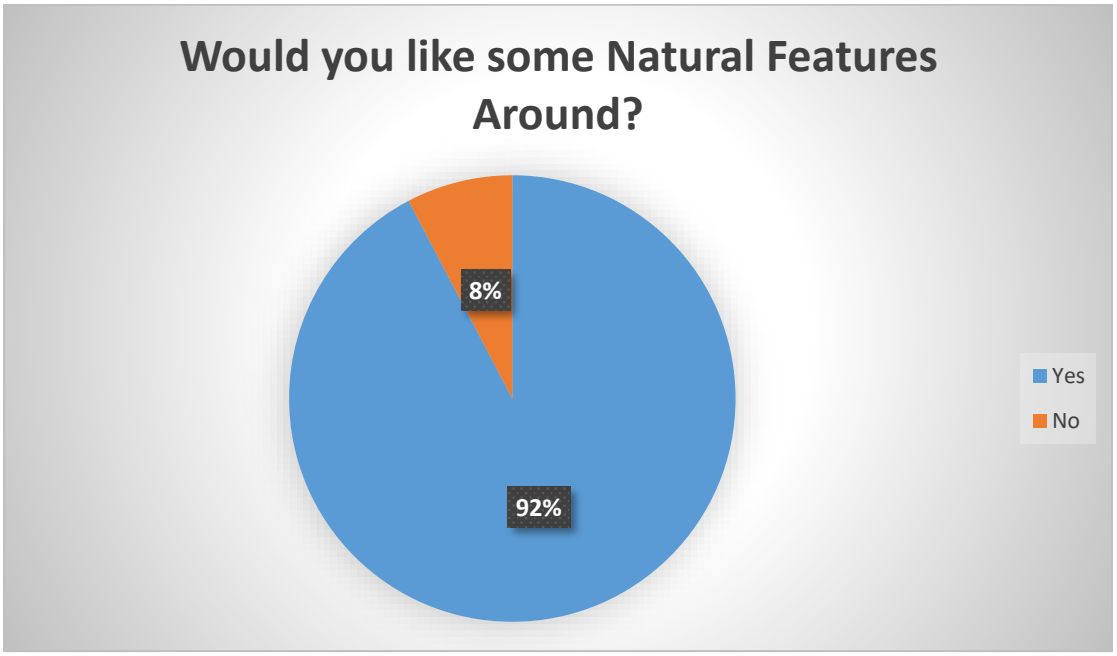


Figure 4.11 Preference to Natural Features. Source: Researcher

The charts above indicate the preferences of the patients of F.N.P.H Barnawa. The chart below is showing the Details of their response to their environment.

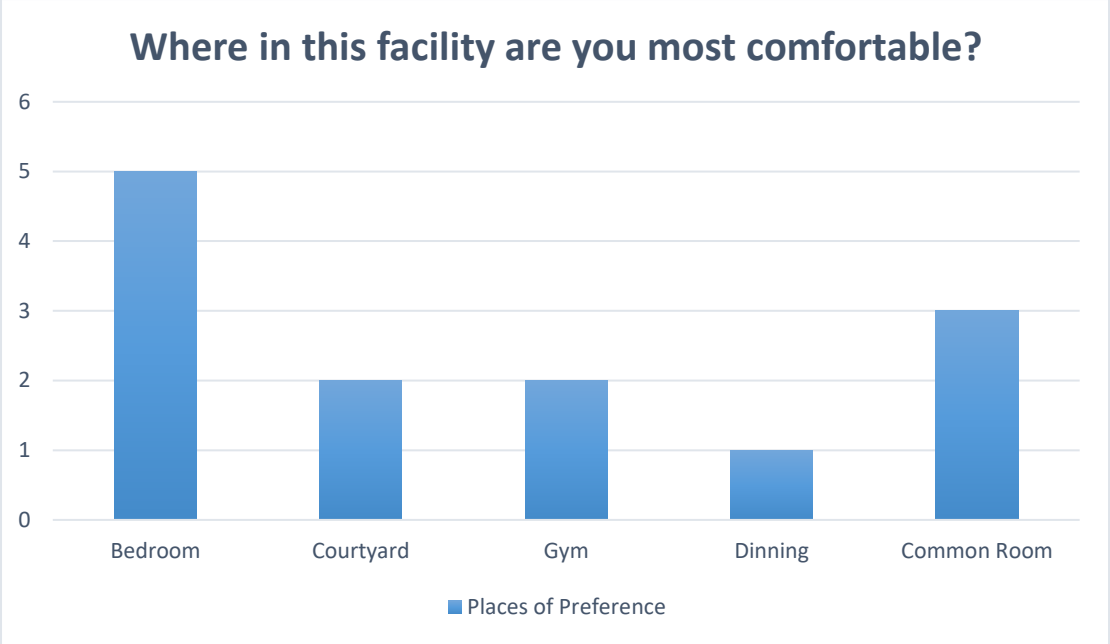


Figure 4.12. Most preferred space. Source: Researcher

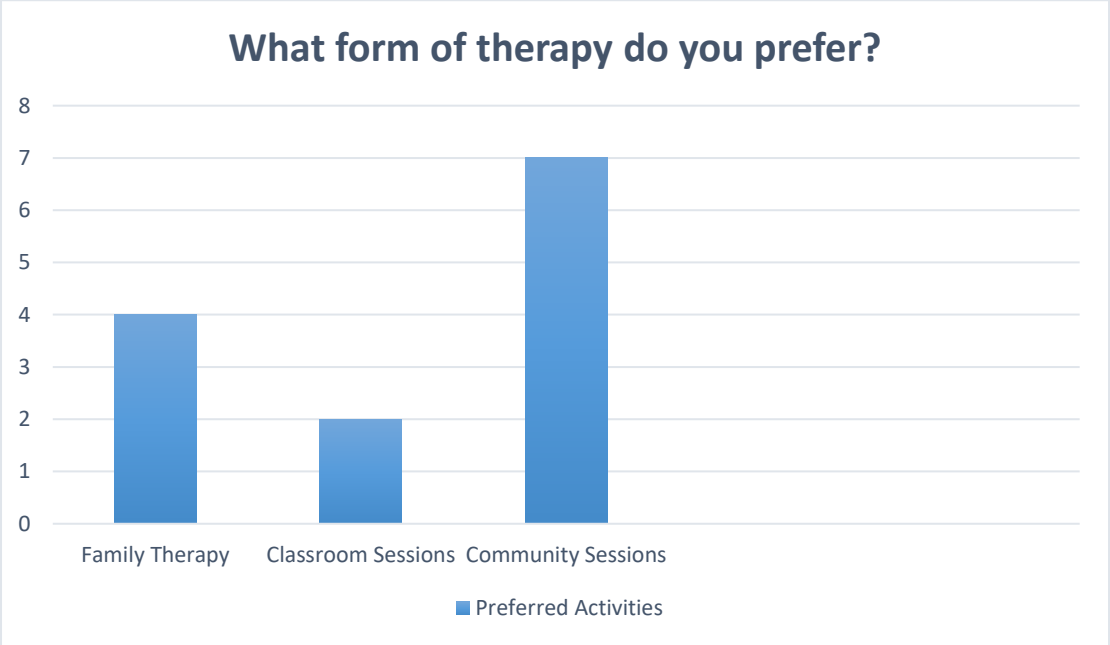


Figure 4.13. Most Preferred Form of Therapy. Source: Researcher

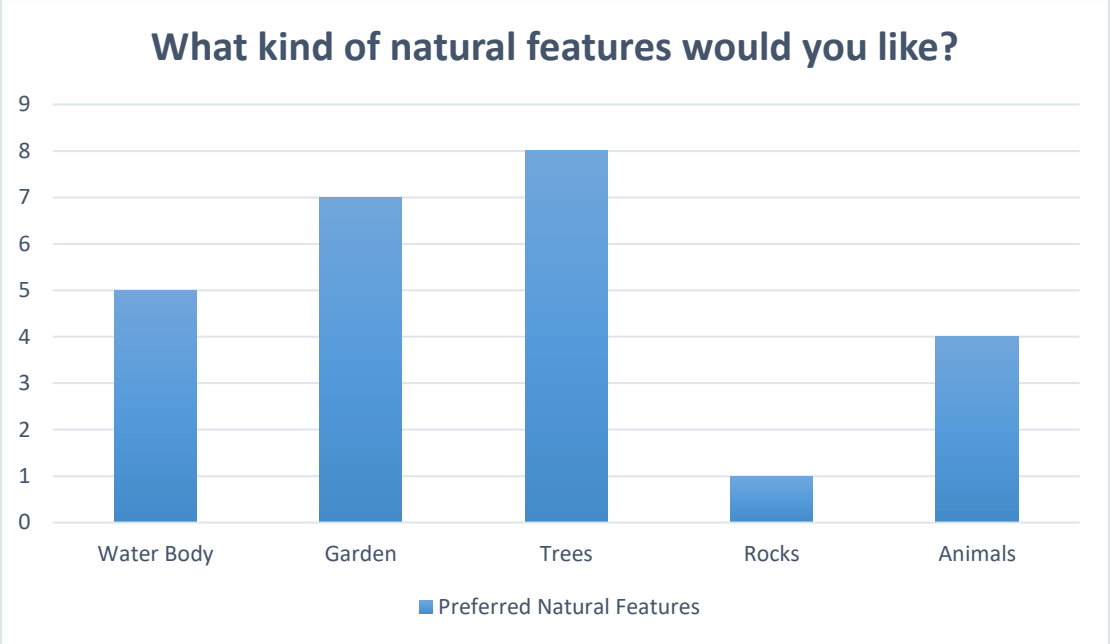


Figure 4.14. Most Preferred Natural Feature. Source: Researcher

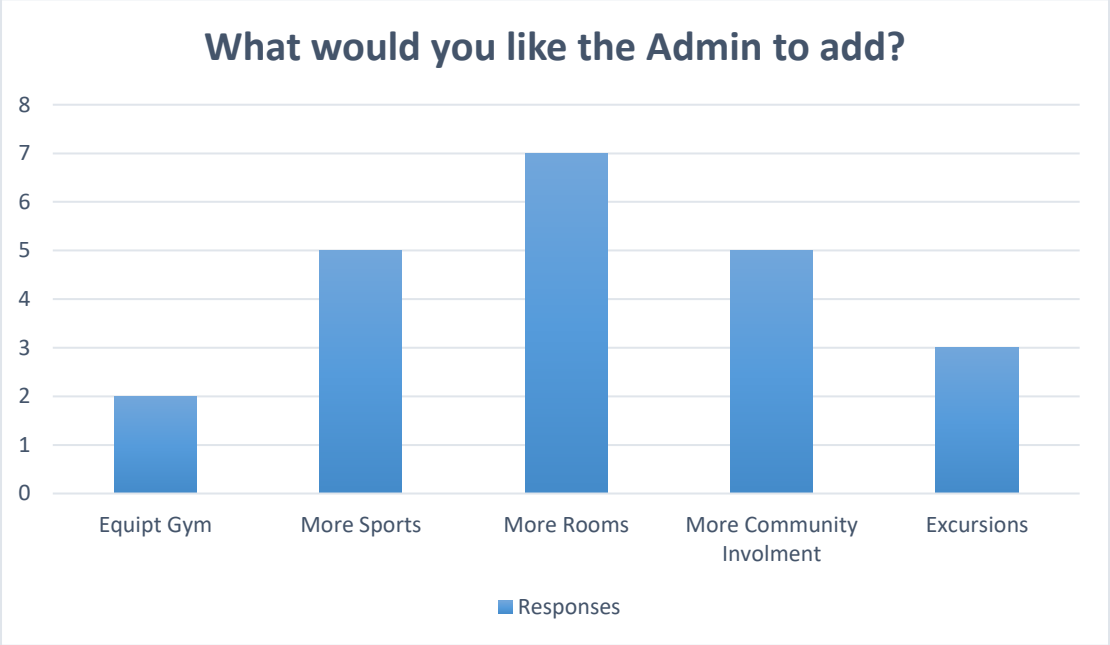


Figure 4.15 Aspects the Admin should improve on. Source: Researcher

Figures 4.10 to 4.15 present the results obtained from the patients of Federal Neuropsychiatric Hospital, Kaduna, in relation to their respective questions.

CHAPTER FIVE: DESIGN AND STUDY AREA CRITERIA

A rehabilitation centre is a facility that renders different specialised therapy on the same premises. In the case of a drug addict's rehabilitation centre, therapy necessary for curing drug addiction is provided for by the centre

5.1 Study Area.

1. Geography.

   The area selected for this design is Kaduna State, this is for strategic reasons considering Kaduna is centrally located making it easy for patients to come from around the country. The state lies close to the center of Northern Nigeria. It is bordered by the Federal Capital Territory to the south, Katsina, Kano, and Sokoto to the North, Plateau State to the east and Niger State to the west. It has a land area of about 45, 567 square meters made up of undulating plateau and hills. The Gongola, Kaduna, Kogom, Guarara, and Wonderful Rivers are some major rivers in the state. The Kaduna River flowing from east to west through the state, drains an area of about 65,000 square kilometers and is characterized by its steep slopes, fast floods and severe lows. The Gongola like the Kaduna River is also a major river in the Jos Plateau and a tributary of the Niger River.

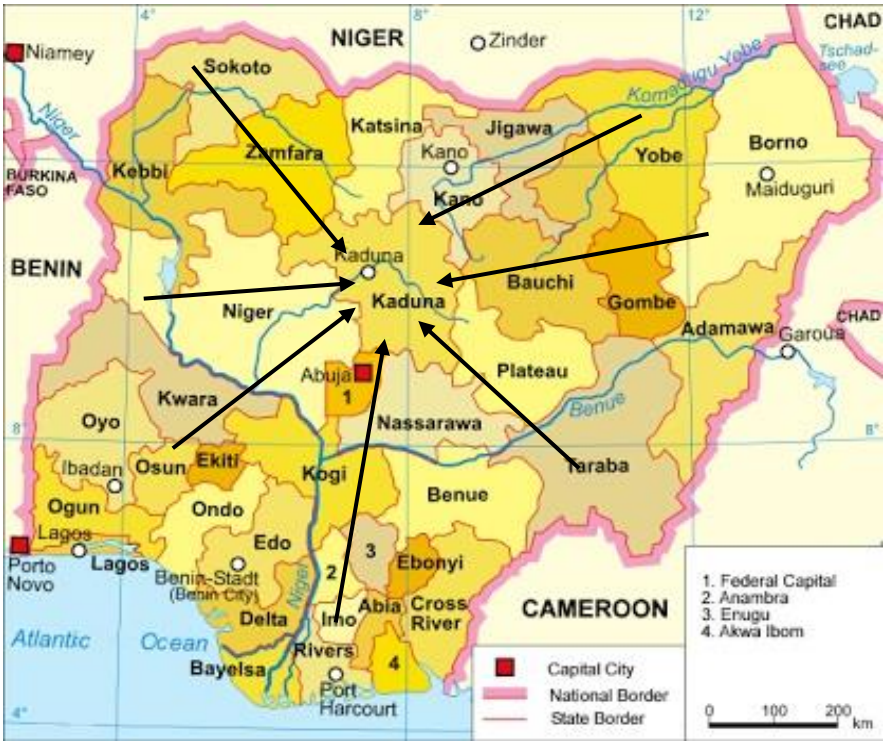


Plate 5.1 Map of Nigeria Showing Ease of access to Kaduna.
Source: (Google.com).

The site selected for this design is located just a few hundred metres of Kaduna-Zaria Express way, which is also a few kilometres from Kaduna City. This will make transportation of patients, staff, and goods to and from the site, very easy.



Plate 5.2. Geographical Map of Site. Source: (Google Earth).

The Plate above indicates that the site as shown by the arrow is located eastward from Katabu Bridge, a few minutes from Rigachukun towards Jaji.

2. Weather and Climate.

Kaduna state usually has two weather conditions in a year as it is experienced in the tropics. These are the rainy season, which usually begins around March and runs through October and the dry season which is usually characterized by bright sunshine beginning from October and ends in March. Within this period, there is a brief interlude of harmattan brought about by the northeast trade wind, with the main feature of dust haze and intensified coldness and dryness. Rainfall in Kaduna reflects the territory's location on the windward side of the Jos Plateau and at the zone of rising air masses.

The mean monthly distribution of rainfall shows a tendency towards a high concentration in the three months of July, August and September. This brings an important consideration in planning the drainage works of the State.

5.2 Site Selection Criteria.

The factors that should be considered in selecting a site for a rehabilitation centre for drug addicts include;

1. Topography: The topography of the site should make the design follow a natural pattern and concept in consideration to the synchronization between the building and the site.
2. Natural Elements: Elements of nature such as; water, trees, plants even birds must exist on the site to achieve the objective of harnessing the healing powers of nature.
3. Zoning: The location of the site must comply with zoning regulations as a quiet location is better than a busy and noisy neighbourhood.
4. Services: Access to services such as water ways and electricity lines, should be available.
5. Security: The site should be located in a safe and secure location that is not too secluded to encourage mid-night attacks and not in a busy or dense neighbourhood to impair monitoring of movement in and out of the site.
6. Expansion: The site should have provision for future expansion as the required population for treatment might increase in time.

After considered the above mentioned factors, a scale was used to select between 3 sites. Each point was given a point in relation to its importance to the objectives of the design. The site with the highest points was selected as the best site for the design.

The Scale.

The factors were graded in relation to the site on a scale ascending from 1-5. The least grade “1”, implies that the factor is not considerably prominent with regards to the site, and the highest grade “5”, implies that the factor is considerably prominent on the site, whereas the mid-grade “3”, implies that the factor is less than considerably permanent but more than totally absent.



Plate 5.3 Site A Location Map.
Source: Researcher



Plate 5.4 Site A Location Map

This is located in Jaji, a few meters off Kaduna-Zaria express road.



Plate 5.5 Site B Location Map.
Source: Researcher



Plate 5.6 Site B Location Map

This site is located Just After Kakau, Before the Kachia Road Interchange along

Kaduna Abuja Express Road.



Plate 5.7 Site C Location Map.
Source: Researcher



Plate 5.8 Site C Location Map

This site is located after Kakaku along Kachia Road, off Abuja-Kaduna express way.

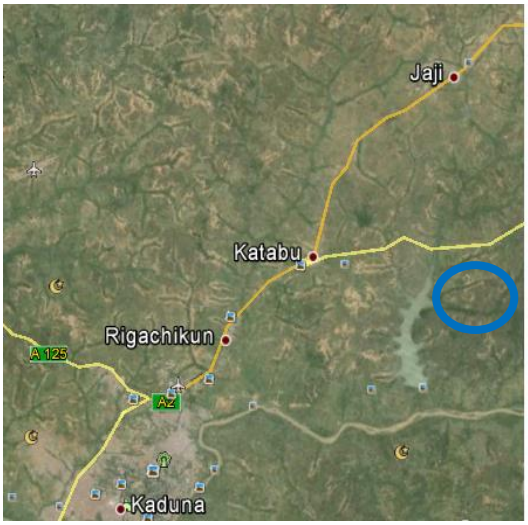


Plate 5.9 Site D Location Map.
Source: Researcher



Plate 5.10 Site D Location Map

This is located a few hundred metres from Katabu Fly-Over Bridge.

Table 5.1. Site Selection Criteria.

Factors	Site A	Site B	Site C	Site D
Topography	4	2	4	5
Natural Elements	5	4	3	5
Zoning	4	4	4	5
Services	5	3	3	4
Security	5	3	3	5
Expansion	5	5	5	5
TOTAL	28	21	22	29

Source: Researcher

From Table 5.1, site D has the highest score of 29 qualifying it as the best location for the design.

5.3 Site Analysis.

Site analysis is a preliminary phase of architectural and urban design processes dedicated to the study of the climatic, geographical, historical, legal, and infrastructural context of a specific site. Site analysis is also a predesign research activity which focuses on existing and potential conditions on and around the building site. It is an inventory of the site factors and forces, and how they coexist and interact. The purpose of the analysis is to provide thorough information about the site assets and liabilities prior to starting the design process. Only in this way can concepts be developed that incorporate meaningful responses to the external conditions of the site.

An understanding of these issues is important in designing a successful home that not only meets its internal responsibilities, but also relates well to its external environment. The home should last for many years, so the analysis of the site should take into account the site's existing and future problems and capabilities.

The secret of using the site analysis is to design a good relationship between the building and the site itself. The building design should be in harmony with those beneficial site conditions and strive to save, reinforce, amplify, and improve on what is existing. The analysis will identify those site conditions which may be altered, eliminated, covered up, disguised or reformed. Basically, take advantage of the good things nature has to offer and protect against the bad aspects of the site. It is important to make these decisions deliberately and thoughtfully so that the effects of the building on the site are deliberate rather than accidental or incidental.

5.3.1 Site Location.

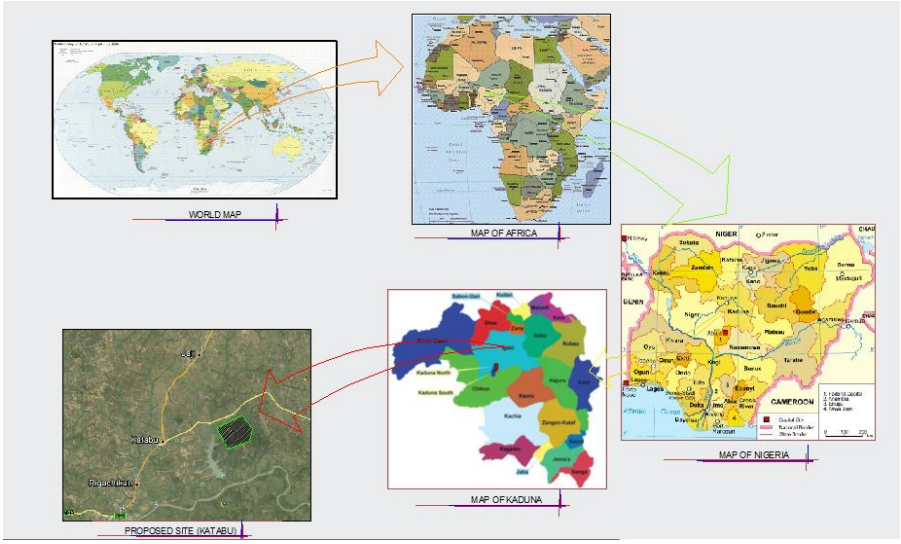


Plate 5.11 Site A Location. Source: Researcher

The site as Indicated in the site selection criteria is located a few hundred metres from Katabu Fly-Over Bridge, close to Rigachukun, Kadauna.

5.3.2 Site Climate.

The dominant features of rainfall in the northern Nigeria are its seasonal character and variability from year to year. The rainfall regime is the result of the cool, moist, south - westerly air mass (monsoon) and the dry, hot north -easterly air mass (harmattan) .the raining season in general starts in April and ends in October .the highest temperature are observed in March. During the harmattan period, the wind speed is high (up to 10m/s in January) towards the eastern direction.

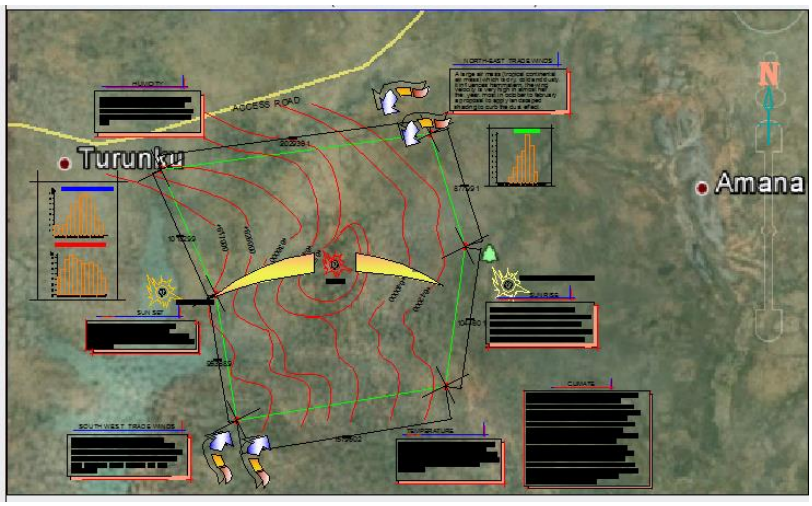


Plate 5.12. Site Analysis: Climate Source: Researcher.

Sun Path.

The sun rises from the east and set in the west, this influences the placement of my building on the site such that the building should have its longer side along the east-west direction so as to reduce the direct penetration of solar radiation, also having less openings on this direction will help reduce glare and solar radiation. However, areas good natural light, and a good view of the sunset, such as the outdoor gardens, should be positioned to take advantage of this.

Trade Winds.

The north-east and south-west trade winds, influence the placement of building on site regarding ventilation. Here, the building should be placed in the east-west direction to enhance natural ventilation, also activities that can cause pollution should not be placed in these directions.

5.3.3 Site Topography and Vegetation.

The vegetation on site consists of patches of trees green areas, and bare land as shown in the site map and suggested on the site layout and site section. Some trees should be maintained to support the natural healing effect of the site. The grass is not favorable for the lawn as it encourages insects, hence a more favorable grass was considered for the lawn and the same applies to the shrubs.

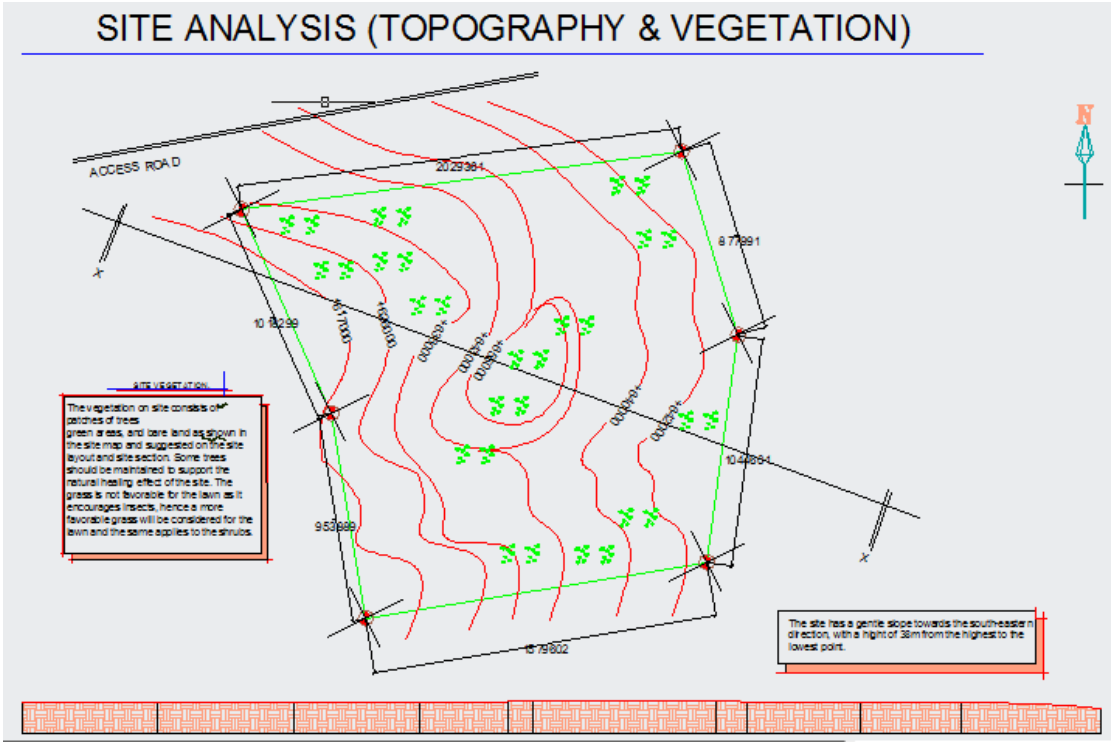


Plate 5.13. Site Analysis: Topography and Vegetation. Source: Researcher.

Plate 5.13 indicates that the site has a gentle slope towards the south-eastern direction, with a height of 38m from the highest to the lowest point.

5.3.4 Site Zoning and Views.

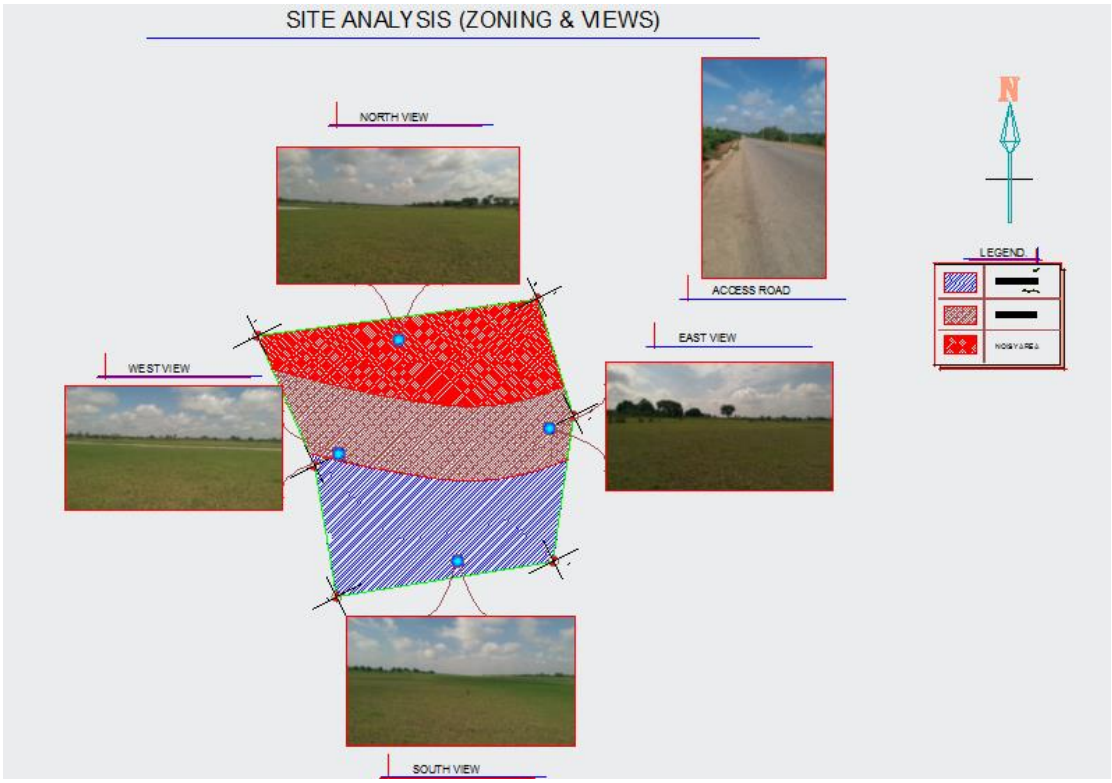


Plate 5.13. Site Analysis: Topography and Vegetation. Source: Researcher.

Plate 5.13 indicates the access road to the site, the north, south, east and western views of the site. In relation to the access road, the site has been zoned into noisy, semi-quiet and quiet zones, indicated by the red, brown and blue coloured patterns respectively.

CHAPTER SIX: DESIGN REPORT

6.1 Brief Development.

Federal Rehabilitation Centre Kaduna is a rehabilitation centre for drug addicts located in Jaji, Kaduna. It was set up by the Federal Ministry of Health, aimed at reducing the number of drug addicts and subsequently the level of social vices conceived by this menace. The Federal Ministry of Health intends to use this Centre as a model that can be modified, adapted and adopted in other states around the country.

6.1.1 Aim of Design.

This design is aimed at producing a model rehabilitation centre for drug addicts that will utilise modern and traditional methods of rehabilitation through the objectives listed below.

6.1.2 Objectives of design.

1. To take advantage of the healing power of nature.
2. To utilize elements of healing architecture.
3. To produce a safe and friendly environment.
4. To produce a building that facilitates the healing process.

6.1.3 Background.

A rehabilitation centre is a facility that renders different specialised therapy on the same premises. In the case of a drug addict's rehabilitation centre, therapy necessary for curing drug addiction is provided for by the centre. Such therapy may include; psychotherapy, combination therapy and family therapy.

Activities in the rehabilitation centre for drug addicts may include;

1. Diagnosis
2. Detoxification
3. Counselling
4. Psychotherapy
5. Combination Therapy
6. Family Therapy
7. Drug Education
8. Teaching and Coping Skills
9. Relapse prevention

The Facilities that support the activities mentioned above are;

1. Administrative Section
2. Detoxification Unit
3. Guidance & Counselling Unit
4. Visiting & Dinning Hall
5. Library
6. Skills Acquisition Section
7. Classrooms
8. First Aid & Sick Bay
9. Testing Labs
10. Accommodation Section
11. Indoor Games Room
12. Outdoor Games Area
13. Garden Park

Several safety measures are taken in a rehabilitation centre for drug addicts, some of which include;

1. Fire safety
2. Furniture Arrangement; the furniture should be fixed to the ground and no movable parts allowed.
3. The table sitting arrangement; this should be done in such a way that the chair of the staff is closest to the door.
4. No ligature points; the fans should not have hooks, and there are no hanging out metals or pipes.
5. No source of weaponry; all potentially dangerous objects should be prohibited.
6. The doors should be double swing.

7. All desks should have panic alarm buttons.
8. Railings for stair case and balconies should have no space underneath.
9. Male should be separated from female.
10. And a designated ward should be provided for psychotic cases.

6.2 Concept Development.

Healing architecture is all about flow, and energy transfer. In accordance with the principles of healing architecture and healing architecture, the site concept will take advantage of the existing natural features on the site, namely;

- Topography
- Water
- Vegetation.

These feature were maintained on site as much as possible. Hence the building form and arrangement has to assume a flexible shape to allow for manoeuvring away from some of these site feature this design aims to maintain. This is why forms like the circle and ellipse was used and the building was disjointed.

6.2 Design Considerations.

This design used the principles of healing architecture as contained in healing architecture in the following manner:

1. The Bedrooms: The rooms/dormitories of the patients are designed with a direct access to a garden, giving the patients good interaction with nature. The colours are also bright encouraging colours; White, Cream and Peach.

2. The Dinning: This was designed with an Elliptical form and the arrangement of the chairs is in circles in order to represent the free form and aid in positive flow of energy.

3. The Auditorium: This facility is a semi-private facility as the parents of the patients will use this facility occasionally, in accordance with the family involvement requirement of the rehabilitation process. This is why the facility is located close to the patient's accommodation facilities and situated within a serene environment.
4. The Patients Accommodation: The Buildings are disjointed in accordance with the design concept and are arranged in an elliptical format, giving a good view for monitoring and a good flow in accordance with the principles of healing architecture.
5. The Admin Block: this is the first point of access for any person coming into the site, and so the building is situated in a garden with trees around it and a wonderful aisle defined by trees and shrubs.
6. Safety Considerations: The offices are designed such that the chairs of the doctors and other staff is close to an exit, in case of uncontrolled outburst by the patients. All fittings are hinged to the ground, and the use of fittings with detachable objects like fan hook and so on, has been avoided.

6.5 Functional Space.

The space have been designed to interact with each other and to provide a healthy, safe and friendly environment for the patients to feel free and happy, even though the design has made it easy for the staff to keep a close eye on the patients. This can be seen in the following points;

- The dinning is located in a strategic location to allow for ease of access for the students and is still maintaining security protocol.
- The rooms have adjoining bathroom facilities.
- The rooms are linked to a garden

- The worship centres are within close proximity to the accommodation.
- The classes are located in the admin block. This is in order to allow the patients room to move around and interact with new faces, helping them feel free, even though they are in a secure and controlled environment.
- The Sick bay is designed to handle all the medical responsibilities expected of a rehabilitation centre.

6.6 Building Materials and Technology.

This design utilizes a lot of natural building materials in accordance with the principles of healing architecture. These materials as used in the design are;

- Mud: This is used in the gardens for seats and water features
- Stone: this is as floor finish for courtyards (Bordering the grass), also used in gardens, Walkways, aisles ad on the wall of the library.
- Wood: This is also used as ornamentation and decoration in the rooms and dinning, also used in the gardens and for roofing of some few parts of the building.
- Thatch: this is used for huts in the healing garden.

6.7 Services.

Services on site include:

- Electricity: The electricity of the site was basically provided by the National grid, but for back up, generators were provided. The generators were strategically located to support different sections of the facility respectively.

This is in order to achieve efficiency of electrical distribution.

- Water Supply: The site will utilize the principles of Low Impact Development (L.I.D) as a water container is situated at the lowest part of the site and the roads have been reduced to a minimum. The green roofs also collect water to be used for domestic activities like flushing and so on.
- Water Drainage: The water was drained to a collection tank in accordance with the principles of L.I.D

CHAPTER SEVEN: CONCLUSION AND RECOMMENDATIONS.

7.1 Summary of Research Findings.

This research has gone into the topics of Healing architecture and its contribution to healing architecture. Also established is the relationship of these topics to the healing of drug addicts in a rehabilitation centre. This has given bases for establishment of the fact that healing architecture can contribute positively to the healing of drug addicts in a rehabilitation centre.

The literature review has shown both from works of other facilities and researchers and from a case study, that healing architecture is required in the design of healing facilities. This research has also shown from field studies that the absence of the principles of healing architecture in the design of healing facilities, leads to poor output of treatment and a slow paced treatment process.

This has given satisfactory answers to the research questions asked at the beginning of this project. The next segment explains how.

7.1.1 What are the requirements for healing of the drug addicts in a rehabilitation centre?

The requirements for healing of drug addicts in a rehabilitation centre are;

- Medically assisted detoxification
- Identification and treatment of co-occurring mental health and medical issues
- Cognitive behavioural therapy (CBT)
- Family participation in treatment

7.1.2 What are the positive contributions healing architecture has to offer to drug addict's rehabilitation centres in Nigeria?

Healing architecture brings about a more efficient approach to design giving consideration to the following factors;

- Site Planning: Stark (2012) stated that "The healing potential of a site is finite ... so architectural development must learn to respect the processes that preserve the natural healing potential of a site." Similarly, (Verderber, 2010) complements this point, rooting for "the provision of site planning and building form principles attuned with the therapeutic amenity in nature and natural landscapes including gardens and walkable pedestrian scaled communities, as opposed to care settings the preclude connections to nature."
- Sustainability: "Sustainability has spiritual as well as technological dimensions. Buildings hold a responsibility to nature … A healing structure holds responsibility to … Nature: to preserve and care for all of life and its material resources, Spirit: to exalt all that is highest in human aspiration and intellect," Stark (2012).

  It is important to note that (Verderber, 2010) supports this points as he advocates for "the provision of health care environments built with locally available materials, methods of construction … versus dependence on geographically far-flung resources."
- Topography: According to Stark (2012) "Sites located in the middle of a slope … have an advantage over sites on the top or bottom." This is looked into from a more holistic view by (Hooper, 2007) in his book "Landscape Architectural Graphic Standards", where he explains that "recognisable place-making

promotes independence, reduces stress, and enhances the healing garden as a unique, identifiable and special space."

- Orientation: "The placement of a structure on the site must consider its orientation in relation to land masses, river systems and building form. The configuration of land or building masses is most important: a site should be protected from behind by higher ground or higher buildings. Lower protection should also be present from left and right. The site should also enjoy a focal point in the distance" Stark (2012).
- The Building Form: "Excellence in architecture is of primary importance in helping to foster health and healing…Clarity of layout and form have an impact on the healing potential of the structure ... The goal is to create an anthropo-cosmos, a structure that is a living participant in the role of healing" Stark (2012).
- Interior Design: "Good interior design helps to reduce stress levels and increases satisfaction and recuperation. To achieve this, interior layout must encourage smooth flow of vital energy ... Lobbies and foyers need to be cheerful and welcoming and should be generously proportioned ...

  Lobbies should always include symbolic or metaphorical recognitions of the healing process: waterfalls, fountains, sculpture, fireplaces, or gardens…"Stark (2012).
- Land Energy: here Stark (2012) stated that "The life force on this planet is the result of cosmic energy streaming into our planet from the sky and its interaction with the biosphere. This vast complex of energies that cross over the surface of the globe is fundamental to life, healing, and recuperation. This array of vibrations is so fundamental to life that without it life is impossible."

- The Healing Power of Water: “Water is symbolic of the vitality in life and is key to the sacredness of a healing site. Water can be metaphorical of peace, tranquillity and calm. Conversely, it is also associated with vitality, fertility, abundance, fluidity and movement. Water opens up the contemplative nature of the soul and helps to elicit memories and a sense of belonging. ... This force can be tapped by enhancing naturally occurring water in site planning of by introducing it into the site or the structure in gardens, water features, and vistas…” Stark (2012). Surface and Underground water have different functions but they all contribute to healing. (Verderber, 2010), in his book “Innovations in hospital Architecture”, advocated for “the provision of water as a therapeutic and aesthetic amenity, and as a means to achieve personal hygiene and public health, as opposed to unsanitary care settings devoid of clean water for personal, aesthetic and other related civic uses.”
- The Healing Power of Gardens: Stark (2012) said “A healing garden is a micro cosmos of the larger world. Each feature in the garden has the power to represent a larger feature in the landscape: mountains, rivers, lakes.

  It is through this holistic modelling that a healing garden can stimulate the senses, improve vitality, and promote recuperation from physical, emotional, mental and spiritual illness.”

7.1.3 What are the principles of healing architecture that facilitate the healing of drug addicts in a rehabilitation centre?

The Principles of healing architecture that facilitate healing include;

- Be inspired by nature and be sustainable, healthy, conserving, and diverse.
- Unfold, like an organism, from the seed within.
- Exist in the "continuous present" and "begin again and again".
- Follow the flows and be flexible and adaptable.
- Satisfy social, physical, and spiritual needs.
- Grow out of the site" and be unique.
- Celebrate the spirit of youth, play and surprise.
- Express the rhythm of music and the power of dance."

7.1.4 What are the effects of healing architecture on healing in drug addict rehabilitation centres across the globe?

This has been established from case studies that have revealed that the use of the principles of healing architecture as listed in section 7.1.3 has led to a more successful and scientific approach to treating drug addicts in a rehabilitation centre.

7.1.5 How can architectural solutions be applied in the special requirements of the rehabilitation centre for drug addicts in Nigeria?

The question has been answered by the example shown in the case study. The design of the Gloot Klemendaal rehabilitation centre has shown one example of how to do this job. The design done by the researches has also adopted these principles and shows another example of how to apply these solutions in the special requirements of the rehabilitation centre.

7.2 Contribution to Knowledge.

The major contribution this project has offered to knowledge is the establishment of a link between Healing architecture and Drug Addict's Rehabilitation as well as a basis for comparison for Nigerian healing facilities to research into the requirements for adopting the principles of healing architecture into the design of the facility. This project has also developed a model design, an example for healing facilities in Nigeria on how to apply the principles of healing architecture to achieve a successful delivery of treatment to the patients.

7.3 Conclusions.

Healing architecture is needed in the design of healing facilities in order to achieve a more successful and scientific approach to delivery of treatment to the patients of the facility. This research has also led us to conclude that, rehabilitation centres for drug addicts in Nigeria are lacking in the implementation of healing architecture and other forms of healing architecture.

7.4 Recommendations.

This research can be carried out on a higher level, where a more controlled environment may be used to assess the response of drug addicts in a rehabilitation centre to their environment, in order to establish a basis for application of principles of healing architecture in these facilities.

The Federal government of Nigeria needs to explore this topic more and establish facilities this will deliver a higher level of success and in the long term reduce the number of hoodlums and hooligans on the streets of Nigeria.

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