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**Toward rethinking the architecture of addiction centers in  
Algeria: the evaluation of lighting quality and its impact on  
patient well-being**

Dissertation for the degree of  
Doctor of Philosophy in Architectural Engineering

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## **Abstract**

The thesis aims to study the relationship between the architectural elements of reception structures for people suffering from drug dependence and well-being through their behavior in these establishments.

The methodology consists of considering the patient as an element contributing to the architectural quality decision in the establishment through an analysis of the spatial aspects of Algerian addiction structures and their influence on the patients' behavior. Based on a spatial quality/behavior correlation, it was noted that the architecture of drug addiction centers in Algeria follows norms and standards that favor factors other than the factor of well-being and visual comfort. This is due to the fact that detoxification establishments are included with the regulations of mental health establishments, and it lacks a protocol or manual concerning the interior architectural design of addiction centers in particular.

The spatial analysis steps of the research led to a gap in the quality of natural light, which indicates a remarkable impact on the behavior and the preference of specific spaces by the patients. As well as the artificial light marked a unified strategy which makes him indifferent to filling the gaps of natural light in these existing establishments.

After an analytical and evaluative process at drug addiction establishments' functional and spatial levels, the thesis proposes a triangular method. It derives a database on the principles of light design from previous research and relates it with the thesis's present functional and spatial findings, plus considering general security norms to have a specified protocol for addiction centers. Besides this, it views the patients' psychology as part of the conception process.

**Keywords:** well-being. Behavior. Addiction structure. Patients. Protocol. Spatial analysis. Natural light. Artificial light.

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Abbreviation	Explanation
<i>DF</i>	<i>Daylight factor</i>
<i>DF max</i>	<i>Maximum daylight factor</i>
<i>DF min</i>	<i>Minimum Daylight factor</i>
<i>ADF</i>	<i>Average Daylight factor</i>
<i>WFR</i>	<i>windows floor area ratio</i>



## Introduction:

Over time, medical systems and treatments in the field of addiction have developed, which helped change the perception toward the classification of addictology. However, the synchronization of the architecture of the addiction centers has still not kept pace with the medical development to provide comfort and well-being within these institutions. Even though the medicine decides that addiction is not a mental illness, the standards and recommendations for the design of drug addiction centers are not specifically designed for this type of case; rather, it includes all mental health establishments, which gives it more restrictions due to safety. This generalization is probably not compatible with the psychological conditions of the addicted patients.

This gap between architecture and medicine in the field of drug addiction cause question mark about the cure process outcome. Since in other cases, it has been proven that the compatibility of the two aspects can potentially influence patients' perception through the implementation of the therapeutic architecture.

This research aims to reconsider the current architectural recommendations of drug addiction centers through the analysis and architectural evaluation of three case studies selected in Algeria. This analysis is based on a concept of correlation between (architecture/behavior) and the realization of this work will be presented in the thesis as following:

- **A bibliographic study**, for the purpose of:
  - Profoundly understanding the dimensions of the subject of addiction and creating a knowledge base on addiction and the atypical functioning of people who follow the treatment and the modality of care.
  - Having a database on previous others' research and the situation of architecture with the requirements of this disease. In order to be able to register a research question.
- **Identification Basic elements of the research**, this part is about identifying the case studies of the thesis and the discretion of the methodological concept that structures the research process.
- **Large-scale analysis (meso-context)** This chapter studies the relationship between the historical-urban variable of the establishment and patients' perception through an analysis of data (historical and urban) of the institutions and their influence on the flow of patients.
- **Analysis of the micro-context**; This chapter aims to point out the interior architectural elements that may influence the visual quality of space, thus the well-being of patients. To respond at this point, the chapter is divided into two-part:
  - The functional program understanding; this part aims to identify the institutions' functional program and understand each space's role in order to establish a framing that could define the thesis orientation and its process.
  - Analyzing the physical quality of the space, this part is interested in the physical architectural elements that influence the interior visual quality of the establishment and its influence on the patients' perception.

# ***Chapter 01: Research background***

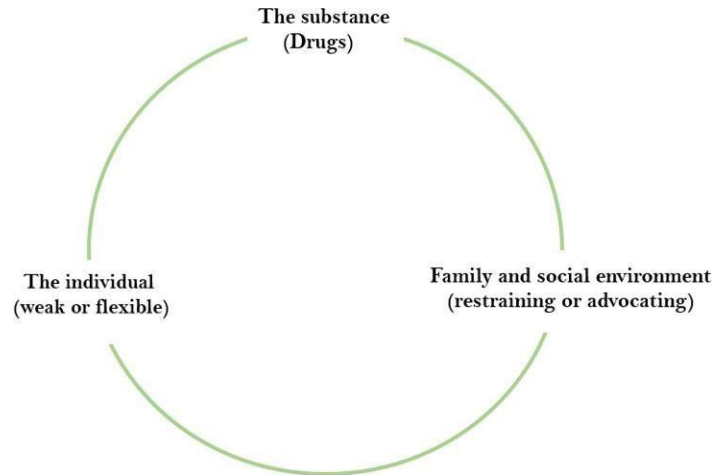
## **1.1 The addiction disease and its classification with mental illness.**

### **1.1.1 The addiction in the psychiatric concept**

Drug addiction is the abuse of psychoactive substances such as cannabis, cocaine, and other types. Addiction enters a biopsychosocial and non-causal cycle; according to Claude Olievvenstein, three elements present the dependence (The product, which is the drug for this research, The individual, The environment). [1], *Figure 1*

WHO identifies addiction diagnostic as a set of cognitive and physiological behavioral phenomena in which the use of elements such as drugs results in gradual disinvestment from other exercises. Addiction is correlated with mental health but is not considered a mental illness. That is because addiction affects the physical health of the addict, so he becomes unable to control his desires, which is a manifestation of various other mental disorders. The effect of substances on the neurochemical level of the brain controls mood, which is usually treated with antidepressants. Therefore, there is an overlap between addiction and mental illness, but it is not considered a mental illness. [2], [3]

Addiction can be due to social and psychological conditions that push the person to take drugs to deal with daily life relationships such as work, sports, or escape from reality to a virtual world where he can find his rest. And then evolve an addiction when these behaviors are repeated to become his only refuge towards comfort. He cannot dispense with it, it returns with time a repeated and irresistible urge, and the addict started to increase the doses to achieve the same effects.



*Figure1. The identification of drug addiction as a substance influencing the bio-psycho-social system of Claude Olivvenstein's. (Source: Author).*

### **1.1.2 The conditions that determine the treating way of addicts**

The care of drug addicts is done through outpatient units, for consultation and day follow-up of patients without admitted them to hospital units, and to assess their overall situation to offer other charge modalities. [1]

Often the treatment with hospitalization in addictology or psychiatric centers is considered a failure of the outpatient program. Still, it is carried out at the free request of the drug addict because weaning is not the only goal of treatment but also finding a strategy to fight against relapse and even reintegrate into society. This step must have a volante is a sense of doubt against the drug consumption for the cure program to have a result. [1]

The intervention for hospitalization should have criteria concerning the patient's psychological state, environment, and the way he/she consumes the drug. The reviews mentioned that the substance is not essential, but the way of consumption can be disturbing. It is impossible to hospitalize patients for addiction treatment if they may present a danger to themselves or others. [1], *Figure2*

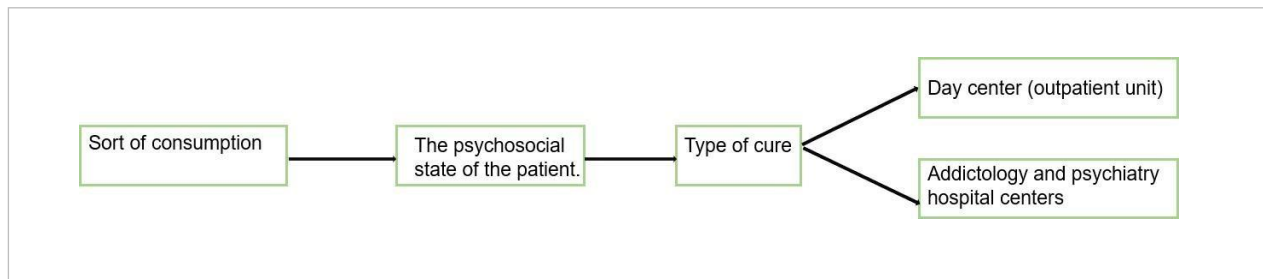


Figure 2. The influence of the situation of drug addicts on the modality of care. (Source: Author).

### 1.1.3 The drug in Algeria and its situation in society

The phenomenon of drug consumption in Algeria generally begins in adolescence, and social contributions play a role in the vulnerability of the psychology of consumers, such as parental abandonment, seduction, mistreatment, which guides the consumer to regular consumption and then addiction. [4], [5]

According to a report of the drug addiction center in ANNABA -Algeria, drug addicts visiting the center range between man and woman but the man number and the highest. For the social case, the single people were more than the instances divorced or married—Moreover, even the workers are higher than the unemployed or people who stop their jobs. [5]

Drug consumption in Algeria varies between cocaine, heroin, sub psychotropic (tablet), cannabis. Moreover, it depends on the social class of the consumers, the cannabis cocaine comfortable class, and glue for the poor class. [5], [6]

### 1.1.4 Treatment modalities of drug addiction cases in Algeria and their characteristics.

In Algeria, drug addiction treatment is divided into treatment on an outpatient basis or weaning in a closed hospital environment for soft drugs. For hard drugs, the most appropriate treatment is outpatient to avoid the risk of depression, but the hospital option can also work for specific instances. [5]

-The most important in the care of drug addicts is the consumption way, the addicted state, and his environment, not the type of drug. [5]

The outpatient care strategy provides psychological support for the patient. It helps protect society from possible behavioral disorders of drug addicts in need, providing them with psychotropic drugs to calm them. This care certainly provides a weaning program, but supervision is done remotely (only daycare). [5]

On the other hand, the strategies of hospital care are more supervised and controlled by specialists, with a weaning period of 21 days and sometimes more, depending on the situation of the drug addict. During this period, the addict undergoes a weaning period and strategy not to relapse again and reinstall in the family and social context. Hospitalization for drug addicts also helps them move away from the environment, contributing to favoring this dependence and rest.

## **1.2 Architecture and healthcare**

The study is interested in how care centers can influence the patients' behavior and comfort in the architectural framework. This discipline of environmental psychology began to have light for hospital and psychiatric structures; it acts as therapeutic support that improves the living space.

Environmental therapy is a field of environmental psychology where physical space is considered a parameter of well-being if it could reach the user's need by studying the factors influencing this space.

This field of interest was studied and developed amid specialized and psychiatric centers clinicians Baker and Sivadon by collaborating with the architect to humanize these institutions and improve them from closed asylums to institutions more open to the outside. However, it was advanced for the psychiatric establishments of this period, which was restricted. basing this perception of the healing space, Roger Ulrich in 1980 discovered the positive impact of the garden view on the healing advancement of patients who undergo therapy. [7], [8]

Supporting the architectural design of hospitals has become increasingly important for improving the management of people by Ulrich et al 2008 and Wahrborg in 2011. [8]

### **1.3 Addiction centers between visual comfort and psychological safety measures**

According to the national institute on drug abuse, even if addiction is related to mental health, it is considered a chronic disease. Starting from this perception allows opening questioning on the influence of architectural quality and the perception of drug addicts, their well-being and the progress of treatment, and the quality of the rehabilitation institutes for this category which has an aspect of a psychiatric institution. [9]

Sure, during the weaning period, the addict is susceptible to high-stress levels, anxiety, and depression, where several factors may contribute to increasing or reducing this stress. A study made by Seaward in 2011 presents the spatial elements Physical such as poor light, the space enclosed influence the elevation of stress level inpatient. [7]

Other research carried out by Jyotsna Chandra focuses on the therapeutic environment, notably by the natural elements in the institution, which are natural light, pure air, and calm in this study; the natural elements have a positive impact on the psychology of individuals. [7]

Research on the life quality in rehabilitation centers has taken multiple dimensions. The classification of addiction centers within psychiatric centers raises several questions about spatial quality and how to achieve satisfaction and reduce stress for drug addicts in light of strict precautions, if safe to describe it.

A study carried out by Brickell and McLean (2011) focuses on safety measures in the therapeutic setting and the well-being of patients. It was observed that the safety measures were more for the workers to the detriment of the patients, influencing their independence and, therefore, their behavior. The psychological issues in mental health exist due to the difficult cure period that patients passed through. However, many studies relate extreme security measures among the institute that decrease patient privacy and increase violent behavior. [10]

The imbalance between the safety of patients and employees with infringement of freedom and comfort of patients can influence the stress factor in patients and increase the danger of aggressiveness. [10]

Other research focused on the impact of therapeutic factors of the external natural environment, such as natural light and gardens, on stress reduction, which was remarkable in the recovery outcome in hospitals.

Despite all these studies concerning the importance of physical space on the psychology and well-being of patients, the standards and specifications of drug addiction rehabilitation centers present a remarkable contradiction between these previous studies on spatial factors, environment. Furthermore, extreme security measures were imposed, resulting in eliminating these theories, especially in Algeria. [10]

Looking at the standards of drug addiction rehabilitation centers, it is noting that the measures of this center are included with other mental illnesses and severe psychological problems institutes due that the addict patients are more susceptible to self-harm, and aggression resulting from weaning. In comparison, the science of health has classified the care of drug addiction as a chronic disease. [11], [12]

This study suggests that the reason is that these theories are still vague and have not yet been merged with standards and specifications to achieve a balance that integrates the precise psychology of addicted patients with comfort factors, which generates a practical basis for recommending the following theories: Studies and experimentation.

Especially in some institutions, these theories were applied without studying the specific psychology and the need of each space, which often prevented them from achieving the desired comfort. [13]

#### **1.4 The visual perception of drug addiction centers between the past and the present**

Even if this study does not detail the history of the architecture of mental health, it is essential to mention the critical and missing points, in particular, what concerns the lack of freedom acting on the personality of patients in traditional conceptions. As it has been called in the past, a psychiatric center or asylum removes the patient from their social environment and considers total isolation as treatment. This traditional method of rehabilitation centers contributes to raising stress and presents a danger to the well-being of the patient and the employees. [14]



Gradually the asylum began to open to the outside thanks to the concept of (the open door) than the village asylum, where it quickly became critical. 1960 the idea of asylums began to be abolished from the institutional appearance to the reflection on the humanization of specialized centers gradually took its place. In the 1990s, psychiatric hospitals began to be established in urban areas with the diversification of care. It turned more to an architecture of communication and contact where the goal was not to cut this category off from its environment. It is returned to these movements that the architecture of these psychiatric institutions adapt it to the specificity of the users, and this has mentioned the architectural therapeutic impact on mental health. [10] [14]

This concept of the man-environment relationship focuses on the interaction carried out by how the individual perceives his environment and the impression that his surrounding diffuses it.

The previous studies considered several perspectives of perception of the environment which made it possible to identify some spatial characteristic which influences the visual perception of the environment inside mental health spaces.

### **1.5- The research challenges.**

Despite all the studies, which present the critical influence of the built environment on the person's perception, drug addiction centers are little approached in architectural studies. Supposedly because it belongs to mental health establishments that the security conditions have eclipsed the comfort factors.

This study focuses on the physical quality of the built environment of drug addiction institutions and how it influences patients' visual perception and therefore affects their well-being and behavior in Algeria.

The aim is to change the reflection of the institutional appearance of drug addiction centers in Algeria while respecting other factors that can present obstacles, such as cultural factors and the psychological problem of the disease.

This study aims to analyze the factors influencing the built environment and the spatial quality of drug addiction centers and understand the functioning and psychology of patients within these institutions. And then make recommendations that serve to detach drug addiction centers'

psychological disorder appearance to provide a homely atmosphere while respecting safety norms of the institute.

The environmental psychology in mental health establishments, especially addictology centers, has much deficiency from several angles. The research is facing obstacles that may influence the methodology and treating the subject, which is listed in these restrictions:

- The age of studies on this topic.
- Treat the subject with a generality.
- lack of detailed and deep update on the subject.
- Lack of design methodology for this kind of institutions.
- The difficult psychological state of these addicts, especially in Algeria, makes it difficult to integrate them into the investigation.

### **1.6- Research questions**

To respond to the main objective. The research is faced with several questions that will help trace the path of study and guide to an appropriate methodology to analyze the problem of drug addiction centers in Algeria and shed light on the imposing role of architecture on visual perception of patients and their well-being.

-Which architectural parameters may contribute to influencing the quality of the built environment of rehab institutions?

-How to prove the impact of the indoor spatial quality of rehab centers on the patients' well-being?

-How can the research correlate the spatial component to the visual perception to reach patient well-being?

-How to meet the imposing safety standards in psychiatric centers while providing a feeling of well-being and eliminating the institutional aspect in rehabilitation centers?

### **1.7-Objectives of the research**

The research objectives revolve around answering questions that constitute the structure of this study and achieve its path as follows.

## **Main objective**

- Elicitation of recommendations and creation of a guideline for the scenario for addiction centers.

## **Particular objectives**

- The organization of the architectural data about drug addiction centers and the therapeutic program used within these institutions (according to the analyzed study cases).
- Approve that the indoor spatial quality of drug rehab centers can influence the patients' behavior (by analyzing the spatial element of the institutions, make comparison study, and interviewing the institution staff).
- Create a link between the functioning of services provided at the center and the emotional impression that must feel and perceive within. That can be realized by understanding the psychological part of patients, then collecting databases that link between the spatial component and their influence on visual perception.
- Collection of a database linking the type of functioning of the spaces, the emotion that should be engaged by these spaces, and the adequate lighting characteristics to create the desired mood.

# *Chapter 02: The context of the study*

## **2.1 Introduction**

The first step after the determination of the research subject and the objective to be reached, is to define the case studies that help carry out the research. This selection must be made carefully to touch all factors that may impact the course of the task so that the combination of elements should be in harmony with the orientation of the research.

In this research, the selection of the case studies was in Algeria, with three establishments granted to do this scientific study. These rehabilitation facilities were chosen from different structures but followed the same treatment process not to have a deficiency at the clinical level.

The reasoning behind the choice of three different structures of the rehabilitation center is to analyze the physical elements inside the space and take into account the indirect factors that can influence the research findings through the comparative evaluation.

The research has a purely scientific direction, which is leading to the use of these institutions anonymously and the application of coding to identify them in such a way; the first establishment (E01), the second establishment (E02), and the third establishment (E03).

## **2.2 Study cases identification**

### **The institute (E01):**

The structure is a complex of several units for different care spaces. However, the selected unit facility for the thesis only takes care of drug-addicted patients. This establishment is located in a city in the northern part of the country, with 30 beds, 15 women and 15 men. The hospitalization of drug addicts can last from 21 days to 6 weeks until the patient becomes stable. Then, he/she follows the external treatment until the complete healing. *Figure3*



*Figure 3. The rehabilitation center named E01. (Author 2021)*

**The institute (E02):**

The establishment is located in the northwest of Algeria; it currently hosts 25 patients (men) shared between drug addicts and people with mental disorders. Hospitalization of drug addicts can take 21 days or more until the patient becomes more stable and then passing for an external treat until complete healing. However, this center is charged only by the addicted hospitalization while the external treatment is carried out in another department. *Figure4*



*Figure 4. The rehabilitation center named E02. (Author 2021)*

### **The institute (E03):**

This establishment is located in the capital of Algiers. Unlike the previous institutions, this unit is a day-care center; it follows the addiction care method and treatment units except that it does not provide accommodation space for patients. The choice of criteria in this research has opted to treat the elements contributing to influencing patients' visual perception within these institutions. *Figure5*



*Figure 5. The rehabilitation center named E03. (Author 2021)*

### **2.3 The methodological structure of the research**

Understanding the relationships between the patient and the therapeutic setting requires identifying the environment that serves the development of this research and which is the internal space in order to be able to understand this complex interrelation. The study is based on considering factors that can directly or indirectly impact the perception starts from a meso-context to a micro-context.

The first part of the context is a factor impacting the frame's performance, and therefore indirectly, influences the quality of perception. The second context directly relates to the interior of the frame built between the physical elements and the behavior of the patients

The methodology of this research is based on a purely analytical system at the meso-environment level for the geo-historical analysis that this study considers as a primordial factor must be affronted before going to the physical environment inside the building. The method will practice a local investigation by collecting data and then a comparative study to bring out the imposing parameters which play a role in the performance of the rehab centers.

The micro-context is linked to the internal space, highlighting the direct relationship between the patient and his internal environment. This study divides it into two parts; Invisible/visible. The first part is the key to the investigation process. It focuses on the functional aspect of the building. It arranges a database that allows understanding the functional structure and framing the research path by unifying the relevant places and spaces that share the same activities in the various institutions to organize the future stages of studies. It also evaluates and redesigns the area according to its distinctive values.

The second part is interested in the visual element of the interior space on which this research focuses. The spatial analysis of this part is based on the evaluation (space/behavior) starting from a local investigation, an observation and interviews with the staff of the institutions, and then a comparative study between the study cases.

Following the spatial element determined previously for its imposing impact on visual quality. The research-oriented towards a cognitive aspect due to the obstacles faced with applying experimental concepts. This orientation is based on a complex analysis (function/impression) that begins with a fundamental understanding of space function, its characteristics, and impressions that place is supposed to make according to its use and the notion of the therapeutic environment. Then the analysis (impression / spatial characteristic) intends to integrate the spatial characteristics of the architectural element with the desired impression in the space to give it its adequate identity and provide visual comfort and therefore not propagate or increase more stress for patients due to standardization of space. This phase rests on an objective basis derived from others previous and proven studies and experiments. Therefore, this research must select them carefully according to specific concepts to integrate them into space's critical needs.

Furthermore, to approve the steps and move from theory to practical approval for the effectiveness of this method, the studies are driving towards a numerical application and validation. This step responds to the need for practical application and the need to emerge the theoretical concept with the norm's decisions. So, the study can be referenced as the design recommendations for this kind of health facility. Figure 6



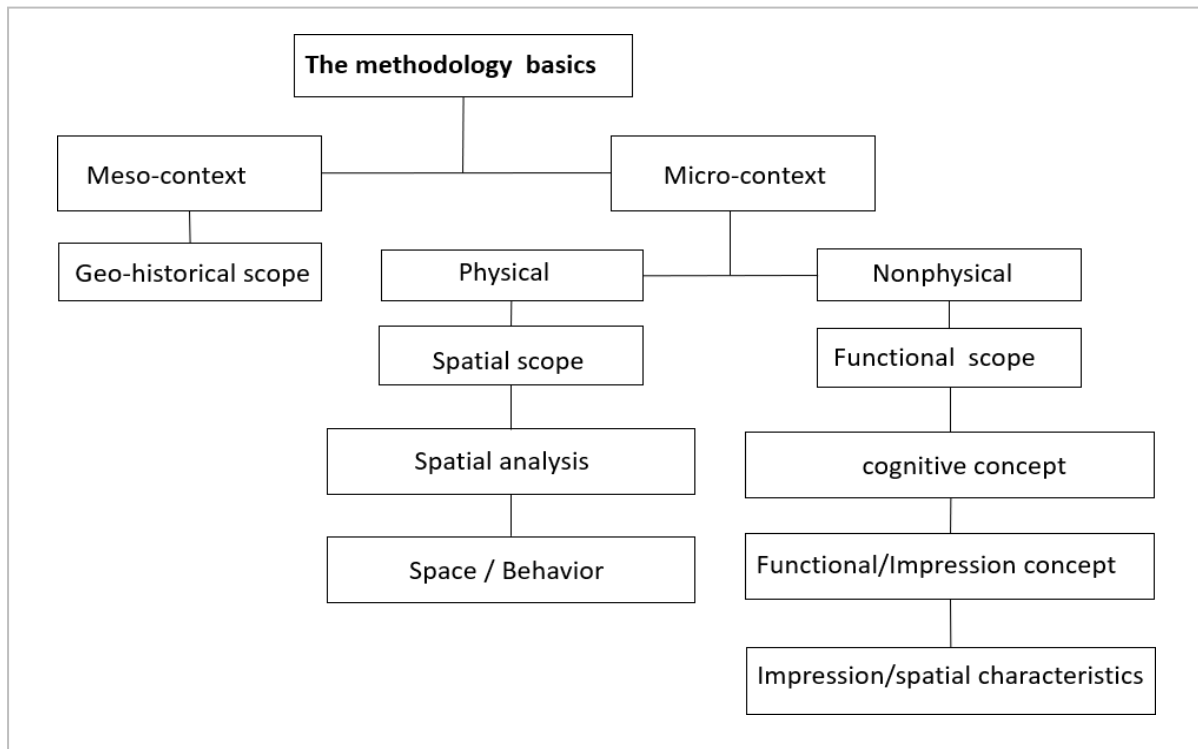


Figure 6. The methodological structure of the research. (Author2021).

# *Chapter 03:*

## *The meso context analysis*

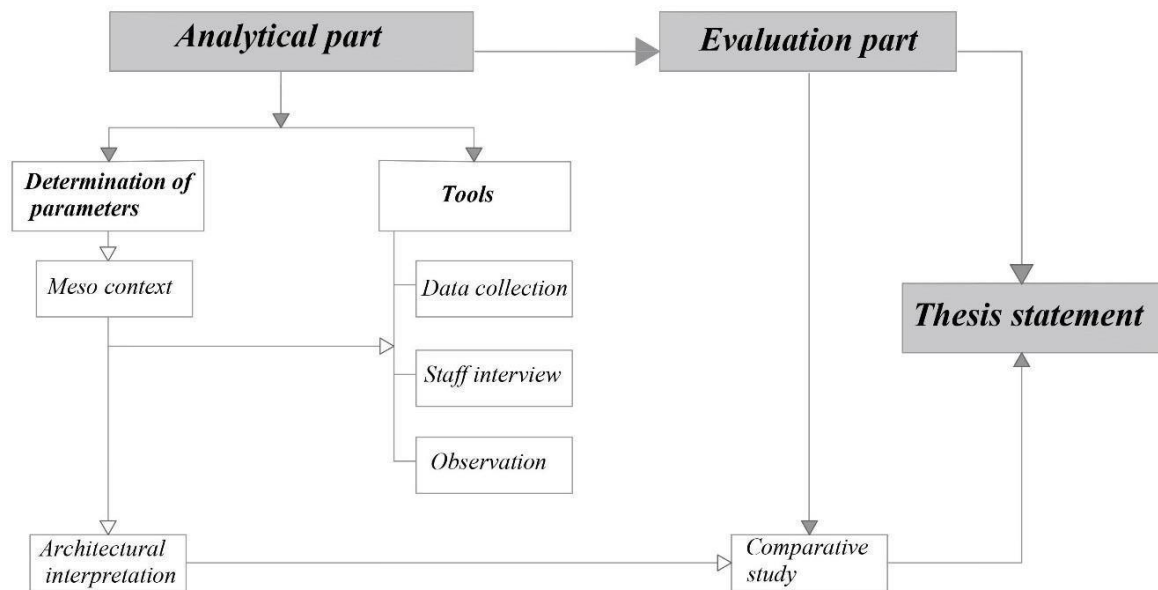


Figure 7: The methodological structure of chapter 03 (Author 2021).

### **3.1 Introduction**

The background of the building is considered a factor that can influence the quality of performance of the establishment. The mission of the research is to figure out if it can also influence patient perception through the flux and the frequency to these institutions. The meso -context of the study aims to determine the identity of the buildings and the impacts of the external factors on their performance by addressing: the urban context of project “urban reading.” The elements of the context present an essential role in understanding spatial planning because often, these components are a product of the urban history, of the structure of which fits the analyzed project. The Urban reading enables the analysis of the surrounding buildings and their impact on the perception of selected institutions. The historical background of the building may affect its physical quality. The cases selected in this research vary from institutions specifically designed to treat addicts. In contrast, others were created for another activity and then changed their functionality and underwent rehabilitation, which should be decided by interviewing the centers' staff.

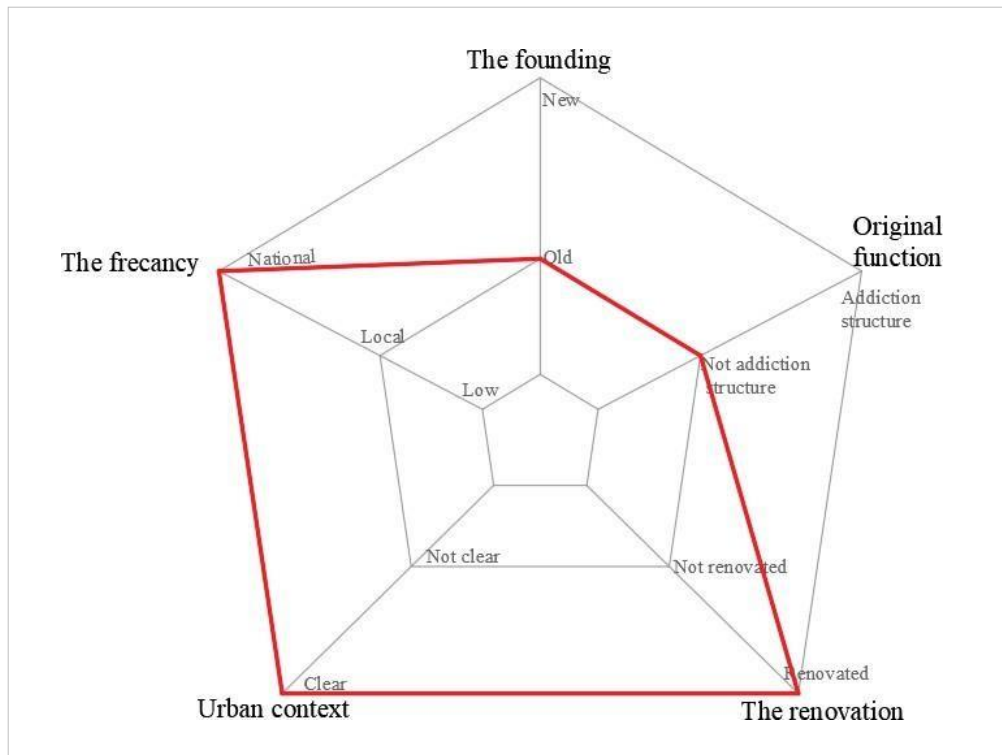
### **3.2 Architectural interpretation**

This part asks first to investigate the historical background of the selected establishments and then the urban context, which has particular importance on the buildings surrounding the case study and the institution itself to determine its urban system and its affecting.

#### **3.2.1 The historical background and urban structure of the institute (E01):**

The institution's creation dates back to the French era in Algeria under a project of a psychiatric structure with a capacity of 1000 beds in 80 hectares. After independence, the hospital gradually included other services. In 1996 it was the opening of the drug addiction service in this hospital. It concludes that the original service structure was not initially intended to treat drug addicts. Still, it

underwent minor rehabilitation for the reception and treatment of drug addicts. It receives an average of 50 patients daily at the National level, and it has 40 beds. *Figure 8*



*Figure 8: The analysis of the characteristics of the establishment E01. (Author 2021)*

Pass to the urban analysis; the building is part of an arrangement of structures located in a large enclosed area, distinguished clearly as group-type buildings.

-The spatial organization of the units inside the hospital differs entirely from that of the outside. The buildings are implanted separately in a remote way; each group occupies a parcel.

-The plots are cut out according to terrain typology, and the orientation of the buildings follows the streets. *Figure 9*

-The character of the buildings nearby to the unit share the same architectural characteristic (French architecture, Neoclassical style, tiles, arcades in the doorways, simple shapes, windows in lengths)



Figure 9: The urban context of the institute E01. (Author 2021)

### 3.2.2 The historical background and urban structure of the institute (E02):

It is a psychiatric center inaugurated in 2012; in principle, it is a hospital for psychiatric disorders, which still retains its function alongside the hospitalization of drug addicts. This new construction has not been modified due to its pristine condition; according to the observation done during the visit to the establishment and the staff testimony, the frequency of addicts is low, as there is no daily frequency for this center compared to other centers. *Figure10*

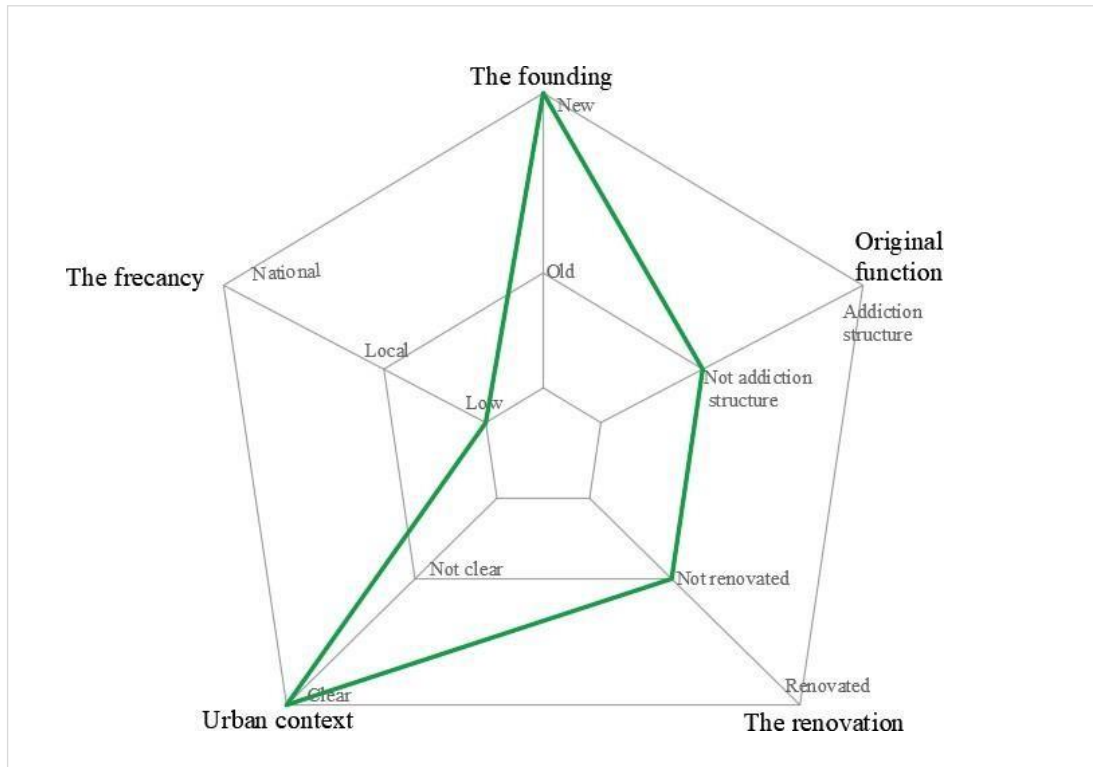


Figure 10: The analysis of the characteristics of the establishment E02. (Author 2021)

Concerning the blocks type of the institution itself, the latter is formed of a structure's arrangement in a finished surface; it is distinguished as a type group. This group of buildings contains varieties of volumes. The administrative unit has a higher template than the other units. The structures of the institution share the same architectural characteristic that gives a theme to all buildings.

The overall integration of the institution follows the topography of the base, and the building's orientations follow the layout of the institution's internal roads. The functions within psychiatry are distributed per unit; each building occupies a role. The attention of the research study is about the hospitalization building. *Figure 11*



Figure 11: The urban context of the institute E02. (Author 2021)

### 3.2.3 The historical background and urban structure of the institute (E03):

The establishment E03 was recently built and inaugurated in 2014; this center was specially designed to cure drug addicts; it is a day center. It has undergone some exterior modification after construction for safety reasons and some superficial interior modification too. According to the observation and testimony of the employees, it welcomes an average of 15 patients daily to have their care at the local level of the region. *Figure 12*

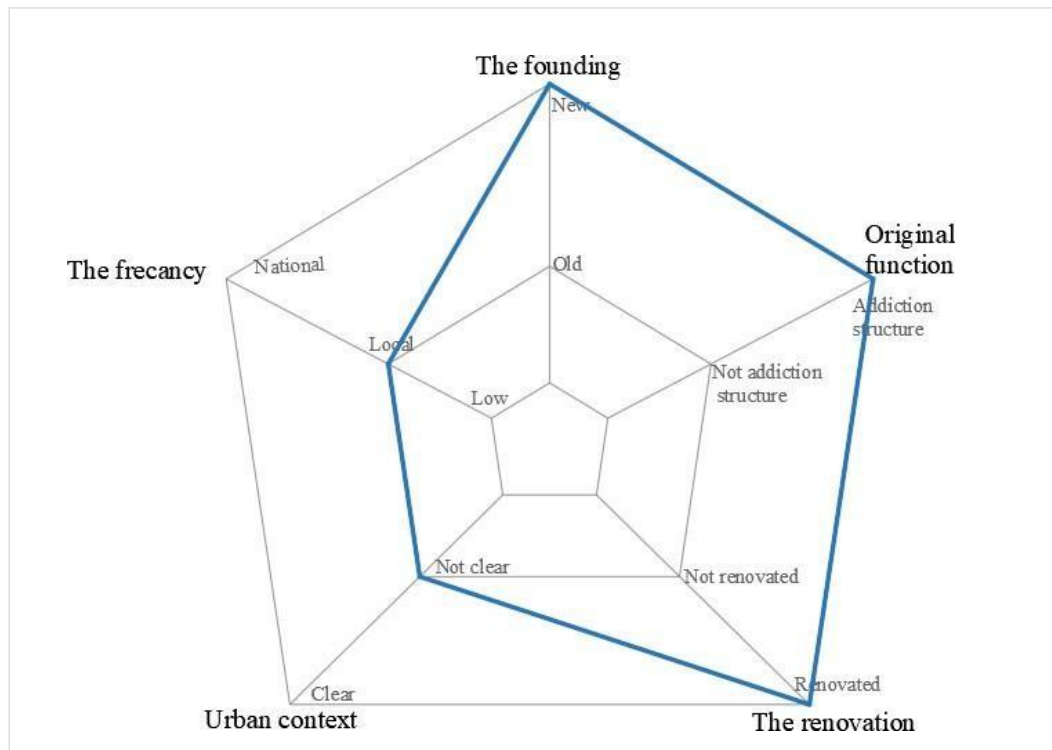


Figure 12: The analysis of the characteristics of the establishment E03. (Author 2021)

The building is located in an unclear urban context, and the distinction of its features is not apparent. The urban blocks are composed of a combination of different types of settlements; where some are integrated within a "courtyard (inverse block)" system, others represent a "Row system." It is not clear to determine the area's urban design based on the different plans that appeared in the context and make the classification of the project complex and not clear. *Figure 13*



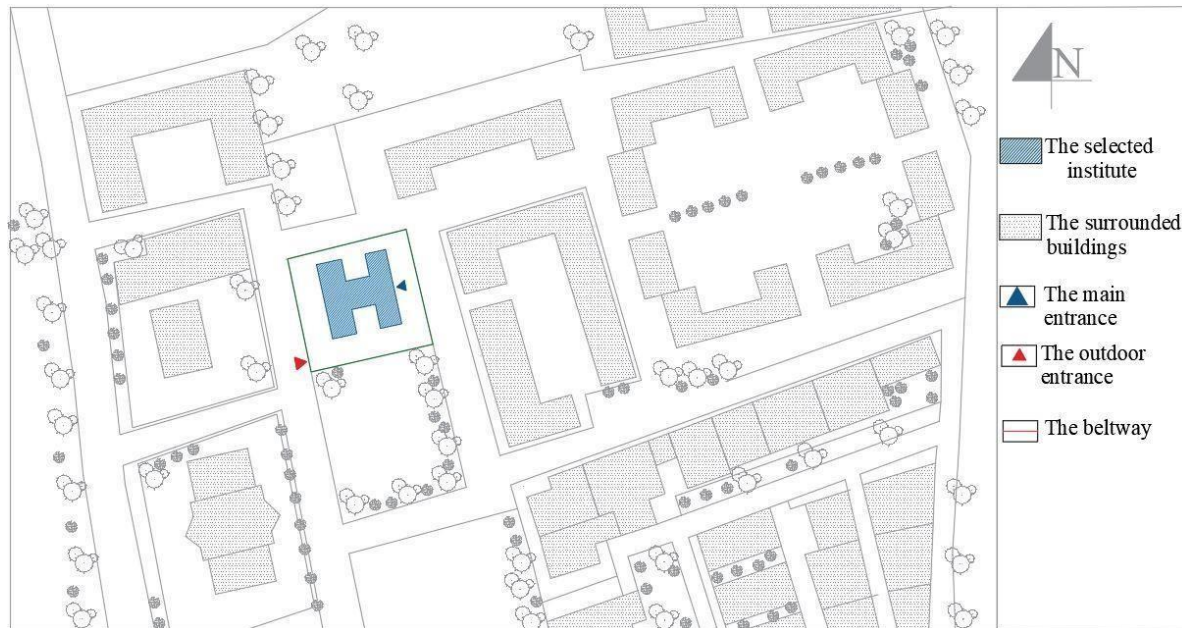


Figure 13: The urban context of the institute E03. (Author 2021)

### 3.3 Comparative study

Analyzing the factors influencing the performance of establishments through the rate of patient frequent requires the study to classify those indirect factors at the meso-context level because they have an external influence on the establishments, unlike the micro context factors that directly and internally impact the visual quality of institutions.

For this, the meso-context encompasses four essential elements on which they were measured to associate them with the frequentation rate at these establishments. Starting with the historical background and the creation of institutions, if it is old or recent. In the second place, considering the establishment's original function, if it was intended from the beginning for addicts or has changed function. Then the modifications and the renovation work were applied to the establishment, or they still keep their initial state. Lastly, the urban situation of these institutions if it has a clear

context or not related to its environment. These factors were linked with the frequency rate of each establishment to have a comparative analysis on factors which has a real impact on this action.

Figure 14

- ❖ The installation and opening date differ from institutions between the old inauguration date 1996 for E01 and a recent start, E02 in 2012, E03 in 2014. According to the correlation, starting/frequenting rate of the establishment, E01 is the oldest with a reasonably high frequenting rate than other establishments, while E02 was opened before E03. However, its attendance rate remains the lowest, indicating that other parameters also impact besides the historical background.
- ❖ The original function of the building took on different dimensions in the selected case studies, where building E01 was not designed for drug addiction but changed its function later. E02 was also not designed to receive drug addicts, but after that, it kept its original function as psychiatry next to the reception of drug addicts. The E03 was dedicated from the beginning to drug addicts' care. Linking this factor with the frequency rate indicates the importance of the current function rather than the establishment's original role. According to building E01, it is explained that its primary function did not affect the frequency of the institute because it has been wholly changed to addiction care. On the contrary, the E02 building did not change its function besides the reception of drug addicts, cause, according to this analysis, a low-frequency rate.
- ❖ The renovation or modification operation carried out to meet the need for the function of the establishment can be classified among the factors also influencing the performance of establishments. This affirmation comes from the comparison between the institution E02 with the two E01 and E03, which have undergone modification to adapt to the function's needs in contrast to the E02, which has always kept its state knowing that it is not even a rehabilitation center.
- ❖ After carrying out an urban reading for each institute, it turns out that the correlation between the attendance rate and the urban clarity of the establishment has no impact depending on the study cases selected, as it is indicated despite the clarity of the urban situation of both E01 and E02. However, they have quite the opposite attendance rate while the E03 has an unclear urban situation, but it has a higher daily attendance rate than the E02.

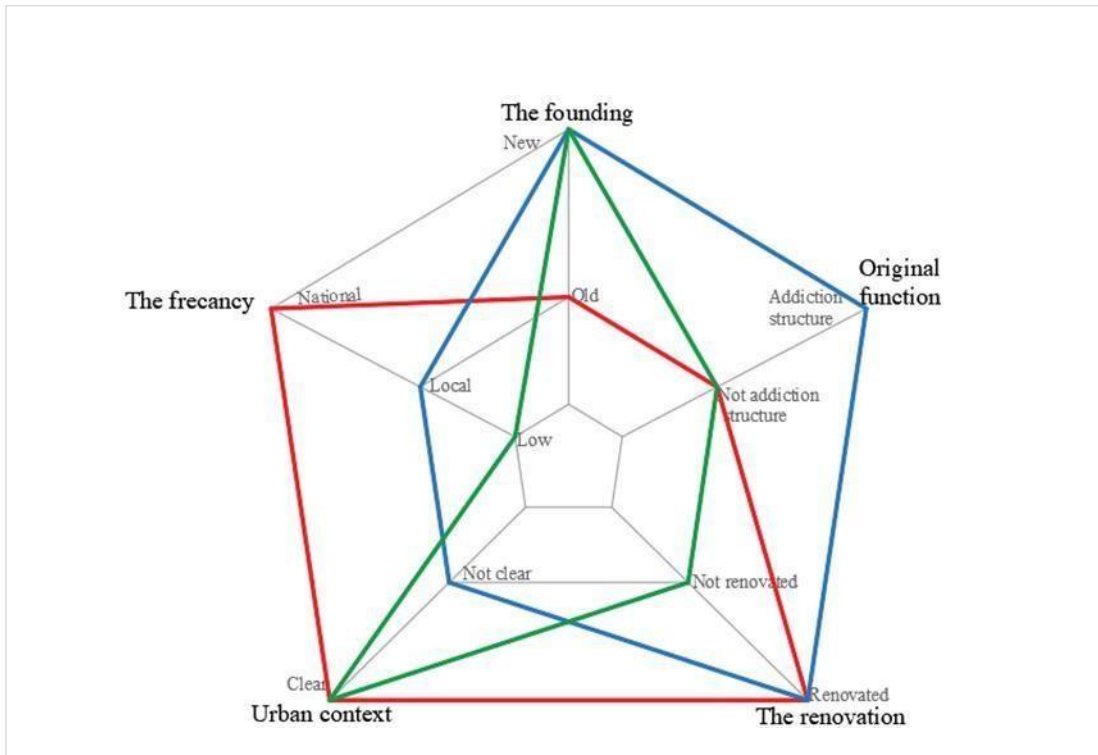


Figure 14: Comparative analysis of the characteristics of the establishments. (Author 2021)

### 3.4 Thesis statement

*The historical factor of the establishment has a significant impact on the performance and frequency of drug addiction centers, unlike the urban context, which has not had a remarkable influence according to comparative research analyses.*

Before starting the micro context analysis of institutions, it is necessary to examine other factors that can indirectly influence the rate of attendance by patients and, therefore, the performance of these institutions.

The historical analysis has shown the impact of the seniority of the establishment's performance alongside the current occupation of the building itself, which is quite essential to improve the attendance at the institute. According to the analysis made and the testimony of employers, the function of the building is a sensitive topic for addicts, despite there being certain conditions for the hospitalization of drug addicts. Still, the patients do not agree to integrate into a unit not dedicated exclusively to addiction treatment that shared its function with psychiatry in the same structure.

# *Chapter 04:*

## *The micro context analysis.*

### *(Non-physical aspect)*

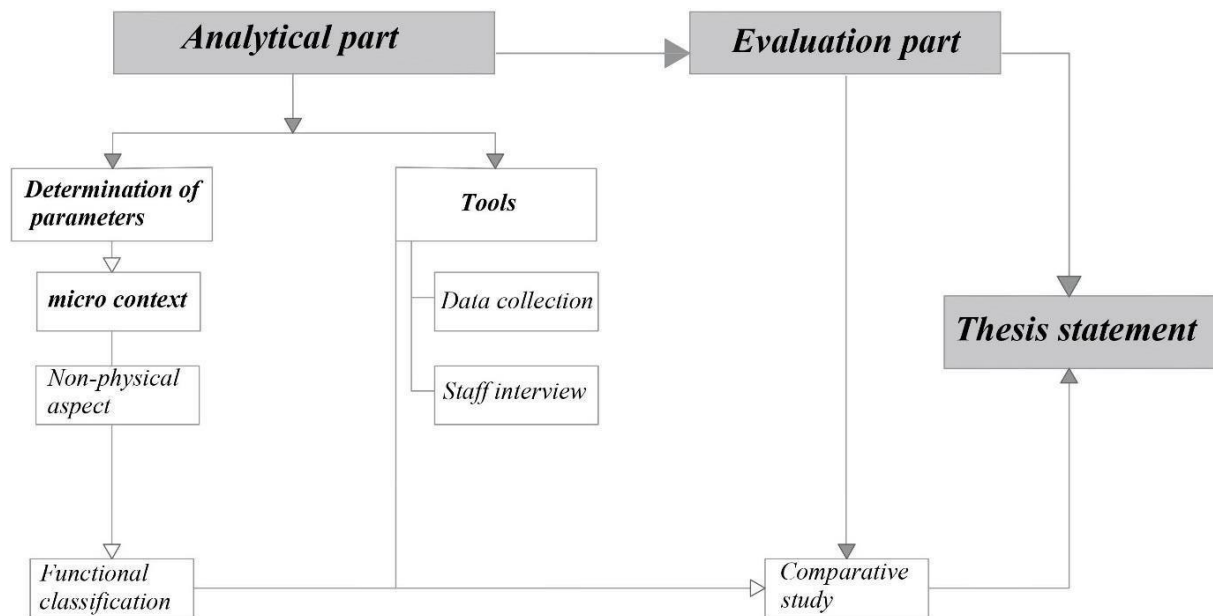


Figure 14: The methodological structure of chapter 04 (Author 2021).

## 4.1 Introduction

The spatial system of rehabilitation institutions provides several functions, depending on the treatment method adopted; due to the different designation of spaces in each institution, this study defines and arranges functions according to the specific activity approach through the center's therapy system. This method contributes to determining the place's functional character to note the daily occupation and the frequentation of the space by the patients. The concept is connected by space-time, representing the main moments of a typical day of an addicted patient in a rehab center.

## 4.2 Architectural interpretation

The spatial configuration and the living pattern within these treatment centers are the two reference points for how the different functions are specialized in different ways and giving a conductor wire for evaluation and spatial design based on this complex structure. The classification is based on including the functional contents of the different facilities in the establishments under common concepts to understand the place's functional structure:

- ❖ **Waiting areas:** The waiting room is an important space, especially for drug addicts following outpatient treatment (non-hospitalized). According to the literature review, these places may affect the behavior of patients. Focusing on the perception of the waiting area, it proves its ability to, directly and indirectly, influence the quality of care acknowledgments by its architectural quality, design, lighting, furniture. (*Camiel J. Beukeboom, 2012*)
- ❖ **The treatment spaces:** These spaces are for the psychological consultation and medical examination, stimulation sessions. These treatments are part of patients' daily routines for hospitalized and ambulatory strategy.
- ❖ **Spaces for activities:** These places are connected to the treatment spaces because they work on the motor and mental stimulation through various activities.
- ❖ **Reposing areas (bedrooms):** These spaces are an essential part of the time of hospitalized patients, including this service in rehab center allow the supervision and observation of patients during the withdrawal stage.
- ❖ **Free time-spaces:** In these areas, the patients are more accessible in their activities; they can play, relax and socialize.

With this functional organization, it is possible to describe the spatial frequentation during the day through a typical day within these institutions. For inpatients, their day begins with breakfast time and a community gathering in the tv room, which is also designed as a refectory, then passing to some therapeutics sessions and other activities during their free time, where they will occupy the time play area. After lunch, they have a program of group activity sessions and also individual therapeutic sessions. It is necessary during the day not to allow the patients to be isolated in their rooms until the evening, the period of rest. The Patient socialization grouping is necessary to have it in the spaces dedicated for free time.

On the other hand, the day of non-hospitalized patients is less busy in the center where their treatment will be based on three axes of prevention, care, and psychological support. The outpatients' healing schedule starts in the institute with their waiting in the waiting room which is considered an essential space in the stressful states of the patient. Then he continues his care program according to the situation and his schedule.

According to the observation and testimony of the therapist, patients are more interested in the consultation sessions because they will have drugs that replace their substances. This research has excluded the treatment space in spatial analysis and focusing only on areas where the patient has the freedom to move. The place can be analyzed without the drugs, having a report in its frequency in the place, and therefore the result is more precise and linked to the architectural and spatial factors.

### 4.3 Comparative study

According to the functional description of each institution, it is noted that despite the different titles and functions, but when they are classified according to the leading role, there is a similarity, especially in the hospitalization institutions E01-E02, they depend on the same functions use. It is also a matter of doing the same daily work in each center. (Table 1)

Since the E03 center is a daycare center, it eliminated certain functions from its program. It focused only on the preventative axes, care, and psychological accompaniment, so as mentioned on the table 1, the play areas where the patients can spend their free time are not provided.

Table 1. The classification of the functions of each institution according to their mainly roles.

The spaces classification	E01	E02	E03
The waiting area	provided	provided	provided
The treatment spaces	-Psychologist's offices -Psychiatrist -Rehabilitation room	-Psychologist offices -Psychiatrist offices	-Psychologist offices -Psychiatrist offices -Social assistant office -Rehabilitation room -Sample room
Spaces for activities	-Ergo therapy room (the activities are carried out in the ergo therapy room)	-Ergo therapy room -Play area -The kitchen -Computer room	-Ergo therapy room -Computer room -Sports room
Free time-spaces	-The courtyard -The TV room -The play area	-The courtyard -The TV room	-Not provided
Reposing areas (bedrooms):	-Individual bedrooms	-Large bedrooms -medium bedrooms -isolation bedroom	-Not provided

#### **4.4 Thesis statement**

*According to the spatial and functional analysis, the addiction institutions experience a remarkable differentiation in the function of the structures, but this does not influence the treatment program and procedures. Therefore, I find out that the unification of the identification of the space according to their activities is the preliminary phase that leads to creating a clear, typical routine day of patients for the next spatial analysis process.*

According to the functional analysis, the hospitalization center or the outpatient center has the same treatment system using the same functional program. However, some functions are not provided in the outpatient centers, due to their link with the accommodation services. Each of the functions classified as places of recreation is related to the fact that the patient stays inside the hospital and devotes his free time to activities that help him reduce anxiety and avoid isolation.

# *Chapter 05:*

## *The micro context analysis.*

### *(Physical aspect)*

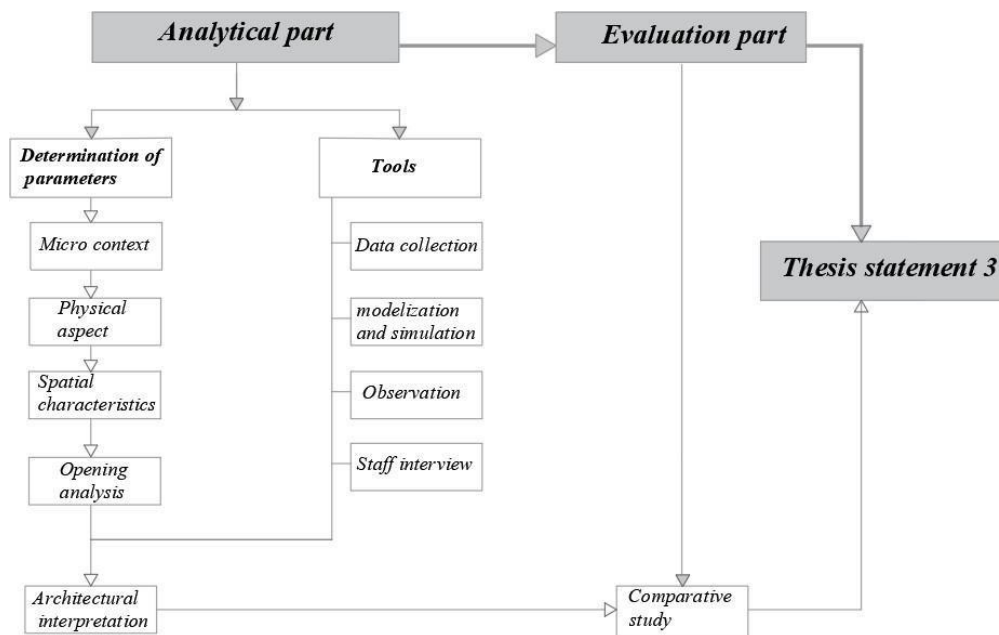


Figure16: The methodological structure of chapter 05 (Author 2021).



## 5.1 Introduction

The therapeutic environment involves various interrelated features in both terms of the physical environment and health conditions. This chapter focuses on the visual environment within the therapeutic centers, using a combined approach evaluation of clinical behavior of patients and the spatial design under the main priority, which is the impact of physical design on patient behavior.

Different therapy convictions determine the physical facilities. Besides, the physical elements of the interior space influence the way the visual perception of the environment could be, consequently the behavior of users. The evaluation method is based on a component (space/behavior) involved investigation through staff testimony and observation and spatial data collection on a qualitative/ quantitative basis.

## 5.2 The limitation of architectural elements

The visual perception of interior space is linked by variables that control and influence its quality; the diagram below illustrates the elements of physical space. *Figure17*

The selection of the architectural elements to be analyzed is based on the research concept, which is about extracting results through a comparative study. Therefore, these factors must be a point of difference in all the rooms that change these spaces' visual quality.

After visits to the institutions, it has been noticed that there is a kind of standardization and similarity in certain architectural elements such as colors, textures, finishing materials, which makes the comparison of these factors without interest and not applicable on all the rooms. The limitation has moved towards the elements that seem the most different in the rooms, which is the quality of openings, *Figure 18*

In architecture, openness is an element of space that allows the enclosure plan's visual and spatial connection with its adjacent environment. The type opening controls the spatial perception concerning the exterior view and the daylight as long as the latter is connected by other interior conditions that can influence the quality of penetrated light. *Figure19*. [15] [16]

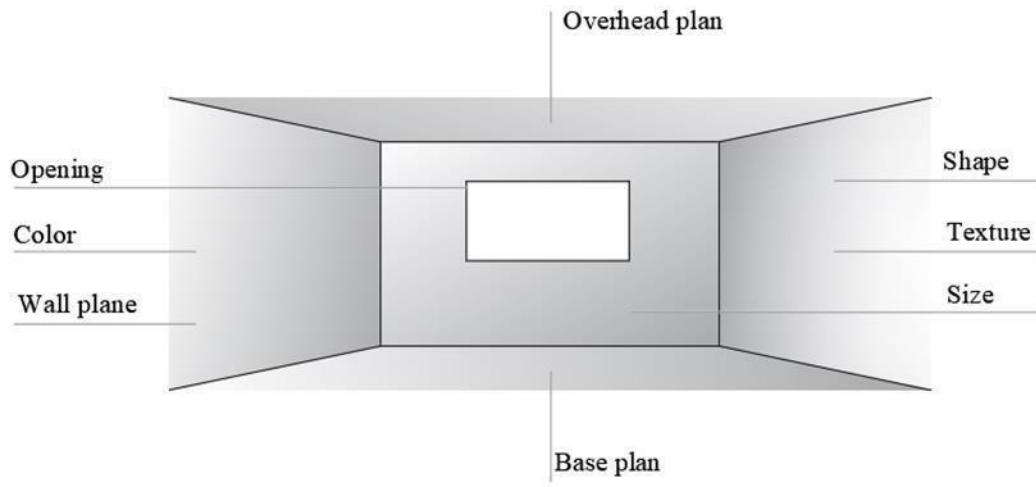


Figure 17: The spatial components that are affecting visual perception. (Author2021)



Figure 18: The architectural elements that shape the spatial quality in different rooms E01

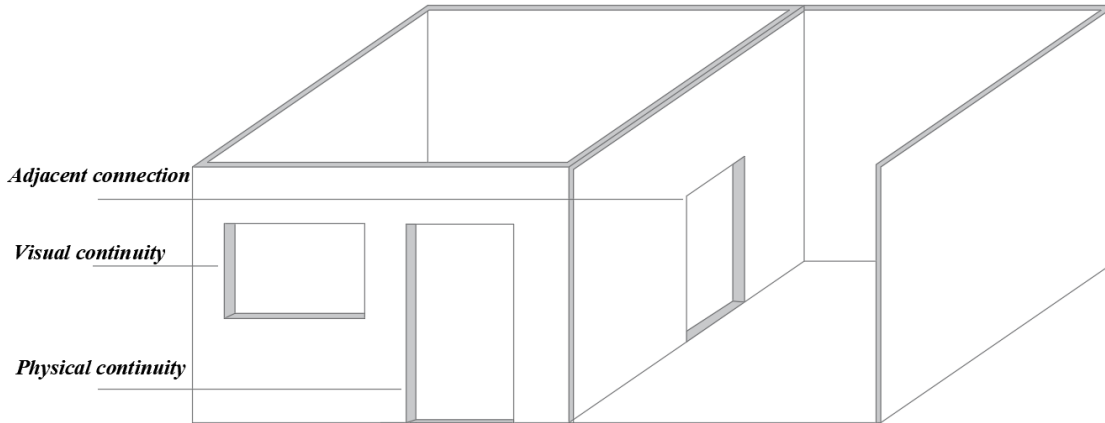


Figure 19: The openings properties. (Author2021)

### 5.2.1 Daylight

The opening controls the physical and visual connection of the space with its surroundings and the visual comfort created by the natural lighting penetration and distribution within the space.

Throughout previous literature, natural lighting quality is essential for users' productivity, but it was limited to some categories. The thesis will treat daylighting topic in the way that if the openings types influence its sufficiency, and if this last affects addicted patients' preference to the space using correlation space/behavior.

The research is focused on the overall natural lighting available in the room. The daylight factor (DF) approach was opted for defining it as an optimal solution. Based on the determined data, the physical models of the addiction centers were introduced by Dialux software.

Daylight Factor (DF) is the ratio of the illumination obtainable indoors relative to the illumination presents outdoor at the same time under overcast skies to simplify the calculation and focus on indoor lighting sufficiency. The daylight factor is designed to evaluate the lighting performance independent of the actual instantaneous sky conditions. However, the external conditions remain to be defined because the luminance distribution of the sky will influence the value of the report.

According to a previous literature review, the Average daylight factor is the most common and simplest method for examining natural light quality in space. [17]

Another basis supported by the selection of ADF is that it is independent of the external conditions, but the internal parameters must be considered. The position of the opening, the space volume, and the surface reflectance significantly impact the light distribution, thus in the quality of space. *Figure 20*

The assessment of daylight factor might be essential in terms of visual comfort since it causes the insufficiency of lighting, or excess in lighting quality recommended so that can influence the patients'

perception for the space thus their behavior. According to the rule of thumb, the average daylight factor (ADF) can be assessed to define the perception of lighting space basing to:

-Under 2%, the room will seem dull with only daylight, so the use of artificial light is required during the day hours

-Between 2%-5% the space appears more daylight, but artificial task light is needed for visual accuracy

-Over 5% of the space will be highly lighted, but with the risk of thermal problems due to the high sunlight penetration. *Table 2*, [18]

The uniformity of the room is a parameter linked to daylight factors and contributes to identifying the risk of glare and visual discomfort. In other words, it defines the regularity of the light distribution. DFmin / average DF calculates it.

The standards of uniformity concretize visual comfort for a side glazing according to BREEAM and minimum 0.4. [19]

*Table 2: The daylight factor appearances classification.*

The daylight factor (DF)	< 1%	1 - 2%	2 - 5%	5 - 10%	> 10%
	Very low	Low	Average	High	Very high

### 5.2.2 The connection of the space

The view through the room, this quality can be referred to as qualitative evaluation since it mentioned above. This part focuses only on the analysis and compassing the available characteristics that may be typical for evaluating case studies. Many researchers focus their topics of outlooks quality on the differentiation between natural, the built views and the landscape benefits. Although the case studies selected in this chapter lack this classification where the nature side is neglected in these institutions, it was needed to evaluate another way. Some studies note that the visual connection with the outside is necessary, so most of the studies of Cooper et al. (1973) comment that “most people will be well satisfied, provided they can see out even the view is restricted. Thomas A. Markus proposes in his research the classification of perspectives through the information provided and contains the source of light, the sky, and the visible sun. [20]

On the other hand, the access lack to environmental information can cause an unfavorable result on the psychology of the occupant, as it appeared the quality of the view, therefore, depends on the type of aperture in terms of size, position, and shape. [20]

Besides the out view called outdoor visual connection, the openings into a space create outdoor physical connection through doorways and the room's connection with its adjacent area. These spatial proprieties influence the enclosure perception of the space and may affect patients' movement and space use. The thesis will analyze each space opening proprieties and relate it to patients' behavior by analyzing their spaces' preferences and daily use. (*Figure 20*)

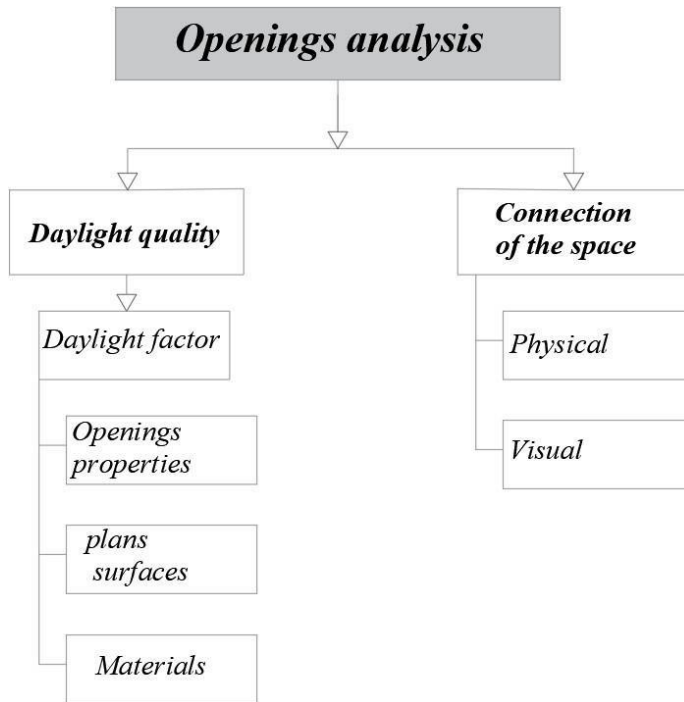


Figure 20: The elements influencing the performance of the opening.

### 5.3 Architectural interpretation

The method relates the spatial evaluation by using the openings as references for their effect on the patients' perceptions and behavior. The evaluation of these behaviors is by their practice and frequency, that is, by the patients' preference for one place over another. The obtained results were by observing the patients' routine diaries within the identified areas, as well as the testimony of the doctors. The impact of openings in the case studies is evaluated by analyzing the abovementioned elements and figuring out their effect on the spatial quality.

The reflection coefficient of the materials was predicted after identifying the materials in each room and extracting the properties of the materials from the agreed standards. [21] And the calculation of reflectance room is done as following : $(\text{walls reflection} + \text{ceiling reflection} + \text{floor reflection})/3 = \text{room reflection}$ .

Table 3: Materials reflectance coefficient [21]

Material	Reflection
Dark blue paint	0.15-0.2
Paint, white	0.75 - 0.85
Mid grey	0.45
Marble, polished	0.30 -0.70
Light grey	0.6
White painted plaster	0.78
Light blue	0.7
Ceramic tile light	0.56
Mid grey	0.45

### 5.3.1 proprieties evaluation of the Establishment E01


#### Waiting area.

The visual and physical continuity of the waiting room is ensured through the main entrance door. The room does not provide any other opening for natural light penetration or clearance of view to the outside. *Table 8*

Based on the analysis of the availability of natural light in the area. The average DF was measured by 0.59%, with a uniformity of 0.1. *Table 4*

After observation, the evaluation of patients' behaviors in the waiting room and the employees' testimony noted that they mostly wait outside the building and check their turn between-whiles. Moreover, the waiting area is sometimes used only by parents who accompany them.

Table 4: Daylight appearance quality of waiting area E01

The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
Waiting area		0.6%	0.06%	3.23%	0.59%	0.1%


### Reposing area (Bedroom).

The institute provides only single rooms; these rooms contain windows with a high altitude, depriving of a view towards the outside and visual continuity.

They do not endow any physical accessibility towards the outside (courtyard); it connects with the main hallway. This opening allows a natural light penetration of a ratio of 2.54%, which illuminates the room. However, another light source is needed to ensure the light sufficiency of the room and uniformity measured by 0.76, which conforms with recommended BREEAM norms. *Table 8, Table 5*

According to staff testimony, the bedrooms during the day are not occupied by patients till evening. They gather in groups to chat until bedtime, which is not acceptable by the staff since the bedrooms are dedicated as repose areas and not social places.

*Table 5: Daylight appearance quality of bedroom E01*


The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
Bedroom		0.6%	1.95%	3.10%	2.54%	0.76

### Free time-spaces

**-Play zone:** This zone is an open space connected to the main corridor. It also has physical continuity and an unobstructed view to the exterior (courtyard) through a doorway. These connections influence the enclosure of the space. According to regulations, the assessment of daylight availability inside the room was 3.73% which classified the area as highly lighted. *Table 8, Table 6*

The patients spend mostly their free time shared by staying in this play area and the courtyard; these two places are the most frequented by patients.

Table 6: Daylight appearance quality of the play area E01

The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
Play area		0.6%	1.92%	6.47%	3.73%	0.51%

**-Tv room:** The large room contains trim windows that maintain the room's enclosure, accessible from the courtyard. Even the windows allow daylight penetration. However, it disturbs indoor and outdoor emergence due to the windows trim type. Using the ADF assessment, the lighting ratio was measured at 3.8%, classifying it as a lighted room, but another source of light is needed. The calculation of the uniformity Within the room shows an imbalance of light distribution with 0.15%; this value is under the required norms, which means that the light distribution of the room has a significant contrast on the area. *Table 8, Table 6.*

According to employees' testimony, this room is the most disliked room for patients even if it provides many activities within playing, TV, and seating area. It is also dedicated to the refectory. Nevertheless, the patients use it only in eating time but not during their daily free time.

Table 7. Daylight appearance quality of the TV room E01


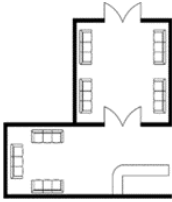
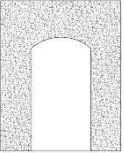
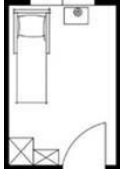

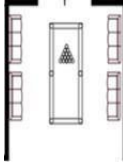
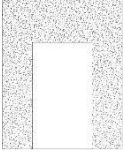
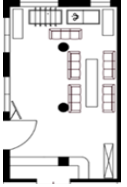
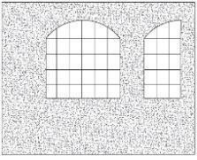
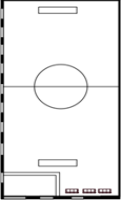
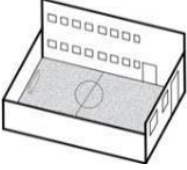
The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
TV room		0.6%	0.59%	10.2%	3.80%	0.15%



Table 8: The characteristics of the openings for each area at E01.

The selected spaces	The selected spaces	The outdoor openings	Visual continuity	Physical continuity	Adjacent connection
Waiting area			Only by the entrance door	Entrance door	To corridor
Bedroom			Not provided	Not provided	To corridor
Play area			By courtyard door	Courtyard door	To corridor
TV room			Trim Windows	Courtyard door	Not provided
Courtyard			Open space		

## Discussion

The diagrams below consider the properties of the opening concerning the occupancy of the institutional spaces by the patients. For the study to be more reliable, the analyzed spaces are only the places that the patients can freely visit in the routine day without being controlled by medical staff.

The diagrams assessed the quality of the relation of the interior space with the exterior environment concerning the available physical and visual continuity. Including also the properties of the quality of natural light generated by this type of opening and which deals with the sufficiency of ADF (<1% = Very low, 1 - 2% = Low, 2 - 5% = Average, 5 - 10% = High); and its uniformity (<0.4, >0.4) according to the BREEAM norms mentioned above. These parameters will be linked by the behavior of the patients that the thesis classifies into three types: a weak / no uptake, limited occupation, a strong occupation.

This phase executes the possibility for comparative evaluation between the spatial characteristics and their influences on the patients' behavior by noting their space occupation.

Based on the evaluation of openings properties in the selected spaces. The thesis found that when the room has an insufficient relation with the outdoor, it can influence patients' perception of the space, thus their use, the case for the bedroom in the institute E01 that is used only in the evening.

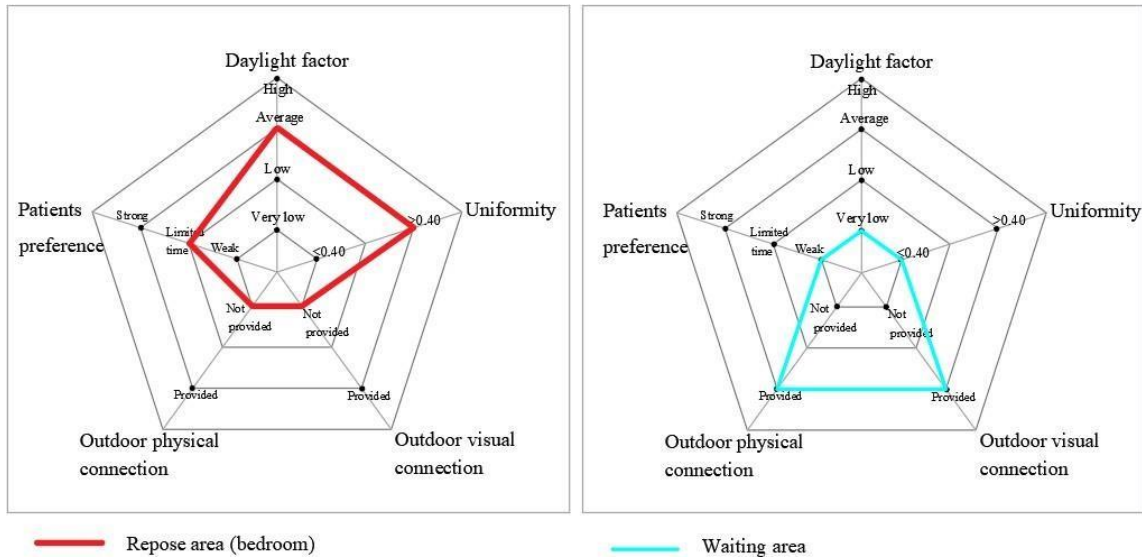
*Figure 21*

As well as, the availability of the physical and visual connection is not sufficient without the quality satisfaction of natural light. This evaluation also notes the importance of natural light for the visual comfort of the room, the case of the tv room, and the waiting room. *Figure 22*

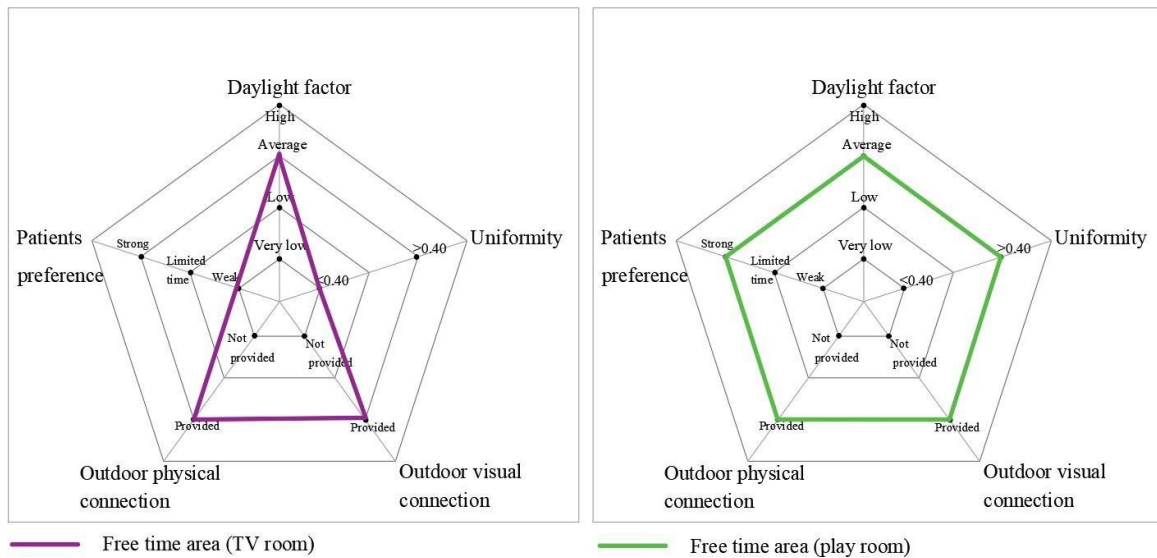
The link between the quality of natural light and the uniformity of the distribution of this light to ensure visual comfort have a noticeable impact on patients and their behavior for the waiting area. Despite the availability of a central entrance to achieve a visual and physical connection at once with the exterior, but it was not sufficient to realize the visual satisfaction of the light quality inside where the daylight factor was so low *Figure 21*; therefore, it influences the visual comfort and the same observation for the TV room.

The evaluation of the play area showed satisfaction with the light quality and the area's connection with the outdoors; by using the spatial quality/behavior correlation, the thesis can observe an improvement in the behavior of patients concerning their occupation of this area during a routine day. *Figure 22*

This evaluation was able to prove the impact of the opening elements on the perception of space and also the interrelation and the importance of the presence of all the conditions in order to ensure the satisfaction of the spatial quality. Besides, this study has marked the difference when the external environment is absent in drug addiction centers and which plays a primordial role in influencing the spatial quality and, therefore, the perception and satisfaction of patients. *Figure 23*



*Figure 21: The characteristics of the space openings and occupancy of the patients in the waiting area and bedrooms*



*Figure 22: The characteristics of the space openings and occupancy of the patients in the Tv room and play room.*

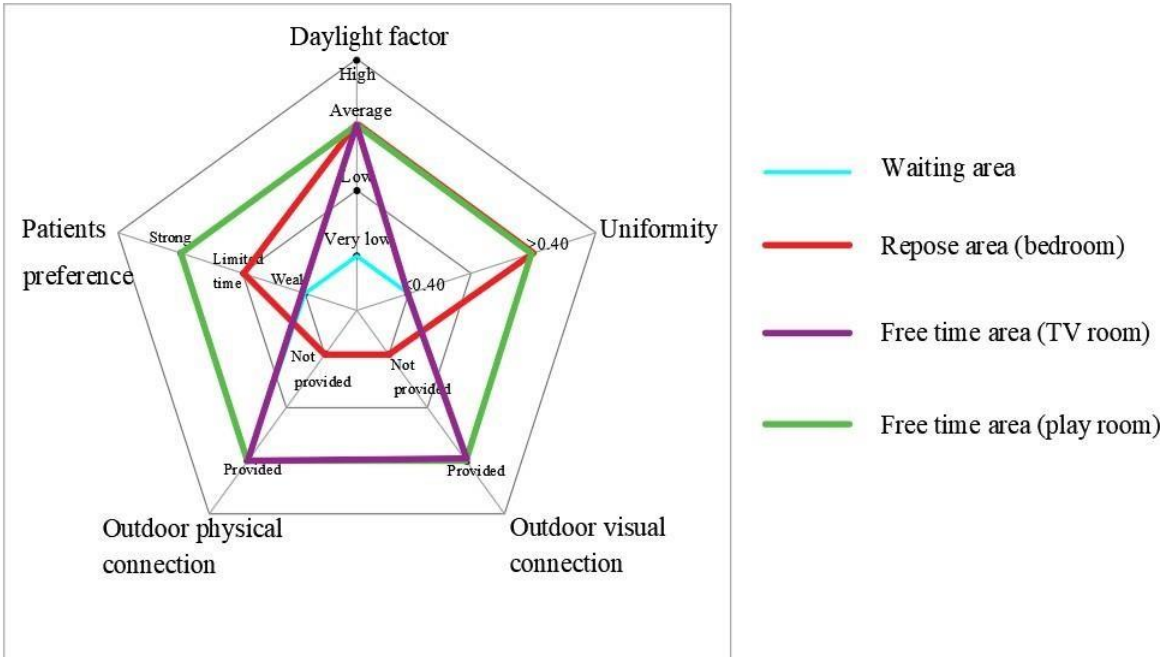


Figure 23: The evaluation of the spatial characteristics of the institution E01 and their uses.

### 5.3.2 proprieties evaluation of the Establishment E02

#### Waiting area.


Due to the small number of drug addicts who frequent the center daily, and that this is an accommodation center and not for the day too, the study could not observe or examine in the waiting room. Since various mental illness cases come to the facility, the employees could not describe the addicts' behavior in the waiting room. So, for the lack of details, this space was eliminated to be evaluated.

#### Reposing area (Bedroom)

The institute contains three types of room:

**-Large bedrooms** This type of room has a capacity of seven beds. It contains two standard size windows with trims, which allow a fragmented view, daylight penetration, and no accessibility to the outdoors for safety and security conditions. Moreover, the lighting inside the room was affected by the interior low reflectance of the dark walls, which produces a poor lighting quality with an average daylight factor of 2% that classified in the range of poor to average quality, which is insufficient to provide visual comfort Inside the room. Moreover, the light distribution indicates a negative margin for light quality uniformity with 0.37%. *Table 14, Table 9.*


Table 9: Daylight appearance quality of the large bedroom E02.

The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
The big bedroom		0.51%	0.75%	5.1%	2%	0.37%

**-Medium size bedrooms:** This type of room is smaller than the previous bedrooms and provides four beds with one standards window with trim and no outdoor access through the room. Due to the different reflectance material coefficients, the daylight quality of these rooms shows a different behavior with a daylight factor of 2.3%, which is classified for an average range according to BREEAM but needs another lighting source for good visual comfort. As well as a good uniformity distribution, was registered according to this ratio of lighting quality 0.47%. *Table 14, Table 10*


According to the staff affirmation, the addict patients always choose the medium rooms rather than the big rooms.

Table 10. Daylight appearance quality of the medium bedroom E02.

The room	3D Daylight Model simulation	Room reflectance	DFmin	Dfmax	Dfaverage	Uniformity DF
The medium bedroom		0.68%	1.06%	5.28%	2.3%	0.46%

**-Isolation room:** The isolation bedroom in the establishment E02 is a small individual room dedicated to one patient; that room does not allow any connection with the outside environment due to the small size and up the window's location. Despite the reflectance of the material coefficient is about 0.68%, the opening size negatively influenced the daylight quality penetration. It was classified as an inferior quality compared to the recommended norms of BREEAM; with a measured DF of 0.15%, the uniformity factor shows a high distribution quality. However, the poor penetrated quality of light has no positive effect but means that the darkness inside the room is uniform. *Table 14, Table 11*

*Table 11. Daylight appearance quality of the medium bedroom E02.*

The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
The isolation room		0.68%	0.15%	0.24%	0.21%	0.74%

By interviewing the staff about the possibility of choosing rooms by patients, they responded that patients entirely make the room selection. They can decide between staying in the big rooms or the medium ones. However, their preferences were all the time the medium rooms. On the other side, the small isolation room is provided only in the agitated cases, but the patients avoid this room.

### Free time-spaces

**-The tv room:** It is a large space dedicated to TV, seating, and eating. It contains standard windows with trim that maintain the enclosure of the room and provides a fragmented-out view. the room has no accessibility to the outside. The assessment of the daylight penetration based on the average DF is 1.73% which makes the room appear gloomy with this insufficient indoor daylighting availability. *Table 12, Table 14.*

According to employees and the observation conducted in this research, the patients do not mostly like to stay in the room, despite the only gathering place during their free time.

The playroom of the institute shares similar specifications as the TV room, but its frequency is controlled by the staff and not optional since it is part of the therapeutic program.

Table 12. Daylight appearance quality of the TV room E02.

The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
TV room		0.64%	0.85%	5.26%	1.73%	0.49%

**-The courtyard:** is a limited area by the fence, the patients have a limited time there, but according to employees, it is their favorite time when they spend their time outside.

**Note:** During the observation days in the institution, it was noticeable that the patients stayed almost their free time in the middle of the corridor; the employees confirmed it. This area is faced to the glass wall of the waiting area, which allows them an extensive view of the exterior. The thesis decided to analyze the lighting quality in that area to define if only the outdoor connection were sufficient to occupy this area or other opening parameters could be contributed. By analyzing the lighting quality in this corridor part using the daylight, factor was measured of average range 2.42% and uniform distribution recommended by BREEAM. *Table 14.*

Table 13. Daylight appearance quality of the corridor E02.

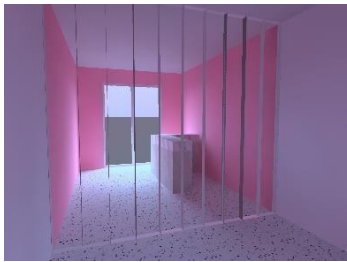
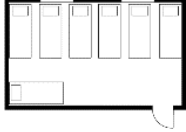
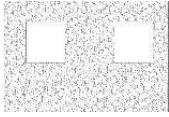




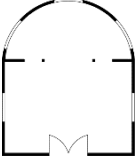

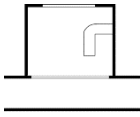
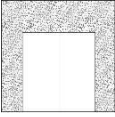
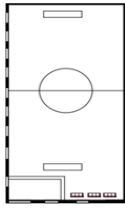
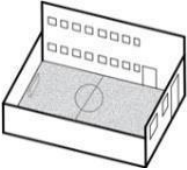
The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
Corridor seating		0.66%	1.17%	7.68%	2.42%	0.48%

Table 14. The characteristics of the openings for each area at E02.

The selected spaces	The selected spaces	The outdoor openings	Visual continuity	Physical continuity	Adjacent connection
<b>Reposing area</b> Large bedrooms			Trim Windows	Not provided	To corridor
<b>Reposing area</b> Medium size bedrooms			Trim Window	Not provided	To corridor
<b>Reposing area</b> The isolation room			Not provided	Not provided	To corridor
<b>Free time-spaces</b> <b>TV room</b>			Trim Windows	Not provided	To corridor
<b>Corridor</b>			Only by the entrance door	Only by the entrance door	To corridor
<b>Courtyard</b>			Open space		



## Discussion

The diagrams below estimate the properties of the opening concerning the occupancy of the institution E02 by the patients. The analyzed spaces are only the areas that the patients can freely visit regularly without being restrained by medical staff.

The correlation (space/ behavior) shows that daylight contributes to the influence of patients' behavior; this is by noticing that the rooms with daylight insufficiency issues control the frequency of patients and their occupation of the space. Starting with the bedrooms, the choice between the big bedroom and the medium room was always the medium bedroom by the addicts. Despite they share the same opening type but a different daylight availability inside *Figure 24*. About the isolation room, there is a complete rejection of it by the patients. According to the analysis of the opening features, it completely lacks both natural light and the absence of physical or visual connection with the external environment. That shows that openings have an essential effect and contribution to a patient's preference for the place. *Figure 25*

The relationship of the patients with the outdoor is crucial; it reveals by patients' preference for the courtyard time. The comparison of the TV room and middle of the corridor that faces the waiting room, where the patients gathered, is well lighted and gives a clear view to the outside through the glazing door of the waiting area. That makes it a hypothesis for this zone occupation rather than the TV room with less lighting inside and a small opening than the waiting area. *Figure 25*

Another case study accentuated the importance of openings components on the patients' perception and their space occupation. The more all the elements are presented and insure, the more it significantly impacts patients' perception. The evaluation could also show the crucial impact of the connection of the outdoor environment with the indoor in terms of visual and physical connection and daylight behavior. *Figures 26,27*

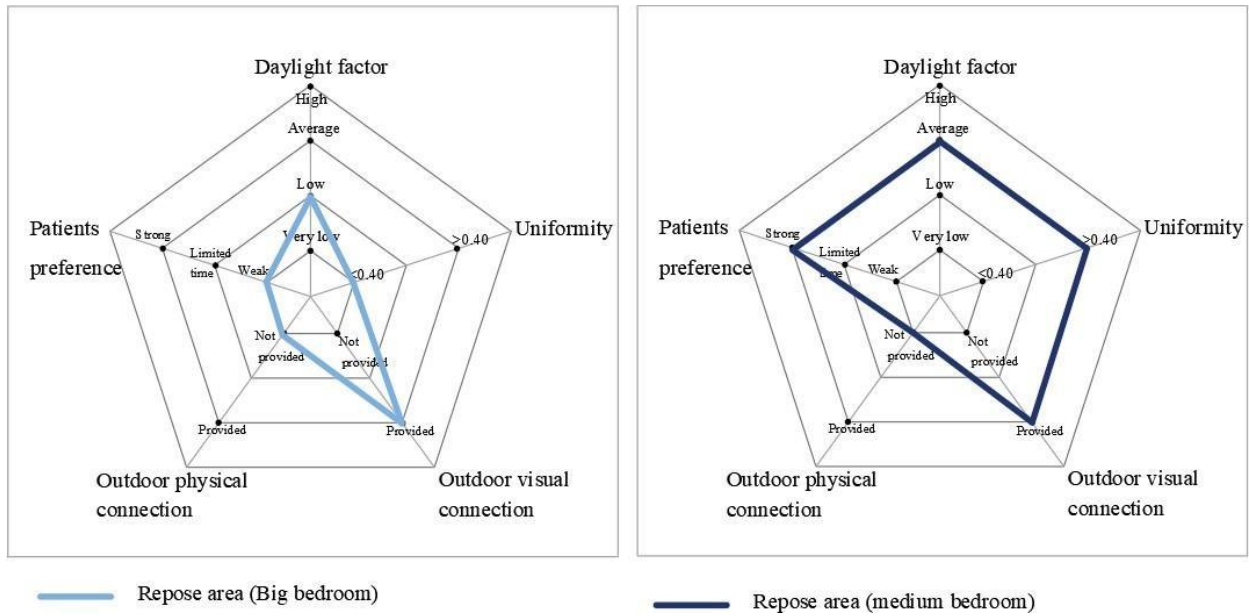


Figure 24: The characteristics of the space openings and occupancy of the patients in the bedrooms.

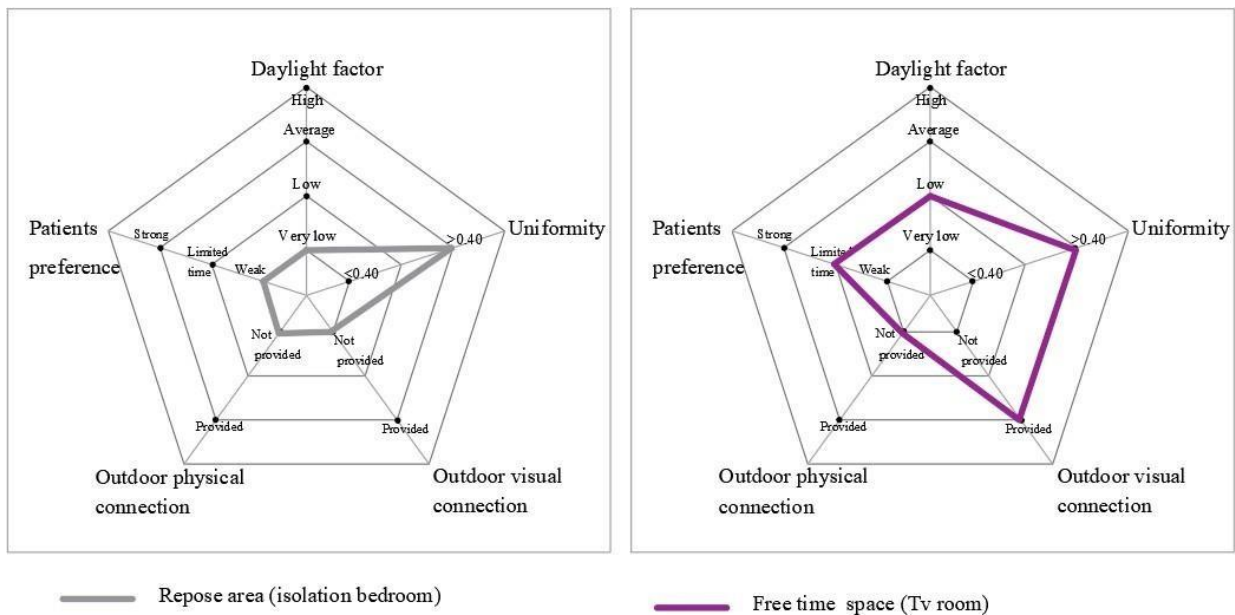


Figure 25: The characteristics of the space openings and occupancy of the patients in the isolation room and Tv room.

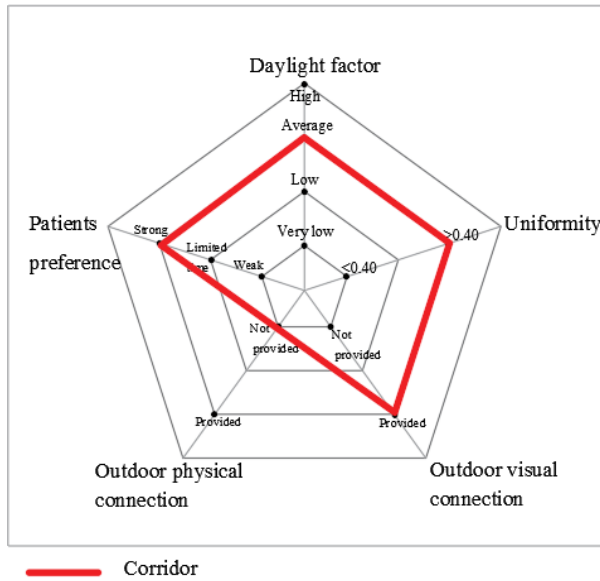


Figure 26: The characteristics of the space openings and occupancy of the patients in the corridor.

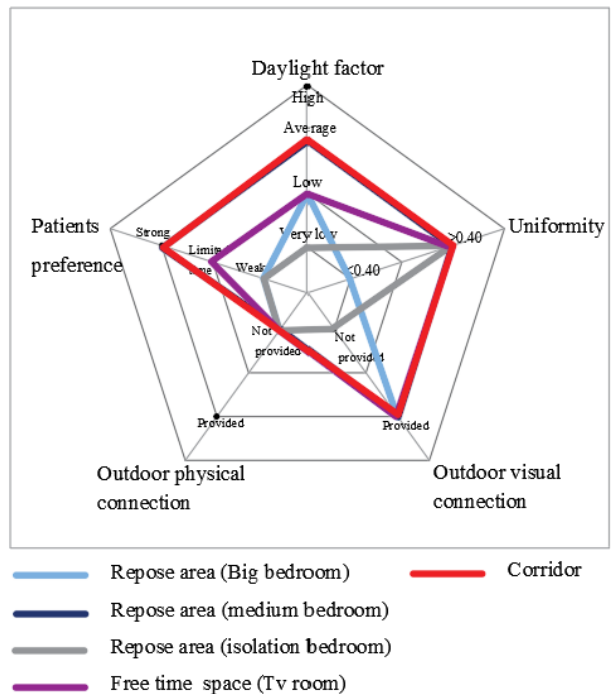


Figure 27: The evaluation of the spatial characteristics of the institution E02 and their uses.

### 5.3.3 proprieties evaluation of the Establishment E03

#### Waiting area

The waiting area of the daycare institution is an open zone that contains a multilateral Longue glaze with trims along the walls. This glazing allows an extensive view to the outside with fragmentation due to the apertures' types. They also allow natural light penetration with a daylight factor of 3.35% and uniformity of 0.41%. These values translate that the area has averagely lighted and uniform quality of light; whoever, supplementary artificial task light is required for vision precision. *Table15; Table16.*

According to the reception employees and the observation done during the visit of the establishment, the patients' behavior inside the waiting area was normal, which means the waiting area is occupied by patients all the time. They do not have a habit of waiting outside compared to the case in the establishment E01.

Table15: Daylight appearance quality of the waiting area E03.


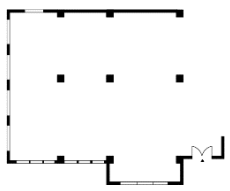
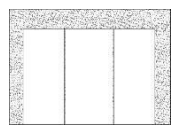
The room	3D Daylight Model simulation	Room reflectance	DFmin	DFmax	DFaverage	Uniformity DF
TV room		0.69%	%1.4	11.51%	3.35%	0.41%

Table 16: The characteristics of the openings for waiting area at E03.

The selected spaces	The outdoor openings type	Visual continuity	Physical continuity	Adjacent connection
		Trim glazing	Only by the entrance door	Corridors, reception, Hall.

## Discussion

The diagram below shows the spatial quality evaluation of the E03 day center in the waiting area. By correlating the properties of the openings, in terms of the connection offered with the surrounding environment, the daylight quality sufficiency according to the standards, with the drug addicts' occupation in these spaces (space/behavior). The results for this establishment assert an apparent connection between the satisfaction of natural light, the availability of the physical and visual connection with the behavior of drug-addicted visitors. Thus, their occupation of the room of the waiting room.

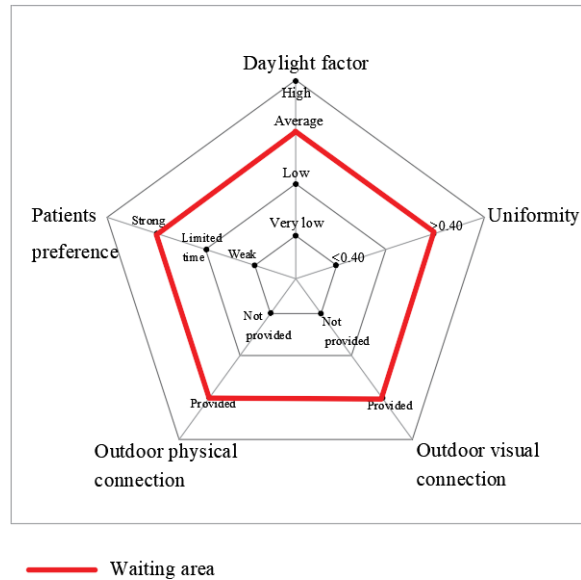


Figure 28: The evaluation of the spatial characteristics of the institution E03 and their uses.

### 5.4 Thesis statement 3

*The classification of drug addiction institutions in Algeria as specialized centers with the same architectural regulations as the psychiatric institutions gives them a restricted appearance, negatively influencing is physical quality, thus patients' well-being. According to the evaluation of the openings based on the correlation space/behavior, the result shows, the more the area is responding to the need for outdoor connection and good daylight quality rated by BREEM, the area notes a high occupancy by patients.*

The evaluation of the spaces of addiction centers shows the significant influence of the spatial quality on the patients' perception. That calls for reconsidering the design of addiction centers and their inclusion within mental health institutions that enter them in closed conception for security purposes, mainly since the medical aspect has settled the matter by classifying and diagnosing addiction as a chronic disease and not a mental illness.

According to the analyses conducted in this chapter, the thesis highlighted the importance of the external environment in favoring patients, which emerged in the preference for spending time in the outer courtyard E01 and E02. Besides their preference for indoor places that provide connection to the outside and ensure visual satisfaction of the space where the daylight is enough. This deduction was made after noticing the preference rank of the play area E01 and corridor E02, which was not planned to be included in the research analysis. However, the attention is drawn to the gathering of patients in corridor E02 during free time, despite the presence of a dedicated place. Furthermore, the waiting area in the E03 is more connected to the outside due to the opening. The behavior of patients is completely different from the waiting area of E01 that has a noticeable lack in the level of lighting

satisfaction. From here, it can be concluded that both the physical and visual connection with outdoor and natural lighting are responsible for an addicted patient's well-being. The regulations ignore these structures as they focus on the security aspect without considering the comfort of the patients' well-being.

# *Physical aspect-Artificial*

## *Lighting strategy*

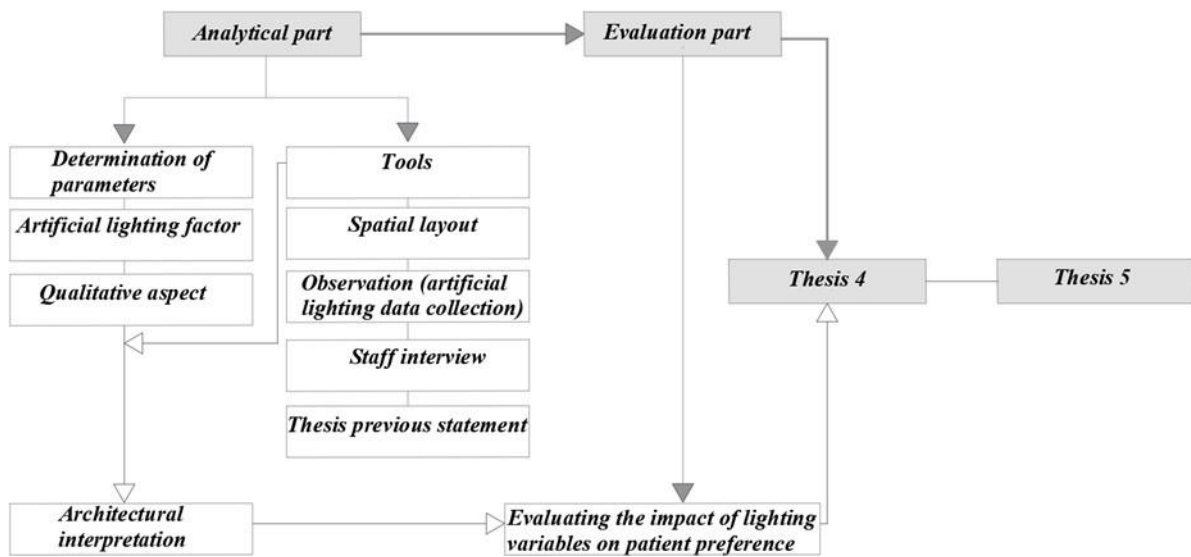


Figure 29: The methodological structure for the artificial lighting strategy in the establishments.

## 5.5 Introduction

Given the gaps found in the previous results about the impact of the absence of natural lighting on the occupation of spaces by patients, the path of the thesis suggests intervening artificial lighting to fill the void where natural lighting cannot be present. This suggestion is supported by the assertion of Joachim Teichmüller, the founder of lighting technology, states that "artificial light can surpass daylight if it is applied purposefully and in a different way. [22]

The statement gives another dimension to artificial light. It changes from the standards aspect, which considers the artificial illumination as a tool to achieve the sufficiency of the visual task in the space, to an aspect that can affect the user's mood by arousing particular impression in space and achieving comfort and well-being. This concept involves a qualitative approach before moving on to the quantitative stage. [22]

Although several studies have been conducted on the importance of artificial lighting, it has always led to a quantitative approach concerned with task performance sufficiency in a particular space. In the book *Interior Lighting for Designers*, Gary Gordon FIES, FIALD, LC says that relying only on standards and manuals for illumination unintentionally causes a bland and unstimulating place. The qualitative aspect is supposed to give an identity to space before starting the application of the calculations. This thesis proposed to reconsider the lighting design method in drug addiction centers since it plays a crucial role in obtaining visual comfort and affects the emotional aspect of the place. [23] knowing the validity and the feasibility of applying this reflection in drug addiction centers required to prove the following hypothesis:

*The application of artificial light in the study cases does not consider the qualitative side, which negatively influences the impact of space.*

By confirming this hypothesis, it is possible to use the impact of the presence of the qualitative aspect to eliminate the standardization of spaces and create a domestic atmosphere that encourages the provision of well-being to patients.

Assessing the impact of artificial light requires understanding the factors that target light visualization and classifying them according to the interests and priorities of the thesis (qualitative/quantitative). Harvé Descottes, in his book "Architectural Lighting Designing with Light and Space", considers a set of lighting parameters that control the visual quality of space; these parameters are a combination of quantity of illumination and quality of lighting. [24] As mentioned above, the spatial quality evaluation is based on priority on the qualitative parameters. The overall basics of lighting design are mentioned in the book and classified by the thesis author as follows: *Figure 30*



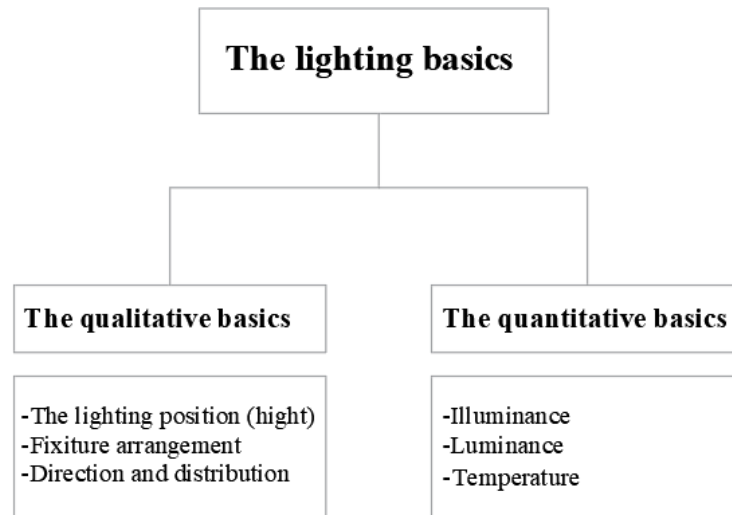


Figure 30: The lighting design basics. Author

### The qualitative parameters that influence the light perception

-The lighting position (the height): according to the others' previous statements, the lighting height controls the mood that the space can provoke, expand the place or make it more intimate. The effectiveness of lighting position was applied in the house's design, where the height follows each function's mood. The purpose of analyzing this parameter in the case studies is to evaluate whether its absence or its presence can influence the patients' preference of the space. [24]

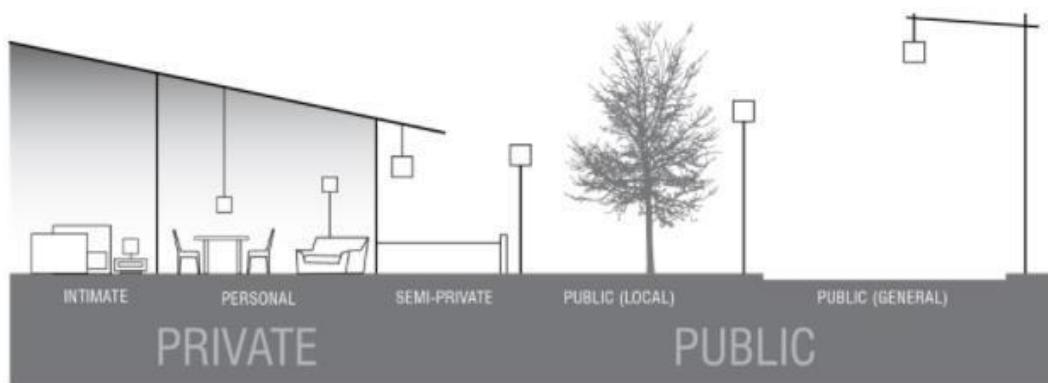


Figure 31: The lighting height and its influence of privacy perception. (Source, Architectural Lighting Designing with Light and Space, Harvé Descotte)

-The luminaires arrangement (density): This parameter address the grouping of the luminaires that can follow manuals to achieve the desired amount of illumination and the emotional purpose that can follow the needed atmosphere within the room. so, it can be classified as follows; [24], [25], [26]

- Related to the grid, which measures the rhythm of luminaires into the space.

- Related to the architecture, which means that it follows the space functions and the area's characteristics.

- Related to the furniture, whether the lighting design includes the furniture to be part of the overall lighting conception.

-lighting distribution and direction: It controls the visual appearance of particular objects on the surface or the overall room according to the needed height spaces that perceivers have to assimilate. The light projection plays on the effect of space, and it is classified as follows.

- A direct-diffuse downlight; for general illumination of the floor or the work areas in a general way.

- Indirect-diffuse lighting illuminates the upper plane surface and gives the appearance that the ceiling plane is a source of illumination.

- Direct /indirect: it gives attention to specific areas highlighted, by offering a nonuniformbrightness in the room.

- Accent lighting: it creates a high luminance surface, with high contrasts within the space.

- Decorative lighting: This conception dedicates to the emotional effect and aesthetics.

- Wall lighting: provides the direction of focus and identifies the textured wall.

## **5.6 Architectural interpretation**

### **Analysis of the existing artificial lighting strategy in the selected rehabilitation centers**

#### **-The reading of the functions of rooms through the spatial layout**

The elements that form the space provide information that patients assimilate through visual perception; these spatial elements help facilitate or restrict the understanding of the environment. This available information constitutes the stimulation process. According to Gary W Evans and Janetta Mitchell, the lack of the necessary stimulation can cause boredom. In contrast, extreme stimulation can lead to destruction. [24], [25]

The adequate stimulation of the space makes it possible to understand the logic of the context, and the process of assimilation of information will be less complex.

The overall law theory of gestalt of “Prägnanz” notes that people will perceive and solve unclear or complicated images in the simplest form possible by tending to find some links between constitutions to find significance in the arrangement instinctively. [26]

Based on these theories, the thesis summarizes that the feeling of boredom in space is produced after perceiving the zone as a whole in the first stage, and in the stage of cognitive analysis, the space does not provide the necessary stimuli. On the other hand, if the room is complex, the cognitive evaluation demands more effort to identify the space; in this case, the stimulating elements are intensive, which generates the stress and even the deprivation of the area by the user in the case of the thesis are the patients.

To assess the quality of stimulation in the selected areas, one must first identify the stimulatory element that should be analyzed, which is in the thesis the artificial light. This research stage targets the qualitative side, aiming to evaluate the influence of light quality in space and the impact of its presence in areas where the quality of natural light is absent or insufficient.

The aspect that the research step will analyze relates the qualitative characteristics of the lighting with the functions and needs of each space. The second step will be related to the performance of natural light in these spaces and the frequency of patients. this allows us to evaluate the impact of the artificial light arrangement all involving the elements (spatial quality / visual perception/behavior).

Evaluating the light quality and the impact of light requires identifying the activities that the space provides and the needs that this space must have to facilitate the performance of these activities.

The research is inspired by the spatial layout methodology; this method serves to re-enumerate the activity that takes place in each room and then divides the space according to several layouts for each activity; this serves to simplify the reading of the space and eliminate the ambiguities. Daina Cheyenne Harvey, in his article about the space for culture and cognition, "subdivisions of space facilitate cognitive subdivision."

This methodology facilitates the evaluation of the logic of the lighting design arrangement. It also facilitates the identification of each space's needs by identifying the activities that take place in it.

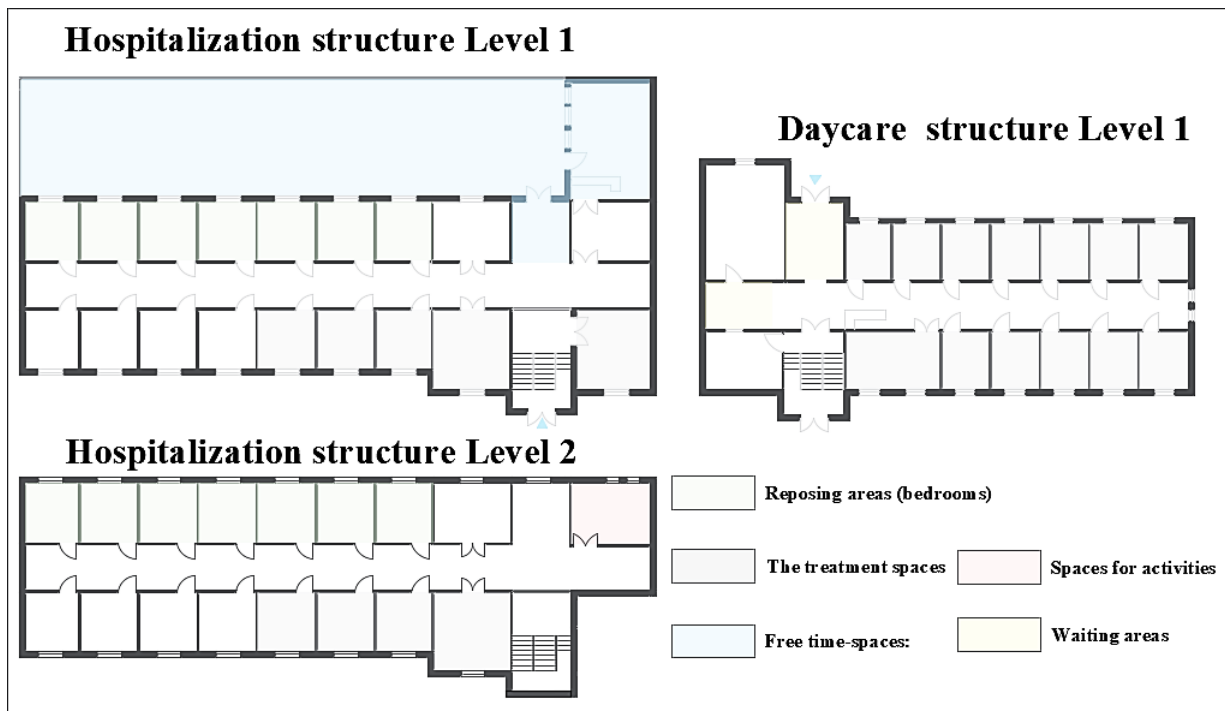
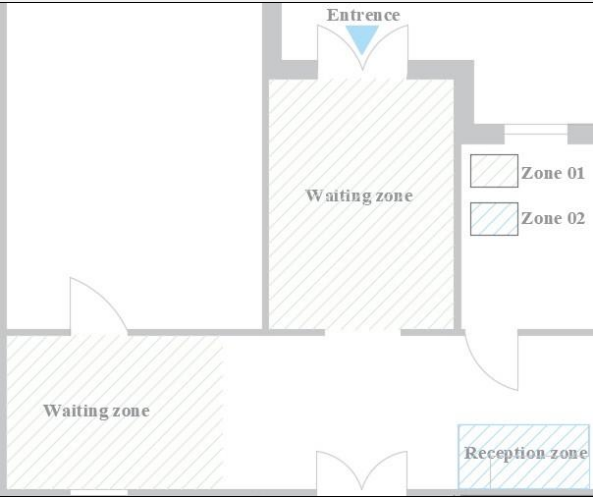
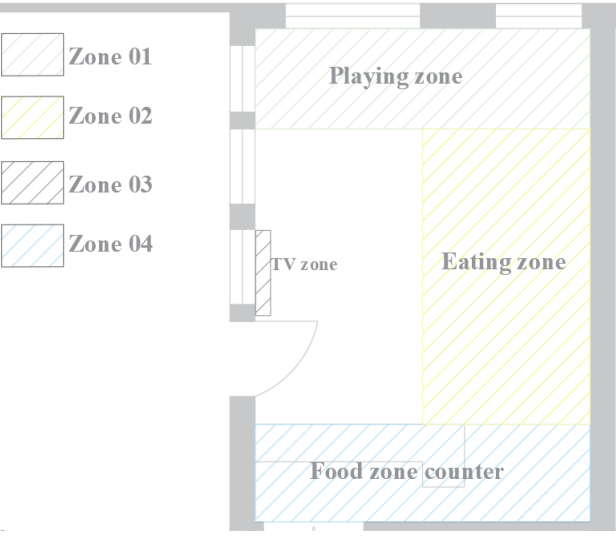
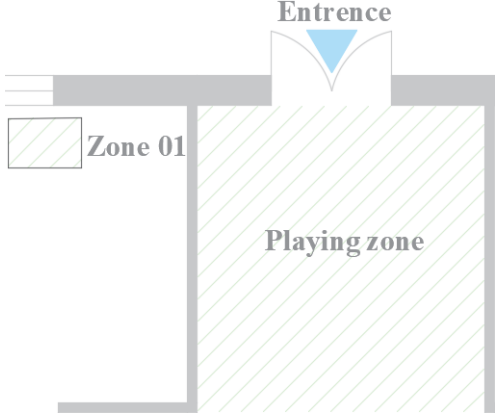


Figure 32: Architectural plan of the distribution of functions in establishment E01.

Table 17: The zoning of rooms in the (E01) according to the activities taking place.

Establishment (E01)		
Rooms	The zoning of space	The spatial configuration
Waiting room	-Reception zone. -Waiting zone.	
Free time rooms	TV room	
	Play room	

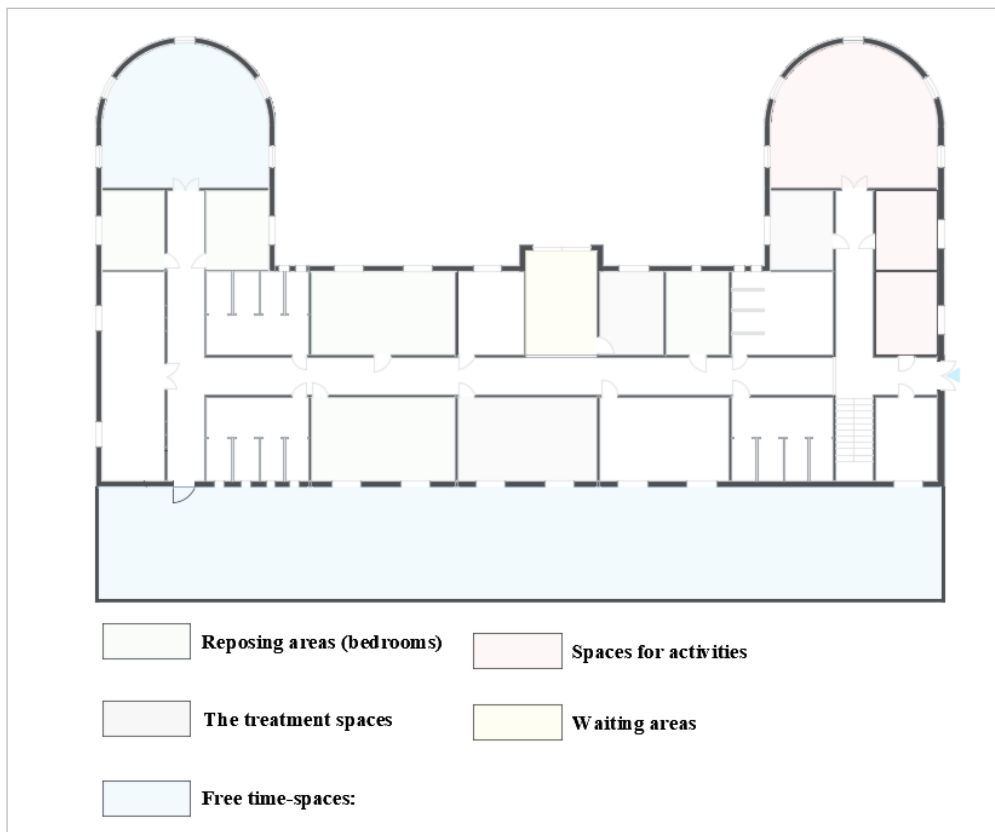
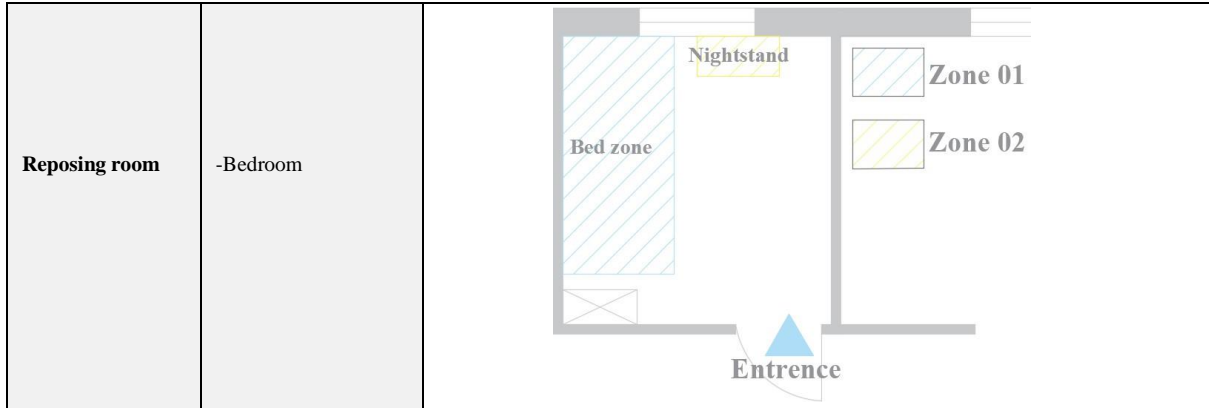
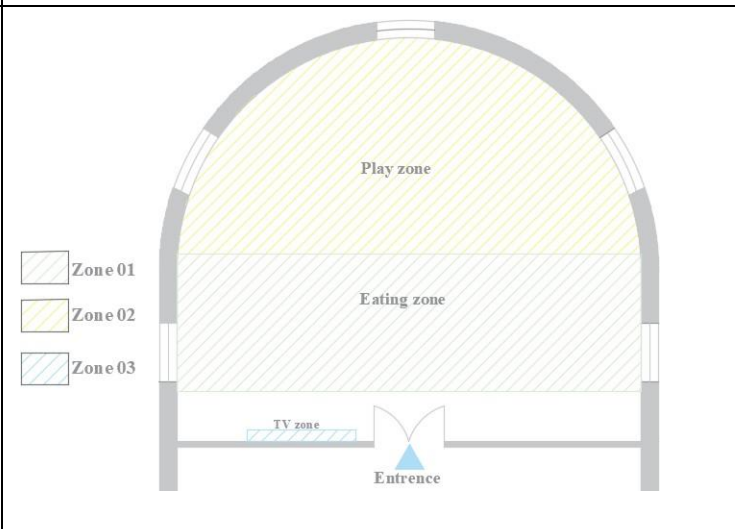
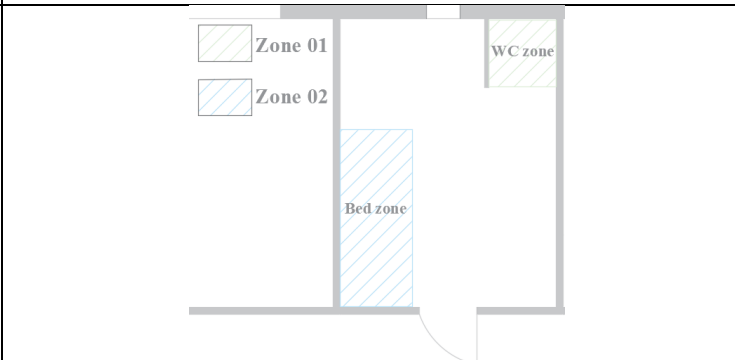
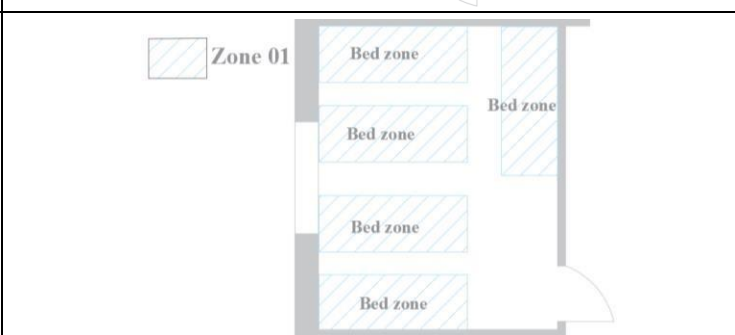


Figure 33: Architectural plan of the distribution of functions in establishment E02.

Table 18: The zoning of rooms in the (E02) according to the activities taking place

Establishment (E02)			
Rooms	Establishment (E02)	The zoning of space	
Waiting room	Excluded		
Free time rooms	TV room	-TV zone. -Eating zone. -Social zone.	
	Isolation room	Bed zone WC zone	
Reposing room	Medium bedroom	Bed zone	

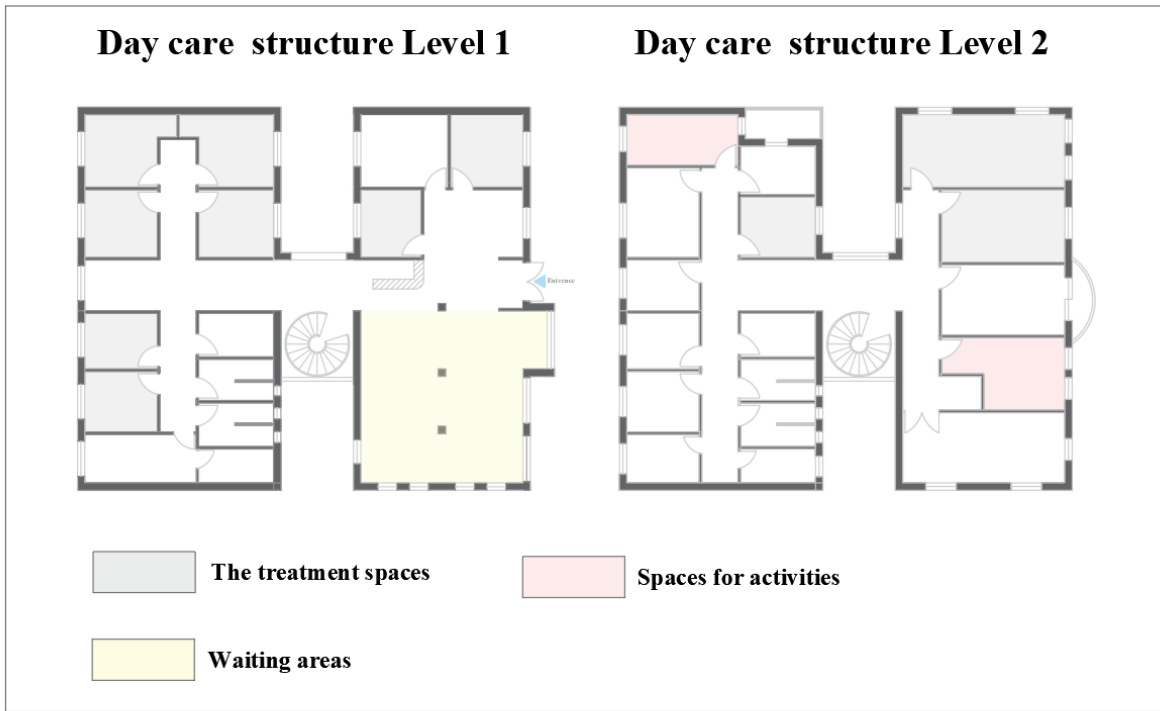
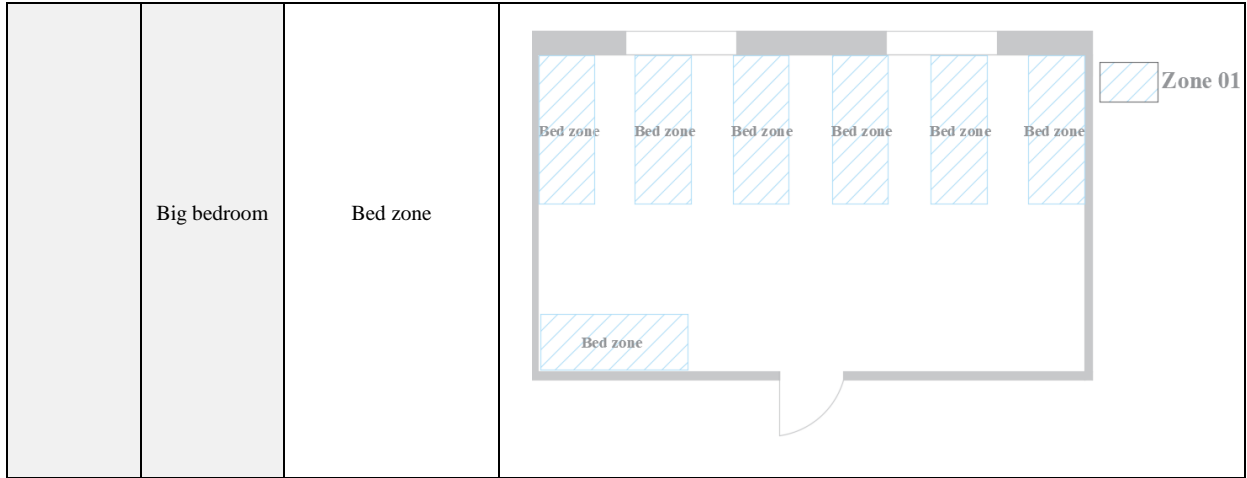


Figure 34: Architectural plan of the distribution of functions in establishment E03.

Establishment (E02)		
Rooms	Establishment (E03)	The zoning of space
Waiting room	Reception zone. Waiting zone. Play zone.	

Table 19: The zoning of rooms in the (E03) according to the activities taking place

### The correlation between the spatial layout and the existed lighting strategy in the study cases

The zoning allows to list the activities that take place in each room; this requires a complete understanding of the space and a functional analysis made with the participation of testimony of the employees of the establishments and the specialized people who are in the field of addiction treatment.

This spatial decomposition is essential for the research process to simplify the understanding of the artificial lighting strategy and facilitate the analysis and evaluation of the existing situation impact on the spatial quality and, therefore, the patients' visual perception. The evaluation will answer the hypothesis about the consideration of the artificial lighting strategy in addiction centers. The following step is based on the activities classification (zoning), linking them with the parameters that formulate the qualitative visualization of the artificial light. *Table 17.18.19*



Table 20: The artificial light situation in the case study E 01

Establishment (E01)						
Rooms	The zoning of space	The zone activities	Existed Artificial light strategy			
			Lighting position	Lighting arrangement	Lighting distribution	
Waiting room	Reception zone	Orientation	Ceiling mounted	<p>Arrangement related to a grid</p>	Diffuse direct Lighting	
	Waiting zone.	Sitting, communication				
Free time rooms	TV room	TV zone	Ceiling mounted	<p>Arrangement related to a grid</p>	Diffuse direct Lighting	
		Eating zone				Eating Sitting Communicating
		Play zone				Playing
		Food counter zone				Distribution
Play room	Play zone	Playing	Ceiling mounted	<p>Arrangement related to a grid</p>	Diffuse direct Lighting	

<p><b>Reposing room</b></p>	<p>Bedroom</p>	<p>Sleeping, Reposing, Reading</p>	<p>Ceiling mounted</p>	<p>Arrangement related to a grid</p>	<p>Diffuse direct Lightning</p>
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*Figure 35: Illustration of of the lighting strategy of the institution E01*

Table 11: The artificial light situation in the case study E 02

Establishment (E02)						
Rooms		The zoning of space	The zone activities	Lighting position	Existed Artificial light strategy	
					Lighting arrangement	Lighting distribution
Free time rooms	TV room	TV zone	Watching	Ceiling mounted	<p>Arrangement related to a grid</p>	Diffuse direct Lightning
		Eating zone	Eating Seating Communicating			
		Social zone	Seating Communicating playing			
Reposing room	Isolation room	Bed zone	Sleeping Reposing	Ceiling mounted	<p>Arrangement related to a grid</p>	Diffuse direct Lightning
		Sanitary area	Hygienic function			
Reposing room	Medium room	Bed zone	Sleeping Reposing	Ceiling mounted	<p>Arrangement related to a grid</p>	Diffuse direct Lightning

					<p>  Zone 01   The system arrangement   Luminaires </p>	
<b>Big size bedroom</b>	Bed zone	Sleeping Reposing	Ceiling mounted	<p>Arrangement related to a grid</p> <p>  Zone 01   The system arrangement   Luminaires </p>	Diffuse direct Lightning	



Figure 36: Illustration the lighting strategy of the institution E3

Table 22: The artificial light situation in the case study E 03

Establishment (E03)					
Rooms	The zoning of space	The zone activities	Existed Artificial light strategy		
			Lighting position	Lighting arrangement	Light distribution
Waiting room	TV zone	Watching	Ceiling mounted	<p>Arrangement related to a grid</p>	Diffuse direct lighting
	Eating zone	Eating Seating Communicating			
	Social zone	Seating Communicating playing			



*Figure 37: Illustration of the lighting strategy of the institution E03*

## **5.7 Discussion**

The tables (17,18,19) aim to dismantle the functions within each room into zones to simplify the understanding of their needs. Understanding the place is the key to getting rid of standardization and a preliminary step towards investigating the relationship between lighting design and the functional needs of each area by using the patients' perception as a reference.

Then Table 20,21,22 relates each of the previously dismantled functional areas to the lighting strategy of each room by describing the qualitative parameters of illumination. This step shows how responsive the spatial layout with the lighting strategy opted for those establishments. As mentioned in tables 20,21,21 above, there is a noticeable standardization in the qualitative part of lighting design, so it is safe to confirm the hypothesis and say that the functions of the rooms were not taken into consideration and completely neglected.

Assessing the quality of the artificial lighting required an evaluation that links the rate of natural light in each space and the characteristics of the artificial lighting with patient attendance.

This step is to bring out the effect of the existing lighting strategy when there is insufficient natural light. In the graphs below, the correlation shows that only the variables that appear in natural light affect the patients' frequency. In contrast, artificial light does not perform its role and cannot cover the absence of natural light in some places, as shown in Figure 35 (Tv room, the waiting area) and Figure 37 (Big bedroom, isolation bedroom).

The evaluation of daylight quality in diagrams (Figure 36,38,49) was made according to the analysis finding of chapter 05 and the rules of BREEM. The thesis classifies the availability of natural light as follows.

Table 23: The rating of daylight quality according to the previous results

Daylight characteristics	Daylight classification
-Low daylight factor+ Conform uniformity. -Average factor+ Low uniformity. - Low factor +low uniformity.	-Poor lighting.
-average daylight + conform uniformity.	-average lighting.

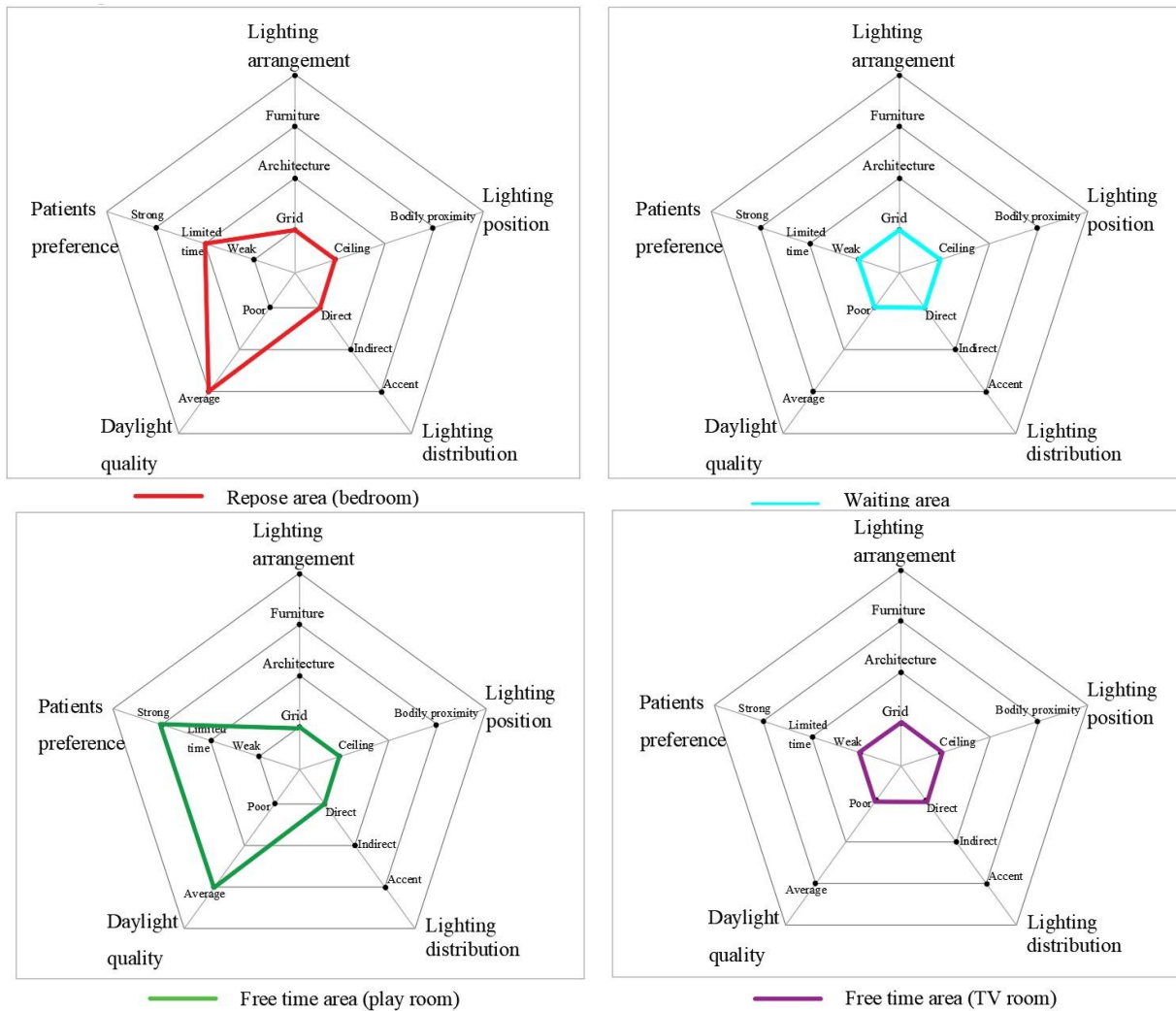


Figure 38. Correlation between artificial lighting, natural light, and frequency to spaces in the establishment E01.



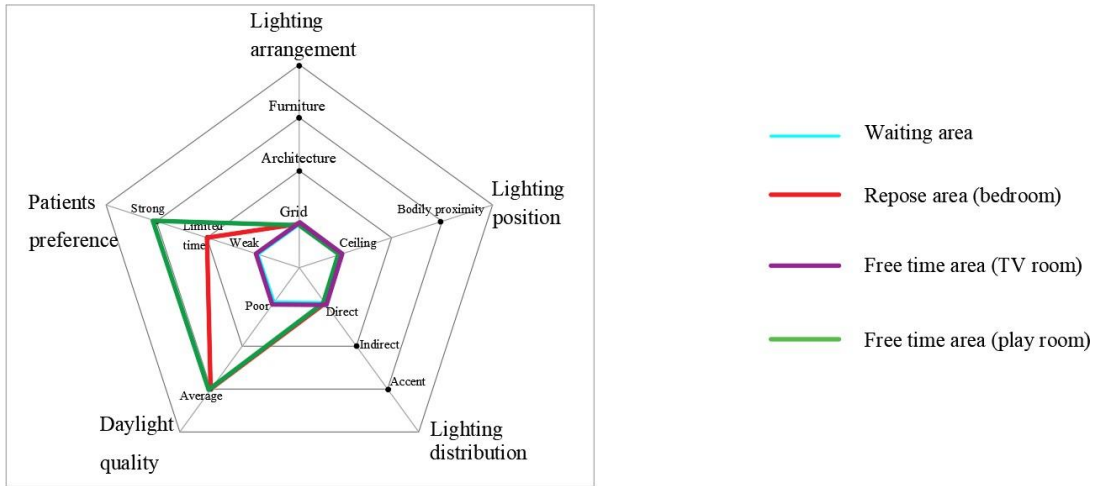


Figure 39. The comparison of the impact of artificial lighting and natural light variables on frequency in each area in the establishment E01.

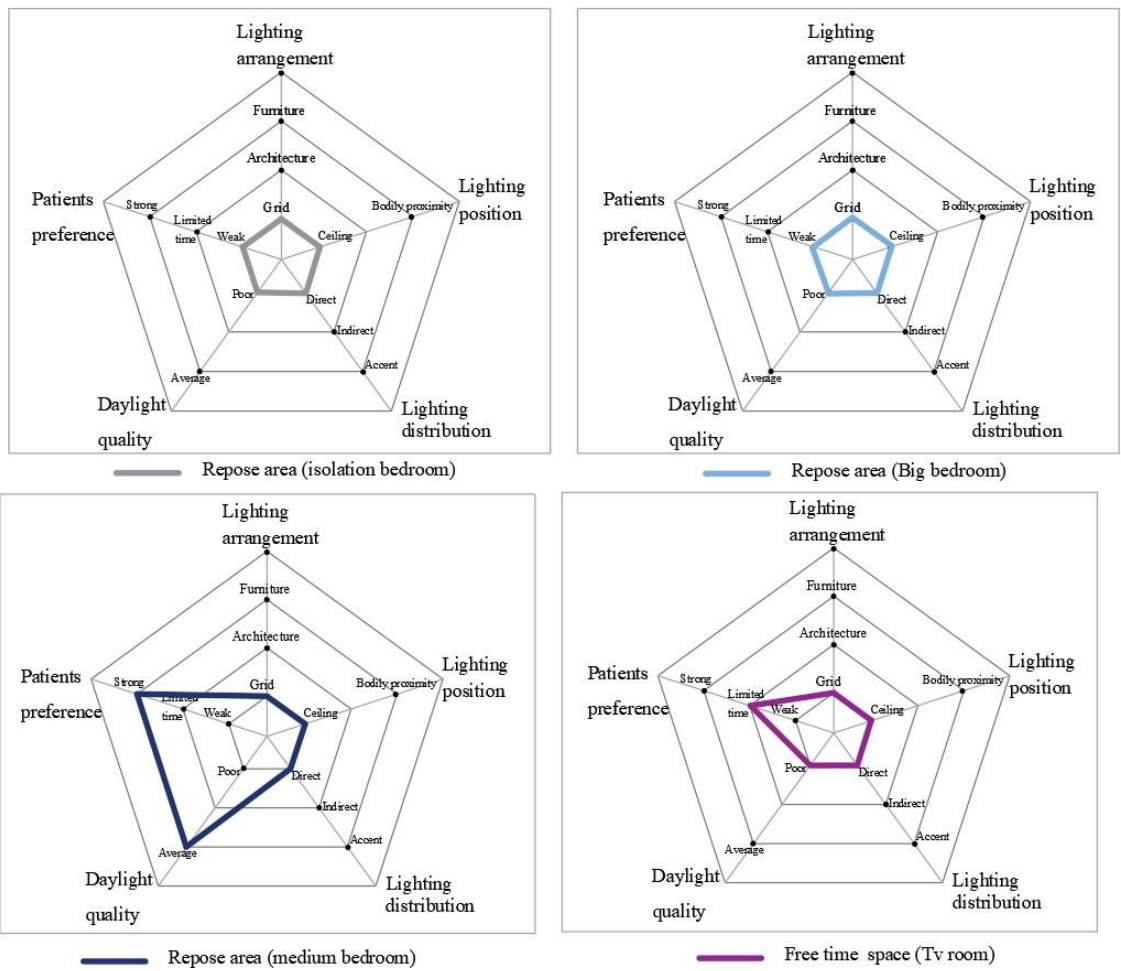


Figure 40. Correlation between artificial lighting, natural light, and frequency to spaces in the establishment E02



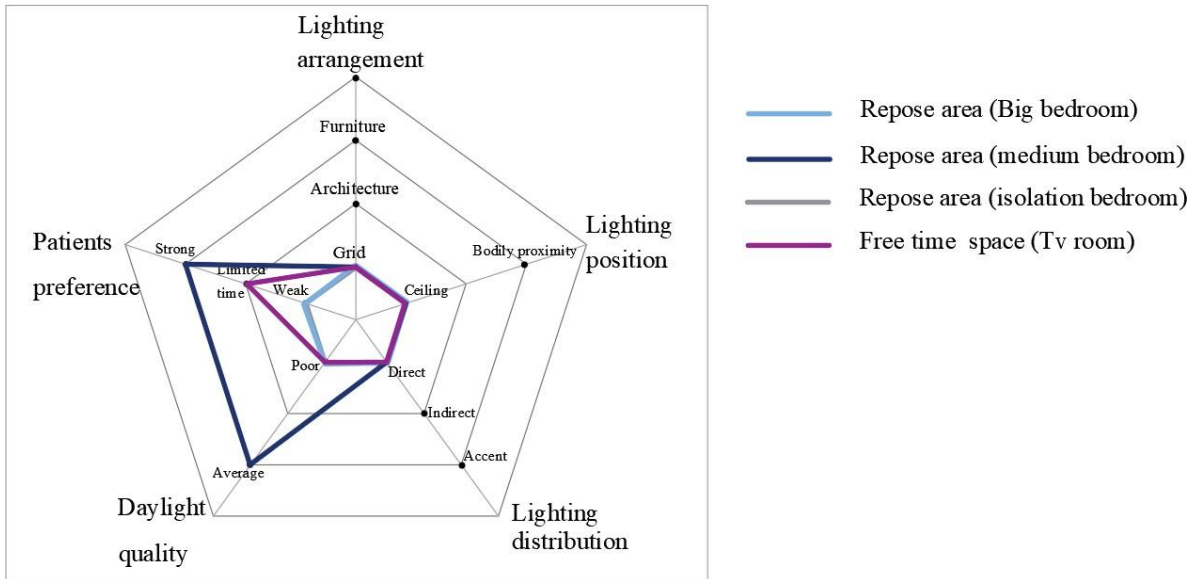


Figure 41. The comparison of the impact of artificial lighting and natural light variables on frequency in each area in the establishment E02.

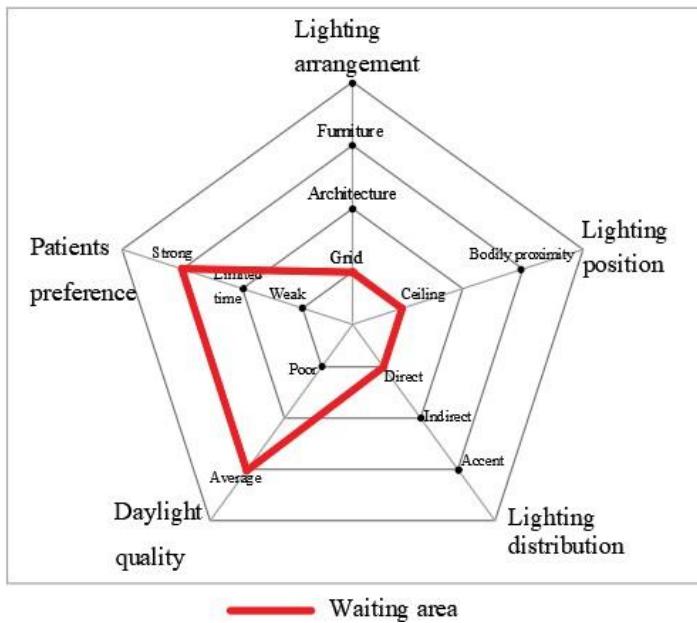


Figure 42. Correlation between artificial lighting, natural light, and frequency to spaces in the establishment E03

### 5.8 Thesis statement 4

The unification of lighting strategy within all the studies cases rooms guides the thesis to evaluate its impact on improving the lack of daylight in the room. The comparative study shows that the occupation rate in the rooms is only related to daylight quality, and artificial light does not influence the strong or weak rate of frequency. That proves that the unification strategy strips the space from any impression related to its function and makes it indifferent.

A spatial layout method was performed to assess the existing quality of illumination that answers the effectiveness of statement four that suggests artificial lighting as a solution to improve spatial quality. The results showed the incapacity of the current artificial light to influence the frequency of the spaces. The answer for enhancing the spatial quality is to find a correlation that would link the lighting strategies with the emotional cognition of the patients, that will create an atmospheric space that meets the needs of each function and create domestic areas.

## 5.9 Thesis statement 5

*Artificial light can be suggested as a solution for the existed cases study to correct the lack of visual comfort. That is carried out by focusing on the qualitative parameters formulating the visual quality of the illumination and the visual impact that each parameter can have on the impression that the patient should perceive. The process of the application and the validation of the results is orientated toward the Triangulation methodology that will include others statements' findings to support the research.*

The previous chapter of the thesis focused on the daylight quality inside the room, without counting the artificial lighting contribution, for figuring out the daylighting sufficient and its influence on patients. Moreover, assessing the cases where the daylight was insufficient and even with the contribution of the existing artificial light of the institute could not fill in the lack of lighting quality to achieve the visual comfort, which was noticeable in areas of the institute, where the daylight factor was low. The existed artificial light was unable to change the result spatial quality/ patient behavior.

So, in the cases tv room and bedrooms of the E02 when daylighting was insufficient, and the tv room case in the E01 when the daylight distribution was inadequate to the norms. the contribution of the existed artificial light had no positive effect on changing the results of patients' preferences.

The thesis concluded that the use of artificial light only to fill a gap or complete the visual task is not sufficient to achieve visual comfort and influence the preference of the space in a positive way.

So lighting is not just a standard calculation is a concept that occupants can perceive and be affected by its emitted atmosphere. Thereby the failure in lighting design might cause displeasure. That is also confirmed during the observation of the lighting design adopted in those spaces, where the institutions opt for the same lighting techniques in all the spaces, using institutional aspects.

As part of the objective of this thesis, which is to eliminate drug addiction centers from the institutional aspect, for a domestic aspect to improve the visual perception of patients, and provide a suitable environment that guarantees the comfort and well-being of patients, the strategy opted to use artificial light to complete the visual task and the visual comfort by using the qualitative aspect of natural light, which gives identity to the space and provides a domestic atmosphere

# ***Chapter 06: Research findings and conclusions***

## 6.1 The Findings discussion

The first results relating to drug addiction cure establishments in Algeria confirm that there are indirect factors that influence in the first place the overall performance of the establishment (the historical background and the functional mechanism). These two factors indirectly affect the flow of patients to the establishment, the more senior the establishment, the wider the field of attraction. Moreover, the functional destination of the establishment has shown in the first step a negative impact, where the admission of drug addiction with the mental disorder facility influences and narrows the spatial environment controlled by the drug addict patient. Therefore, it affects the acceptance of integration within the institution.

Decreasing the research scale to the objective of the thesis, which is the interior architecture of the establishment. Previous studies have already addressed the influence of the visual properties of interior space on the user. However, this study was limited to specific fields, and it was not extended to the field of drug addiction. Especially since the architecture of this institution in Algeria completely neglects the topic of improving the visual quality by involving the psychological aspect of the architectural characteristics of the space. This observation is made after collecting the architectural data of each establishment, where it noticed that there is unification in the use of materials, colors, textures. According to the investigation, the health system in Algeria experienced three phases after the heritage of the French system, the 1962-1992 phase and then 1993-1995, and finally 1995 to the present day where hospital equipment is subject to international standards. [27]

Therefore, no official protocol specifies the quality of materials and the internal quality of health establishments in Algeria, but only a standard protocol that focuses on the security aspect. These data raise questions about the relationship of patients to these places and the factors affecting this relationship. After the data classification, I made a limitation to the factor that appears the most different in each space and which may influence the visual quality by its properties, and which is the openings.

This element was evaluated according to its effect on the visual quality of places by analyzing daylight quality and connection with the external environment.

Daylight analysis adopted is based on the daylight factor; the method is used to assess daylight inside each room using Dialux software for calculation and BREEAM regulation for data interpretation.

The connection factor with the external environment is based on a visual and physical connection, where patients can have visual access and physical accessibility.

By projecting the spatial analysis results with the patients' behavioral survey, there is a correlation between the daylight quality and the continuity with the external environment in improving the spatial visual quality; therefore, the preference and the use of these areas were found by the patients. Furthermore, the absence of one of those elements can influence the occupation of the space inversely. This result proves that

- ❖ The current quality of space is not adequate for the well-being of patients
- ❖ There are no design protocols about natural lighting quality to follow to ensure an environment that responds to the need for visual comfort of patients in Algeria.

Joachim Teichmüller the founder of the Institute for lighting technology in Karlsruhe, pointed out that "artificial light can surpass daylight if it's applied purposefully in a differentiated way". This argument took the research into questioning the nature of the artificial light in the rooms of establishments and its effect on the physical quality of the place; what is meant here is the lighting design that gives the place different impressions according to its function [28]

To investigate the effect of artificial light on the impression of different places, I categorized its elements in terms of quantitative and qualitative and selected the features that help the course of this investigation by analyzing the behavior of these elements in each room to extract the logic and concept of exploiting artificial light. The results indicated that there is general uniformity in all rooms, regardless of their different functions, which means that the existing light aims only to provide a source of illumination for the visual tasks, with complete disregard for other aspects.

Projecting this artificial light analysis with previous natural light results showed that artificial lighting design within institutions does not enhance the emotional aspect of the space.

In the field of lighting and the advancement of research on perceptual psychology, the concept of artificial light has become no longer a quantity that provides simple visibility to objects but can be applied on the same set to create different impressions for time or even emotionally. That can significantly influence the visual quality of the space by giving it an identity appropriate to its function and therefore affects the user to assimilate all the information of this space without difficulty. Thus, generates visual comfort for him. Unfortunately, this research revealed that this concept is not yet applied to addiction rehabilitation centers, particularly in Algeria, where this study was carried out. It is still limited by international standards that include the architecture of addiction centers with the mental illness norms and the missing of defined protocols for interior finishing design, which showed in the results.

The study was based on the hypothesis that the physical environment of drug addiction centers could impact the behavior of drug-addicted patients in Algeria because of including it with architectural standards of the construction of mental illness without a specialized study on drug addiction. To investigate the hypothesis, the thesis was oriented for an analysis based on (spatial quality/behavior) which considers the patient as a 3rd part of the design. After an analytical and evaluative process, the research has pointed out results that lead to the following recommendation;

- In terms of the functional specialization of the center, it should be directed to the addicted category only and not collect any other psychological diseases that would affect the restriction of the functional program as is the case in the institution (E02).
- Organizing a protocol that ensures an appropriate quality of natural light in the rooms in relation to a visual connection with the external environment improves the interior spatial quality and, therefore, the well-being of patients.
- Relying only on ensuring the visibility of objects in space makes the area visible. However, it strips it from any emotional impression, which negatively impacts patients' well-being and thus their frequency to the space. After the research result, it is recommended to involve lighting design as an element that can control the emotion of space to provide the appropriate impression for relaxation or stimulation according to each area's function. The institutional aspect resulting from the unification strategy will be excluded through the recommended method.

The emotional space is achieved by considering the qualitative elements that control the quality of the artificial light according to the activities that take place in each establishment. The method builds on the research finding of artificial lighting evaluation as a database to identify space requirements. Therefore, link it with a triangular method, including others' previous statements on lighting design plus the conditions and safety terms of drug addiction centers. In short, this method integrates the other statements studies about lighting design strategy through a triangular projection on these research findings and topic data to validate the recommendation.

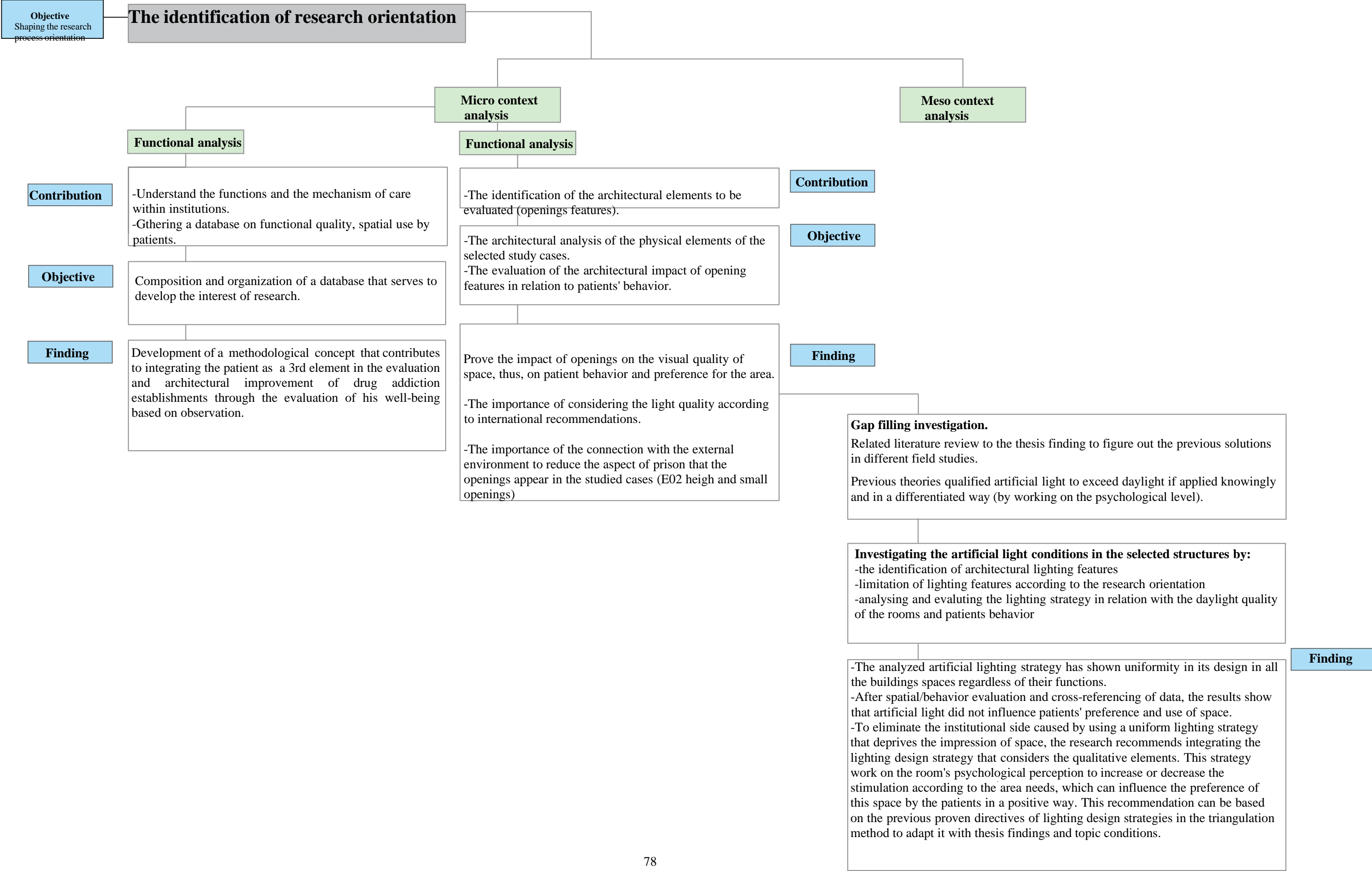


Figure 43: methodological scheme of research process and results

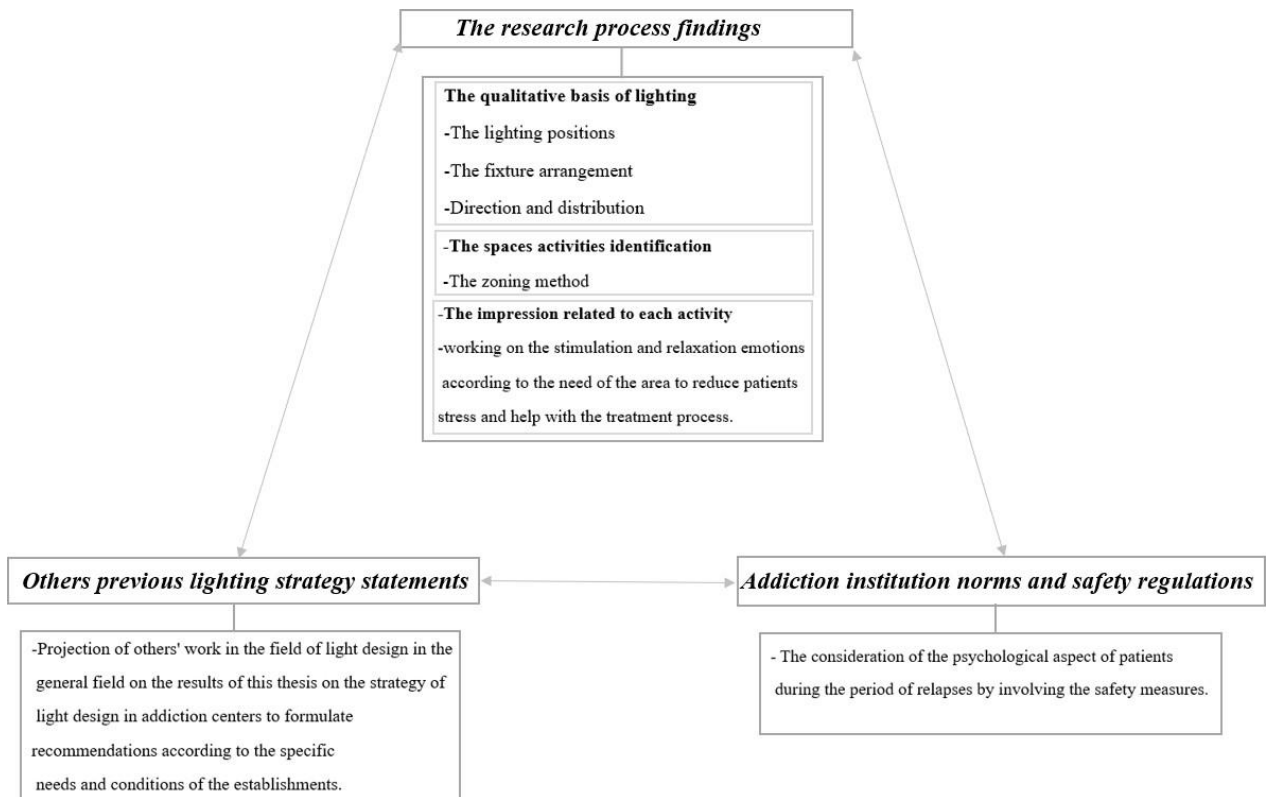


Figure 44: The resulting triangular method to validate the lighting strategy within addiction institutions



## 6.2 Presentation of a prototype model that explains the procedures of the lighting design methodology adopted by the thesis.

The construction of the model that fills the gaps found in the thesis analysis results is based on a triangular form, as mentioned above. This method considers all the parameters that influence the light quality of the rooms and the patients' visual perception to have results validated on a proven basis. The elements that constitute this method are classified by stages as follows.

### Initialization of key planning units based on consideration of regulations and norms.

This step consists of preparing the basic structure of the prototype spaces according to the international standards of mental healthcare establishments. This part is important to achieve a solution based on an approved platform. Table 23

Table 24. The fundamental recommendations for the treatment spaces analyzed in the thesis [30]

The needed requirements extracted from the IHFG guideline			
Patients' area	Size 16 Beds	physical Safety considerations	physical design considerations
For outpatients		-Fittings and fixtures should be safe and durable and should avoid the potential to be used either as a weapon or to inflict personal damage; there should be no ligature points.	-Surface finishes should be impact resistant and smoothly cleaned. Floor finishes are to be non-clinical where feasible and easy to maintain.
Reception /Waiting area	10 m2/15m2		
For inpatients		-Bedrooms should be designed to avoid a narrow corridor at the access to the room. There should be no 'blind spots'. An outer view coupled with high ceilings adds to the perception of light and space and creates a positive contribution to treatment and care.  -The doors should be fitted with a vision panel with suitable resistance glass, which can be covered by slide panels for privacy. Doors are not required for patients' wardrobes to minimize ligature. the door hardware must not provide points for ligature.	-Ceiling linings in inpatient spaces within the Unit should be solid sheets, not ceiling tiles. Supply secure, substantial sheet ceilings to all patient rooms.
Single Bedrooms	18 m2		
lounges /free time area	1*40m2		
Activities/ Dining area	1*40m2		

In addition to identifying the area for each room, it is necessary to determine the necessary height of the ceilings to constitute the volume of space. To set the ceiling height, I opted for the following formula that serves to determine the compactness of the room by using the surface and the volume. [14]

$$C = \frac{S}{V^{\frac{2}{3}}} = \frac{S}{(\sqrt[3]{V})^2}$$

C= The compactness.

S= The surface.

V= The volume.

The compactness controls the volume perception of the spatial envelope. It is responsible for the feeling of the vertical crush of space. When the compactness equals 01, the ceiling height is the square root of the area, which gives a cubic volume for the room. When the compactness is greater than 1, the ceiling height is lower than the room surface. And when the compactness is more major than 01, the ceiling height is greater than the room surface. [14] Figure 45

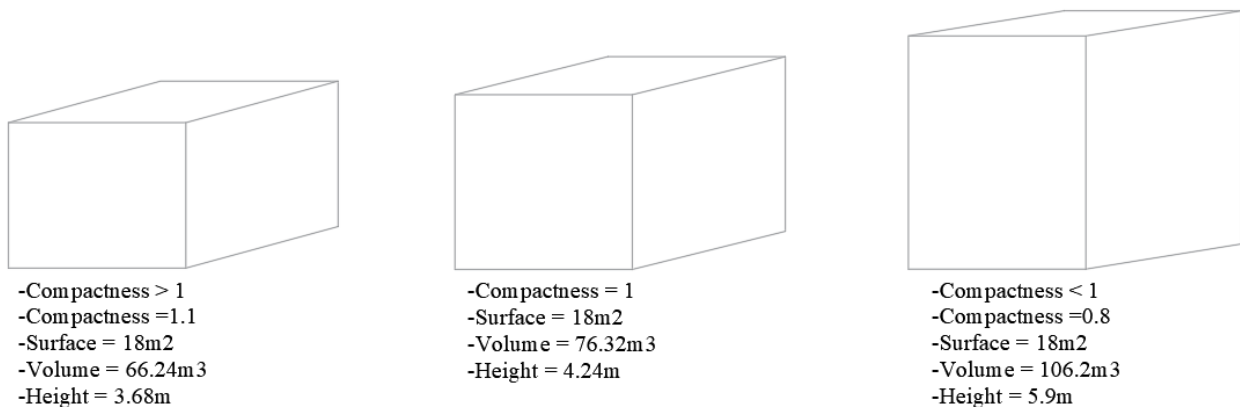


Figure 45. An example of the impact of compactness of rooms height appearance.

The ceiling height calculations consider the ratio of compactness with the surface of each room using the formula mentioned above, the results give the following values; 3.01m for the reception and waiting room, 3.6m for the bedrooms, and 3.8m for free time areas. as it is found the values balance around 3 meters and therefore to unify the overall envelope of the rooms in the institution, I selected the medium found value of 3.6m.

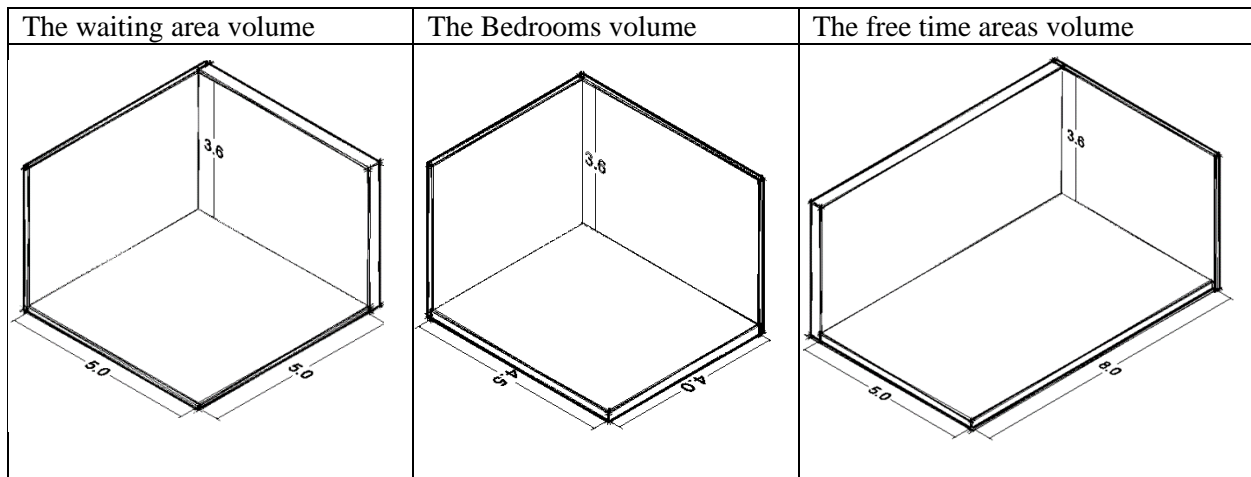


Figure 46. The determination of the volume envelope of the spaces selected in the establishment.

### 6.2.1 The process of determining the opening properties of the prototype concerning natural light and the connection with the exterior.

The determination of the openings is based on the results of the statements by targeting the characteristics of the openings which show their impact on the spatial quality and the preference of the patients. The first step is to define the size of the openings which provide an optimal quality of natural light, this will be carried out based on the windows floor area ratio (WFR) and evaluate the sufficiency of natural light through the Daylight factor (DF).

The recommendations suggest a minimum ratio of 10% for glazing in order to have a sufficient light supply. To obtain the optimal results, several scenarios have been carried out in each room.

The first scenario of 10% WFR for the bedroom did not give enough natural light according to the daylight factor simulation carried out by Dialux software and evaluated by BREEAM. The second scenario has been carried out by considering 15% of WFR. By this ratio, the daylight factor shows a sufficiency in the lighting quality. That leads to opting for the dimension of 2.7m<sup>2</sup> as an optimal size for the bedroom. Table 24

The same steps were followed to identify the glazing size of the reception and waiting area. The first scenario with the WFR of 10% shows an insufficiency at the level of natural lighting quality inside the room. The first result leads to a second scenario with 15% of WFR. This ratio shows a glazing size that provides a sufficient daylight quality with a good distribution based on BREEAM. So for the waiting area, the size of 4.5m<sup>2</sup> of windows opted. Table 25

The free time areas (dining and activities room, lounges) have the same size, so the same results for glazing will be applied to the rooms. The first scenario of a 10% window floor ratio shows an insufficiency at the level of natural lighting based on the daylight factor simulation. The second scenario of WFR15% shows a sufficiency for daylight factor but a not good lighting distribution of less than 0.4, which can cause a

strong contrast based on the BREEAM rating. A third scenario is performed with a windows floor ratio of 25%, which gives a sufficiency in terms of natural lighting quality and a good distribution of light inside the room based on BREEAM. The results show the scenario 03 as an optimal solution for glazing in free times rooms. Table 26

Table 25. The sizing scenarios of the opening and their impact on the natural light in the Bedroom.

	Opening size	Daylight factor (DF)	Uniformity
<b>Scenario 01</b> <b>WFR=10%</b>	-Window size= $(18*10)/100=1.8m^2$ -Reflection ratio of the room $\geq 60$	Average DF=1.7	Unifrmity =0.41
<b>Scenario 02</b> <b>WFR=15%</b>	Window size= $(18*15)/100=2.7m^2$ -Reflection ratio of the room $\geq 60$	Average DF=2.5	Uniformity =0.42

Table 26. The sizing scenarios of the opening and their impact on the natural light in the waiting area

	Opening size	Daylight factor (DF)	Uniformity
<b>Scenario 01</b> <b>WFR=10%</b>	-Window size= $(30*10)/100=3m^2$ -Reflection ratio of the room $\geq 75$	Average DF=1.03	Unifrmity =0.2
<b>Scenario 02</b> <b>WFR=15%</b>	-Window size= $(30*15)/100=4.5m^2$ -Reflection ratio of the room $\geq 75$	Average DF=2.1	Uniformity =0.53

Table 27. The sizing scenarios of the opening and their impact on the natural light in the free time rooms (Dining room, lounges)

	Opening size	Daylight factor (DF)	Uniformity
<b>Scenario 01</b> <b>WFR=10%</b>	-Window size= $(40*10)/100=4m^2$ -Reflection ratio of the room $\geq 60$	Average DF=0.96	Unifrmity =0.25
<b>Scenario 02</b> <b>WFR=15%</b>	-Window size= $(40*15)/100=6.0m^2$ -Reflection ratio of the room $\geq 60$	Average DF=2.1	Uniformity =0.28
<b>Scenario 03</b> <b>WFR=25%</b>	-Window size= $(40*25)/100=10 m^2$ -Reflection ratio of the room $\geq 60$	Average DF=3.2	Uniformity =0.4

### The Adaptation of openings position to the outdoor visual connection.

According to the thesis statements, the visual continuity to the outside environment has a noticeable impact on the space preference. These results lead to considering the availability of the out view in all the rooms by controlling the glazing positions.

The decision of openings positions is based on the vertical visual field of the patients in different situations in each space. **Figure 47**

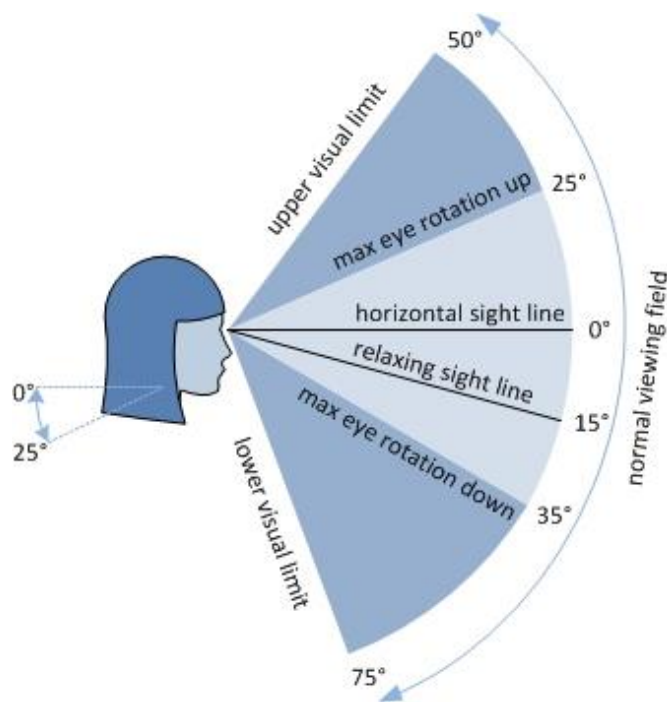


Figure 47. Vertical Viewing Field of the Eye [31]

The process considers the relaxation sight angle and integrates windows height according to it to provide an optimal solution. The following figures show the process of positioning the windows in each zone.

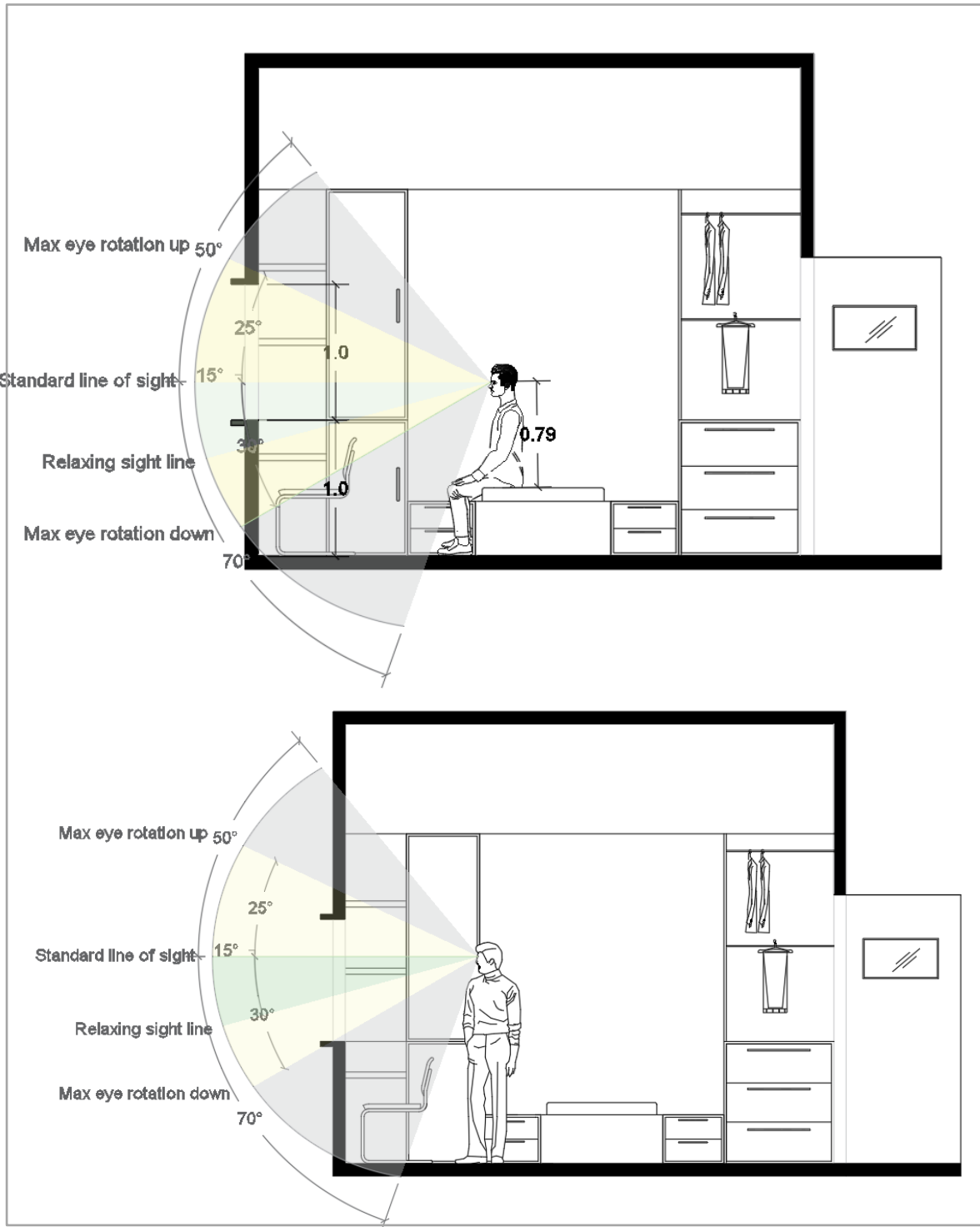


Figure 48. Ensuring visual continuity in the bedrooms

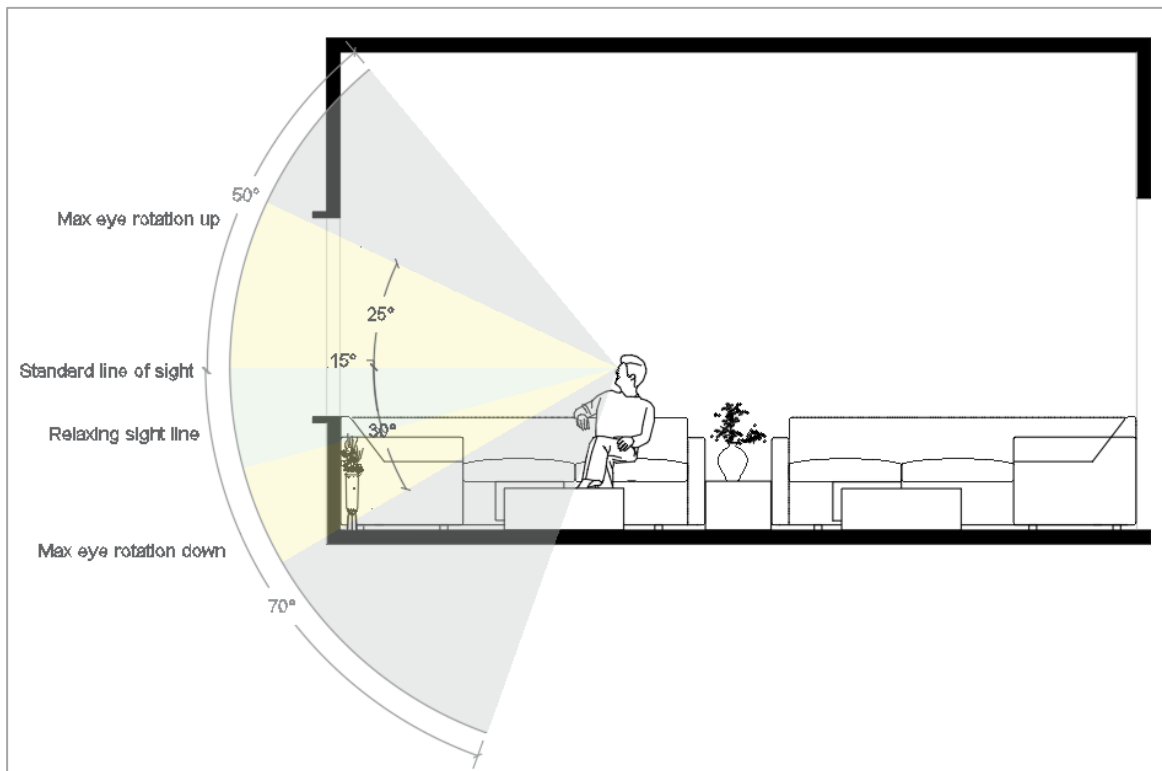


Figure 49. Ensuring visual continuity in the waiting area

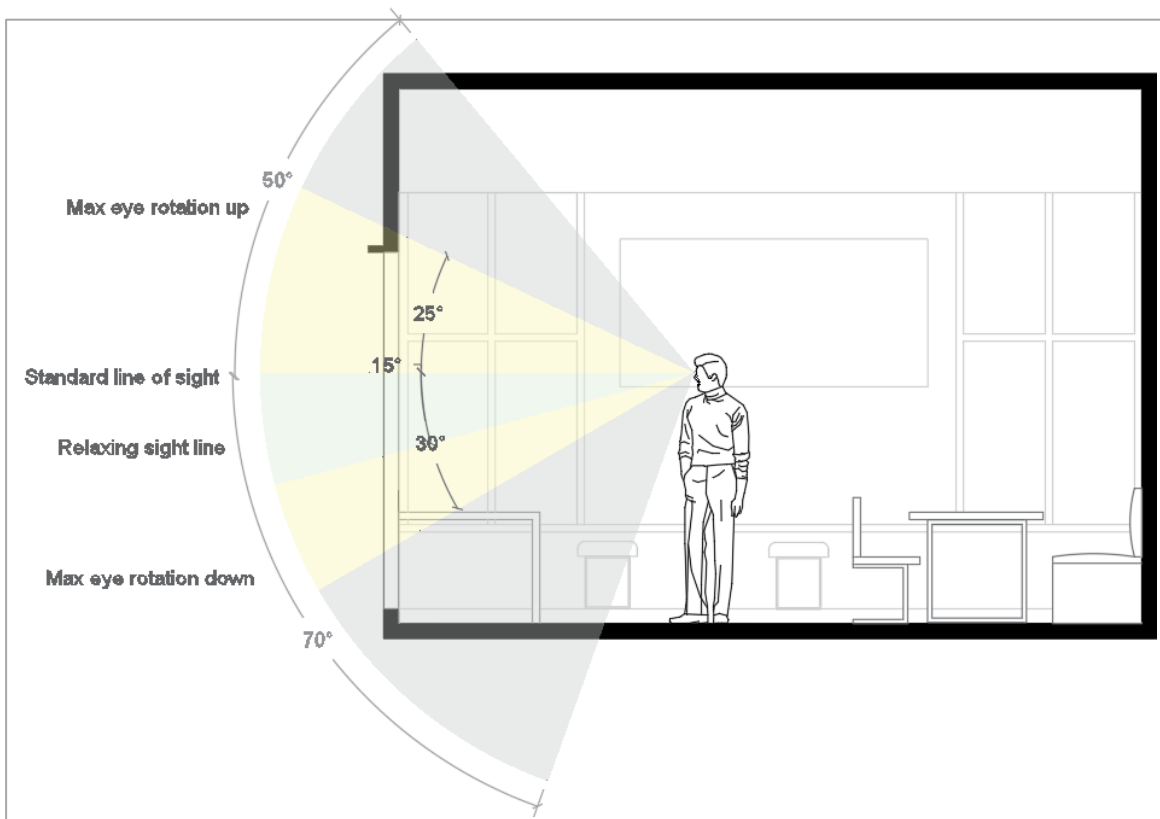


Figure 50. Ensuring visual continuity in the dining room

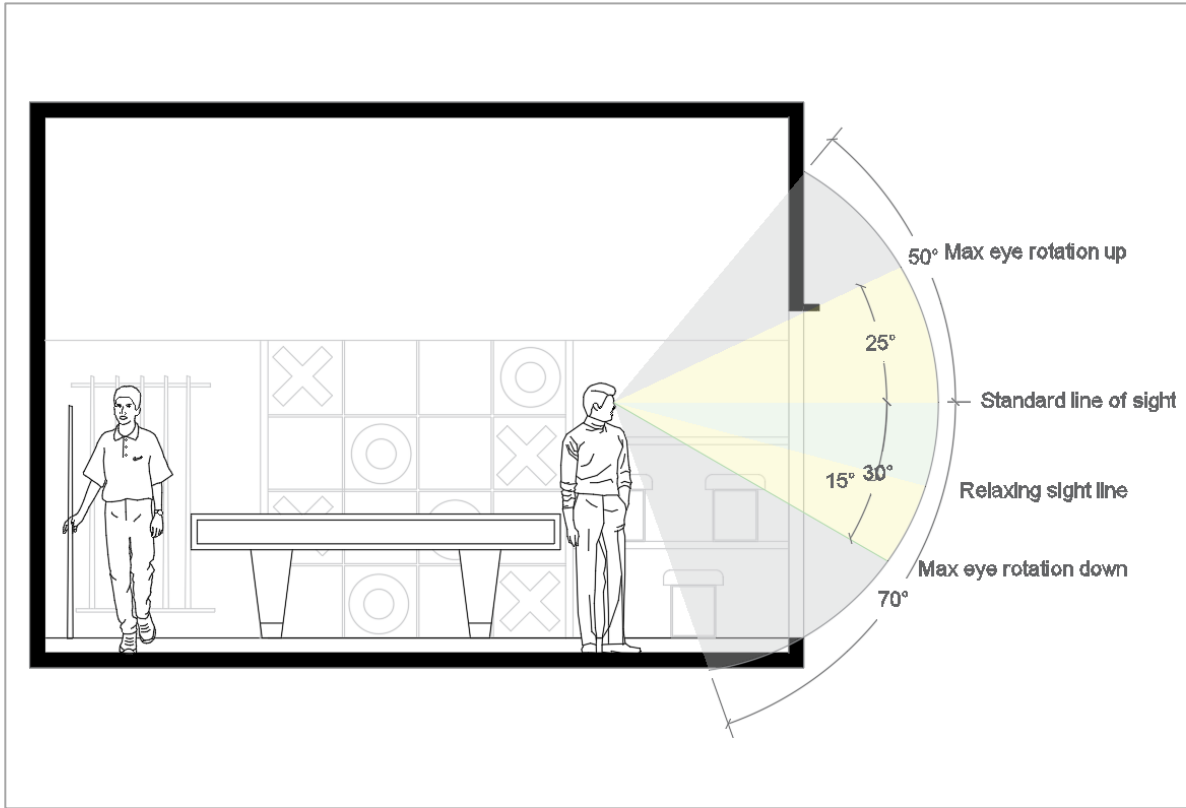


Figure 51. Ensuring visual continuity in the plying room

## 6.2.2 The methodology of integrating artificial lighting in the rooms

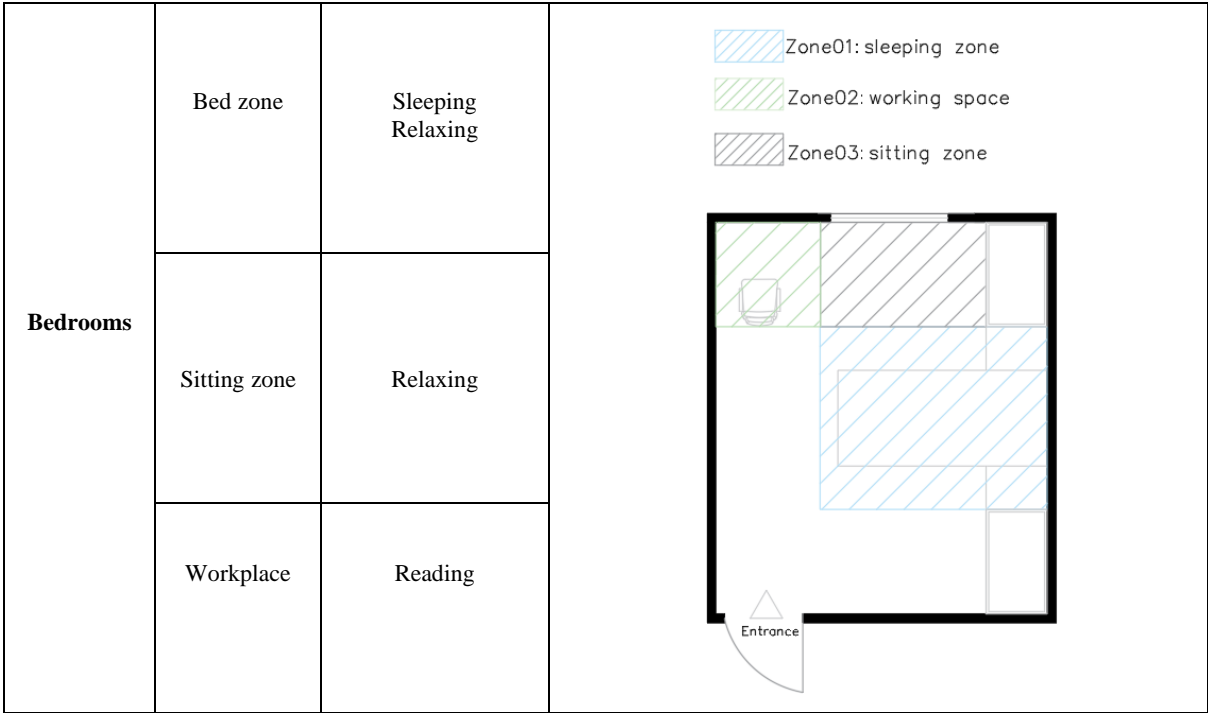
This step aims to improve the physical quality by integrating artificial light in the rooms and eliminate the standardization found in the case studies selected for this thesis that reveals a visual problem in the spatial quality of the rooms and therefore influences the attendance rate. The method used is the layout system.

This method leads to defining the area use, and according to that, it can be possible to figure out the needed atmosphere in each room and zone. The table below shows the activities in each room and their classification into zones to simplify spatial reading.

Table 27. spatial identification and use of each room.



The prototype room			
	The zoning space	The use of space	
Waiting area	Reception zone	Orientation	<p>Zone01: Reception zone</p> <p>Zone02: Waiting zone</p> <p>The diagram shows a rectangular room with an entrance at the top center. The left side is shaded with blue diagonal lines (Zone01) and contains a reception desk and a hand icon. The right side is shaded with green diagonal lines (Zone02) and contains several rectangular tables. A compass rose is located in the top-left corner of the Zone01 area.</p>
	Waiting zone	Sitting Communication	
Dining area	Eating zone	Eating Sitting Social interacting	<p>Zone01: eating zone</p> <p>Zone02: TV zone</p> <p>Zone03: food distribution zone</p> <p>The diagram shows a rectangular room with an entrance at the bottom center. The top-left area is shaded with blue diagonal lines (Zone01) and contains several tables. The top-right area is shaded with green diagonal lines (Zone02) and contains a TV set. The right side is shaded with brown diagonal lines (Zone03) and contains a food counter. A compass rose is located in the top-left corner of the Zone01 area.</p>
	TV zone	Watching	
	Food counter zone	Food distribution	
Lounges and play area	Play zones	Playing Social interaction	<p>Zone01: Game zone</p> <p>Zone02: wall exposure zone</p> <p>The diagram shows a rectangular room with an entrance at the bottom center. The entire room is shaded with blue diagonal lines (Zone01) and contains several tables and chairs. A large rectangular area on the right side is shaded with green diagonal lines (Zone02) and contains a pool table. A compass rose is located in the top-left corner of the Zone01 area.</p>



### **6.2.3 The incorporation of lighting strategy with the use of spaces and the psychology of patients.**

The conceptual methodology used to improve the visual quality of the rooms starts from the functional identification and uses (Table 27). Through this basis, it is possible to determine the necessary light layers in each space and which are classified as follows

- Ambient lighting; is the essential scene source that aims to produce clear space.
- Accent lighting; is a focal illumination that aims to draw attention to an object and highlight its presence.
- Task lighting; focused illumination aims to clarify the visualization that aids in performing a specific task.

The superposition of these layers produces a balanced visualization of the space. However, it is important to identify the need of the area to obtain an optimal stratification. In some cases, the spaces do not need the presence of the three types of lighting.

By projecting this concept on the prototype in the bedrooms, the identification of the activities requires the presence of the three types of illumination to interpret the spatial functions that existed. (Table 27.28)

For the waiting area, lounges, and dining area, the usage places identification shows the need for two types of lighting: Ambient lighting that serves to illuminate the space and accent light that aims to highlight the areas of different use. (Table 27.28)

After identifying the appropriate spatial needs and lighting strategy for each room, the next step requires specifying the characteristics of the luminaires in relation to the impressions the rooms should emit. the selection of luminaire properties is based on a correlation (spatial need/lighting effect).

The luminaires basics application in the bedroom follows these steps:

#### **The luminaires arrangement identification:**

The disposition of luminaires is referenced to the room architecture to specify the use of each zone. Unlike the grid system evaluated in chapter five, the results showed a unification in all the areas, which caused a lack in the reading elements. (Table 20)

#### **The luminaires' height:**

The second basis is the position of the luminaire That has a role in controlling the degree of privacy. As the bedroom lighting layout shows three coatings, the illumination installation follows the effect that should be perceived according to each layer. The first layout represents the ambient light for a general visualization

that can be provided by a ceiling installation. The personal impression in lighting design is related to the closeness of the luminaire source and the ability to control it. From this basis, I opted for wall installation of luminaires with low distance. This strategy can provide a private atmosphere in the zone. Simultaneously it respects the safety measures that recommend the avoidance of wires in the installation that may cause harm for the patient in a moment of anxiety.

**The luminaire distribution:**

The third basic is the lighting distribution, which can stimulate perception in several ways. Favoring the relaxing atmosphere leads to two types of lighting diffusion based on the previous steps: A direct downlight for ambient illumination that contributes to avoiding extra stimulation to space since it provides uniform lighting. The accent lighting for the work surface for additional stimulation if needed during a visual task. Wall lighting, this type of distribution, provides a visualization of the surface texture of walls and creates a warm and relaxing filling inside the room. *Figure 52*



Figure 52. The illumination strategy followed for bedroom design

The same process was followed to illuminate the waiting area, Based on:

**The luminaires arrangement identification:**

The arrangement follows the architecture and the use of each zone, which lead to the creation of two layouts of luminaires, an ambient lighting layout for the waiting area and an accent lighting layout for the reception zone for the eye-catching.

**The luminaires' height:**

As the waiting area is a public space it is mandatory to afford an illumination with less contrast that enhances the spaciousness impression of the space, this effect could be reached through the ceiling fixture that ensures a wider illumination for the overall waiting area.

The reception desk is the central focal point, the illumination height should be different to highlight the guiding effect. Based on this theory, the fixtures selected are at a distinct distance from the overall lighting system.

**The luminaire distribution:**

The lighting distribution in the waiting area serves to respond to two criteria. The first one is the spaciousness which can be achieved through direct downlight for general illumination and indirect lighting (cove lighting) to give a higher ceiling impression. The second effect is the guide that could be provided by accent lighting to highlight the zone. Figure 53

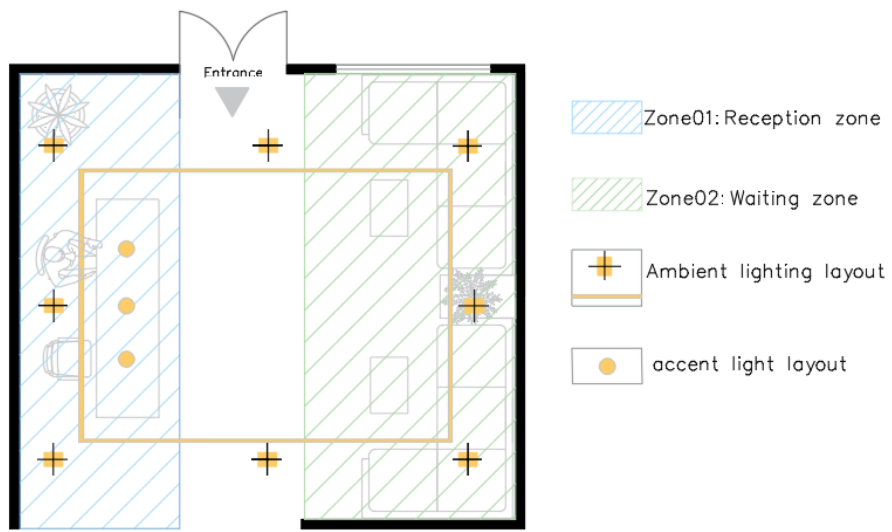


Figure 53. The illumination strategy followed for the waiting area design

In the application of the qualitative basics in the activities/ dining room, the basics were identified based on the needed impression in the space as follows:

### **The luminaires arrangement identification:**

Identifying the space uses is a primordial step that has helped determine the needs of this room since it encompasses several activities. The arrangement concept that I based on considered in all the rooms, the spatial architecture, and the furniture for a better interpretation of space. The plan shows three distinguished areas. The first zone is the dining zone, the central part where most activities must occur. It plays a role as a living space as well. Getting the most activities there leads to selecting the dining zone for the ambient lighting to provide necessary illumination. The Tv zone can be designed to emit a homely feeling by using an accent layout that breaks the uniformity of the ambient lighting. The third zone is the food counter, which should also be highlighted through accent lighting as a distinguished point. The difference between the tv zone light and the food counter is in the illuminance high where the tv area must appear less highlighted because it is decorative lighting while the serving food bar is a focal point.

### **The luminaires' height:**

Since the Dining Area is free time and more accessible to patients, the lighting installation must consider the safety measures in terms of distance height of luminaires. All the fixtures are fixed to ceiling shelves lighting that is connected to the furniture.

### **The luminaire distribution:**

The distribution of light pursues the layout arrangement and the spacing effect, the ambient lighting introduced by direct illumination, and the accent lighting with a focal distribution to highlight the distinct area. In addition, a decorative shelves light was added with a diminutive accent distribution for a warm effect and shadowless corners.

*Figure 54*



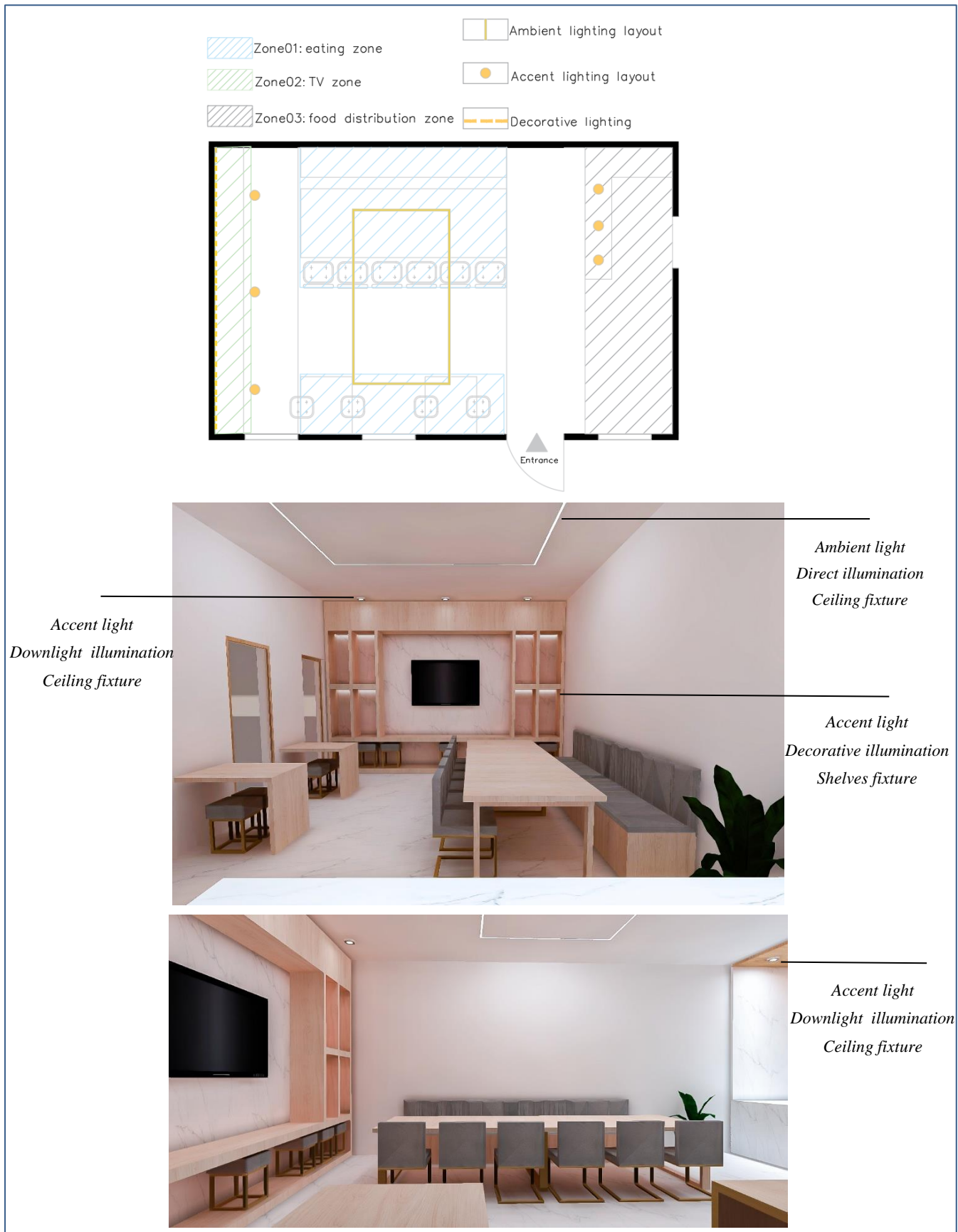


Figure 54. The illumination strategy followed for the dining area design

The playing room is a space for physical and mindful activities that rest on stimulation. The illumination strategy will play on this effect through:

**The luminaires arrangement identification:**

The fixture arrangement followed the spatial use of the room and the visual need for space. The first layout selected is the accent light that highlights the wall game and aims to draw attention to the distinct zone. The second layout is ambient lighting for the overall plays that are classified into two lighting arrangements, a grid lighting system for table games to manipulate the visual stimulation through the contrast that luminaires spot can create between the ceiling and the floor surface. The second arrangement system follows the design of the zone. Figure 55

**The luminaires' height:**

The same safety precaution was considered for the playing room, so they are installed at a height distance from patients. Simultaneously, raising the installation of luminaires results to the down surface plan a large illumination which gives visual comfort to the game's tables. The accent luminaire has less height distance than the ambient illumination to point out a different zone.

**The luminaire distribution:**

The distribution of luminaires is divided into two types, Accent downlight for a specific zone illumination and direct general lighting ambient illumination varied between recessed panels and spots light to create a ceiling contract for stimulation.

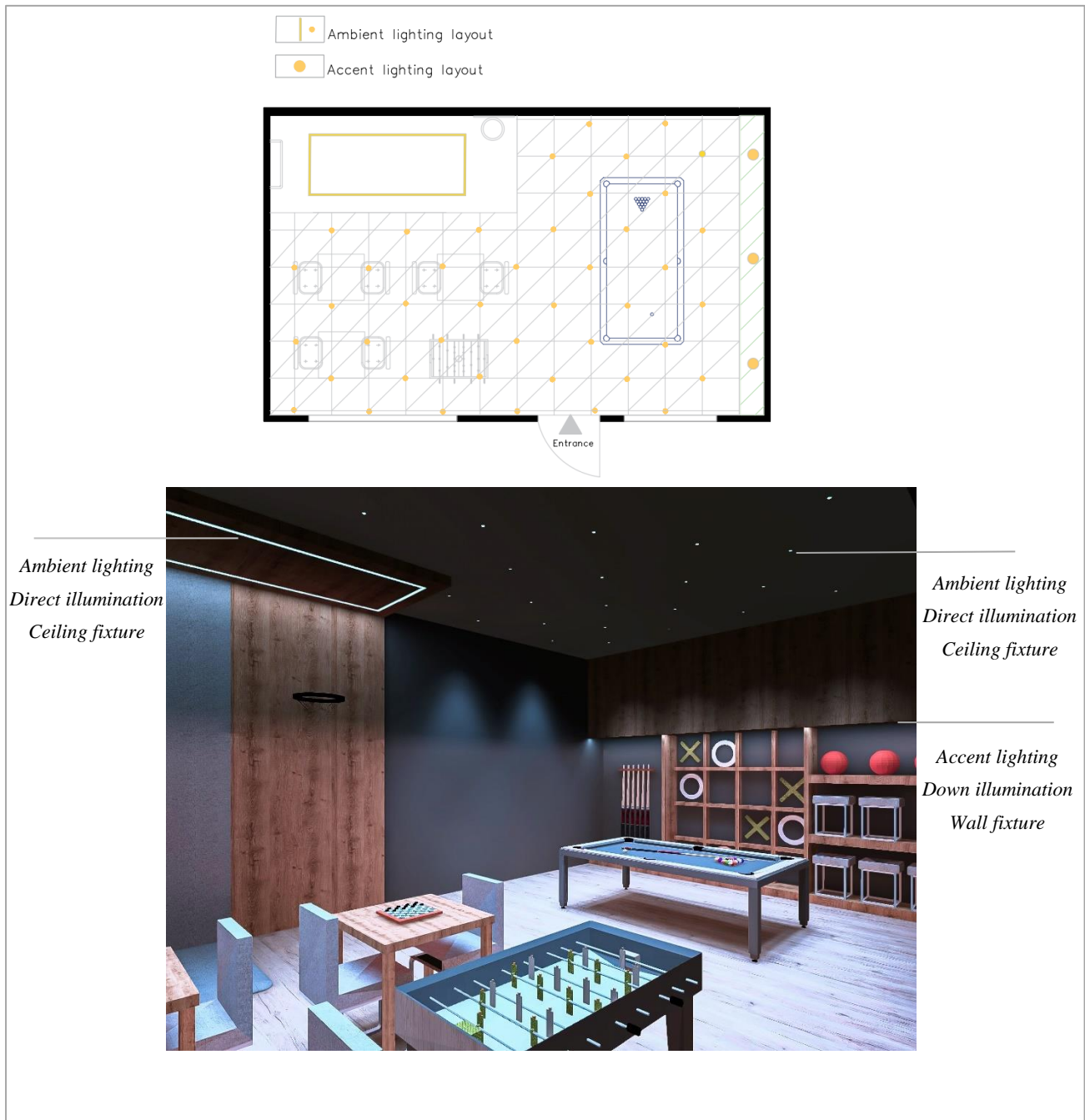


Figure 55. The illumination strategy followed for the playing room design

Table 29 The integration of lighting design strategy with the space impression.

Designed area	luminaires layout	The psychology effect	Fixture type	Fixture arrangement	Luminaire distribution
Reception/ Waiting Area	-Ambient light -accent light	-Guiding -Welcoming -spaciousness	-Wall fixture -Ceiling fixture	Following the room arrangement	Direct / Indirect lighting
Dining area	-Ambient light -accent lighting	-Guiding -pleasantness	-Wall fixture -Ceiling fixture	Following the room arrangement	Direct lighting
Lounges /play room	-Ambient light -accent lighting	Pleasantness	Ceiling fixture	Following the room arrangement	Direct lighting
Bedroom	-Ambient light -Accent lighting -Task lighting	-Relaxation -releasing -privacy	-Wall fixture -Ceiling fixture	Following the room arrangement	Direct lighting (diffuse, accent)

After consideration of the qualitative principles of illumination which manipulate visual perception, the role of the quantitative part can be applied as needed for each visual task. This complex approach between lighting engineering and lighting design allows a spatial differentiation and gives each space a specific atmosphere that should fit its needs.

The quantitative basics of light are:

**The illuminance:** It shows the quantity of luminous flux from a light source falling in a specific zone or any measured point in the space. The illuminance amount is deliberated in each space according to the need of the visual task performed on the surface or place. [28] The following table indicates the listed illumination in each area according to the international standard.

Table 30. The required illuminance for the prototype spaces according to the international standard [31],[32],[33].

<i>The illuminated area</i>	<i>The required standard illuminance (lux)</i>
Waiting area	200Lux
Reception desk	200Lux
Bedroom	100Lux
Bed area	200Lux
Reading Area	300 lux
Kitchen counter	300lux
Dining area	150 Lux
Playing room	100Lux
Table game	300Lux

**Color temperature:** is a form to describe the light appearance provided by a light bulb. It is measured in degrees of Kelvin (K).

Typically, Kelvin temperatures for business and interior lighting usage are on a scale from 2000K to 6500K. The temperature of the luminaire stimulates the room in a way that can show a warm and private atmosphere with a low measure. While it can alert the brain by using a high-temperature scale. *Table 31* The temperature in the rooms was selected according to the atmosphere and the stimulation needed in each space. As well based on the staff questionnaire about the activities' effect and role.

Table 31. The luminaire temperature and its ambiance effect on the space. [34]

Color temperature	2700K	3000K	500k
Light appearance	Warm light	Warm light	Cool daylight
Ambiance	Cozy, inviting	Warm, welcoming	Crisp, invigorating

**The luminance:** illustrates the brightness of an illuminated plan. The luminance is defined as the ratio of the luminous intensity of the surface (cd) to the projected area of the area. As well, it is the basis for describing perceived brightness. [28]

The selection of the appropriate luminaire for a room can be calculated according to the luminaire position and type. A large room with ambient light is calculated through the following equation:

$$\Phi = \frac{Eh \times (a \times b)}{F \times M}$$

$\Phi$  = Luminous flux of all direct radiating luminaires.

Eh = Horizontal illuminance on the work surface.

F= Correction factor (f=0.8 in case of direct lighting), (f=0.4 in case of indirect lighting).

M= Maintenance factor.

(a x b) = The plan surface width x length

The calculation of luminous change in the case of accent lighting to the following equation:

$$I = \frac{E_{ph} \times R^2}{\cos \alpha}$$

The calculation of luminaires is performed according to the illumination standard basics and the international equation to achieve the visual task sufficiency, *Table 33*

*Table 33. Calculation of the luminous flux and intensity of luminaires.*

Room	Required illuminance	Luminaire type	Temperature	The calculated luminous
Bedroom	General light 100 lux	Direct diffuse	3000K	<b>2812 Lumen</b>
	Work surface 300Lux	Accent light	4500K	<b>192 Candela</b>
	Bed zone 200Lux	Accent light	3000K	<b>128 Candela</b>
Waiting room	Waiting zone 200 Lux	Direct diffuse Indirect diffuse	3000K	<b>4687 Lumen</b> <b>9375 Lumen</b>
	Reception zone 200 Lux	Accent light		<b>03 luminaire with 288 Candela</b>
Dining room	Dining/activities zone	Direct diffuse	3000K	<b>9375 Lumen</b>
	Food counter	Accent light		<b>03 luminaires of 2352 Candela</b>
	Tv zone	Accent light		<b>03 luminaires of 252 Candela</b>
Playing room	Wall Game 300	Accent light	4500K	<b>03 luminaires of 2700 Candela</b>
	General light 100	Direct diffuse		<b>6250 Lumen</b>

### **6.3 The research contribution**

The thesis establishes an analytical method through which it treated the correlation between the physical space of rehabilitation institutions and the visual perception of patients. The results contribute to opening the door to rethinking the architecture of drug addiction centers by integrating the well-being of patients as an element of interest and not just including these establishments in standard norms and systems.

The dissertation constitutes a first step toward producing a manual of recommendations that frees the establishments of drug addiction from their institutional aspect due to the pure application of the norms and regulation that ignores the side of design.

The analysis process established in this research can be used as a qualitative approach to evaluation and the development of other criteria that can address the physical aspect of space in relation to user behavior.

### **6.4 The future research recommendations**

-Due to the health status caused by the Covid 19 virus at the time this thesis was set up, the methodology of this thesis suffered from several factors which generated a limited outcome. However, it can be considered a key to on which future studies can be based to continue or develop new strategies that can add other recommendations that improve the architectural quality of drug addiction centers in Algeria.

- As the research proved the importance of lighting quality for the patients' well-being, it is recommended to use other methods that involve patients in the decision of new lighting design by using technology tools such as 3D virtual reality.

- The thesis has limited its field of research on the impact of lighting factors, it is recommended in future research to touch all the other physical factors to complete the recommendation guideline and contribute to enhancing the architecture of addiction centers in Algeria.

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# *Appendix*

The interview was done with staff from three establishments, and it was done twice.

The first interview was for the purpose of collecting data on the establishments themselves in order to define their performance and their working mechanisms.

The second interview was intended to limit the ramification of the thesis and collect more data that focuses on the patient and his space in order to be able to determine the patient's behavior while taking into consideration the restrictions of the space and the psychological side of processing.

The interview contains a mixed method of questions to collect more qualitative information and facilitate the evaluation.

, for better classify the data, the establishment were coded as following

- The first establishment: (E01)
- The second establishment: (E02)
- The third establishment : (E03)

## **Part 01**

### **1) What is the age category most likely to come to the addictions center for treatment?**

#### **Answers:**

Establishment (E01): The institution receives all age groups, starting from minors and also up to the age of 60 years.

Establishment (E02): There is no specific age category; the establishment receives all age groups

Establishment (E03): we receive all age categories from teenagers of 14 years old to older people.

### **2) What is the most frequented category in the establishment between women and men?**

#### **Answers:**

Establishment (E01): this unit receives both women and men categories but the percentage of men is higher compared to women, and this comes down to social causes.

Establishment (E02): This unit receives only men, but there is another unit that is dedicated to women.

Establishment (E03): The unit receives both categories at a daily rate, but if we compare the two types that frequent the institution the most, it is the men's category.

### **3) who decides the type of patient care?**

#### **Answers:**

the type of patients' treatment is according to the type of substance consumed but we need in all the cases the patient's decision, so the patient's decision is the first key to start the cure.

### **4) How you can describe the discipline and attendance of patients at the institutions and even with the treatment set?**

#### **Answers:**

Establishment (E01): The response of patients to the treatment is very positive. Sometimes the patient comes confused and frightened at the first visit, but we try to reassure him, and in most cases, patients return regularly. We receive addicted patients daily, with an average of 50 patients from all over the country, as well as 30 beds in the hospitalization unit for males and females.

Establishment (E02): For addicted patients, we have limited attendance, which is not daily; the unit is dedicated only to hospitalization, so few cases are oriented to us. And in addition, it is not easy to convince patients to be treated in an establishment that includes mental disorders in the same unit.

Establishment (E03): Patient attendance is considered regular; approximately 20 patients are seen per day locally; the establishment provides daily treatment, including psychological and medical support.

**5) what are the cases supported by the unit?**

	Only addicts patients	All mental illness cases
Establishment (E01):	<b>X</b>	
Establishment (E02):		<b>X</b>
Establishment (E03):	<b>X</b>	

**6) What is the type of care of the establishment?**

	Daycare	Hospitalization
Establishment (E01):	<b>X</b>	<b>X</b>
Establishment (E02):		<b>X</b>
Establishment (E03):	<b>X</b>	

**7) What was the original function of the building, and has it undergone renovations?**

	originally for addiction cure	not originally for addiction cure	renovated	not renovated
Establishment (E01):		<b>X</b>	<b>X</b>	
Establishment (E02):		<b>X</b>		<b>X</b>
Establishment (E03):	<b>X</b>		<b>X</b>	

**8) How do you evaluate the daily flow of patients to the facility?**

	Low flow	local flow (medium scale)	National flow (Large scale)
Establishment (E01):			<b>X</b>
Establishment (E02):	<b>X</b>		
Establishment (E03):		<b>X</b>	

**9) What is the treatment program for a routine day for patients?**

**Answers:**

Establishment (E01): Day of treatment for inpatients; hospitalization is for weaning, which involves a complete abstinence process and a considerable duration defined by 21 days, so it requires planning a

full day within the establishment. And it is summed up in; waking up from the bedrooms, having breakfast, and gathering in the community in the refectory. Then hold therapy sessions and stimulating activities, relax during free time in the play areas and courtyard, lunch and therapeutic sessions, free time, dinner, and finishing the day by going to the bedroom.

For outpatients, their daily treatment routine consists of medical care, psychological and social support but does not use inpatient facilities.

Establishment (E02): The support of inpatients is summarized in a full day in the center, starting by; waking up from the bedrooms, having breakfast, and gathering in the community in the eating area. Then hold therapy sessions and stimulating activities, have a supervised courtyard break, lunch, therapeutic sessions, long Break for social interaction, dinner, and sleep.

Establishment (E03):

Here, patient care includes only a day-care routine where they receive medical and psychological support through consultations with psychologists and sociologists and individual and group stimulation activities.

## **Part 02**

**10) Is patients have the freedom to frequent the areas during their daily routine treatment and move freely within the rooms?**

**Answers:**

Establishment (E01): inpatients are not free to move freely in the treatment areas unless there is an emergency the visiting time of these places is supervised by the employees but they can move freely in the other areas where they go about their daily routine.

Outpatients they cannot freely access to treatment facilities.

Establishment (E02): The treatment program is carefully framed, where the therapists control the movement of patients to most places, and this is due to security reasons as well.

Establishment (E03): The frequency and flow within the rooms is controlled by the therapists and follows the treatment programs for the patients

**11) According to the functional program of the establishment, classify the place freely frequented by patients and the places with circulation and controlled attendance**

**Answers:**

	<b>The functional program</b>	<b>Freely accessible</b>	<b>Controlled Access</b>
<b>The establishment E01</b>	The waiting room	<b>X</b>	
	Psychologist offices		<b>X</b>
	Psychiatrist office		<b>X</b>
	Rehabilitation room		<b>X</b>
	The courtyard	<b>X</b>	
	Ergo therapy room		<b>X</b>
	The TV room	<b>X</b>	
	The play area	<b>X</b>	
	Bedrooms	<b>X</b>	
	The waiting room	<b>X</b>	

<b>The establishment E02</b>	Psychologist offices		<b>X</b>
	Psychiatrist offices		<b>X</b>
	Ergo therapy room		<b>X</b>
	Play area		<b>X</b>
	The kitchen		<b>X</b>
	Computer room		<b>X</b>
	The courtyard		<b>X</b>
	The TV room	<b>X</b>	
	Bedrooms	<b>X</b>	
<b>The establishment E03</b>	The waiting room	<b>X</b>	
	Psychologist offices		<b>X</b>
	Psychiatrist offices		<b>X</b>
	Social assistant office		<b>X</b>
	Rehabilitation room		<b>X</b>
	Sample room		<b>X</b>
	Ergo therapy room		<b>X</b>
	Computer room		<b>X</b>
	Sports room		<b>X</b>

**12) How can you classify patient preference for areas controlled by therapists?**

**Answers:**

Establishment (E01): It can be said that the patients are enthusiastic for certain therapeutic sessions because they know that they will obtain medicines to fill their needs.

Establishment (E02): patients feel comfortable for the treatment session where they can use more areas

Establishment (E03): for certain therapeutic sessions that allow patients to have a medical prescription, patients are very comfortable coming, but it is difficult to convince them to face other sessions concerning motor activity.

**13) during a day in patients routine how do you rate their occupations of the spaces where they are freer to move.**

**Answers:**

	<b>Strong occupation</b>	<b>Limited time</b>	<b>Week occupation</b>
Establishment (E01)	The play area	Bedrooms	The waiting room
	The courtyard		The TV room
Establishment (E02)	Medium size bedrooms	The TV room	Isolation bedroom
			Large bedroom
Establishment (E03):	The waiting room		

**14) in places where the patient is free to move what are the interior elements that he can control.**

**15) How can you classify patient preference for areas controlled by therapists?**

**Answers:**

Establishment (E01): It can be said that the patients are enthusiastic for certain therapeutic sessions because they know that they will obtain medicines to fill their needs.

Establishment (E02): patients feel comfortable for the treatment session where they can use more areas

Establishment (E03): for certain therapeutic sessions that allow patients to have a medical prescription, patients are very comfortable coming, but it is difficult to convince them to face other sessions concerning motor activity.

**16) during a day in patients routine how do you rate their occupations of the spaces where they are freer to move.**

**Answers:**

	<b>Strong occupation</b>	<b>Limited time</b>	<b>Week occupation</b>
Establishment (E01)	The play area	Bedrooms	The waiting room
	The courtyard		The TV room
Establishment (E02)	Medium size bedrooms	The TV room	Isolation bedroom
			Large bedroom
Establishment (E03):	The waiting room		

**17) in places where the patient is free to move what are the interior elements that he can control.**



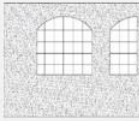

	<b>Furniture position</b>	<b>Openings (windows)</b>	<b>Artificial light control</b>
Establishment (E01)	<b>No</b>	<b>Yes</b>	<b>Yes</b>
Establishment (E02)	<b>No</b>	<b>Yes</b>	<b>Yes</b>
Establishment (E03):	<b>No</b>	<b>Yes</b>	<b>Yes</b>

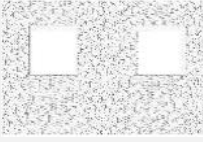
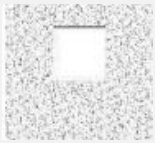

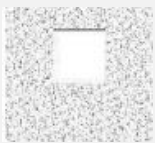
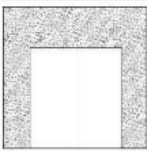
18) While you are trying to prepare patients for the psychological treatment process, how do you classify the patients' activities within the institutions affects their psychological aspect.

	<b>The functional program</b>	<b>Relaxation/ calming</b>	<b>stimulation</b>
<b>The establishment E01</b>	The waiting room	X	
	Psychologist offices	X	
	Psychiatrist office	X	
	Rehabilitation room	X	
	The courtyard	X	
	Ergo therapy room		X
	The TV room	X	
	The play area		X
	Bedrooms	X	
<b>The establishment E02</b>	The waiting room	X	
	Psychologist offices	X	
	Psychiatrist offices	X	
	Ergo therapy room		X
	Play area		X
	The kitchen		X
	Computer room		X
	The courtyard	X	
	The TV room	X	
	Bedrooms	X	
<b>The establishment E03</b>	The waiting room	X	
	Psychologist offices	X	
	Psychiatrist offices	X	
	Social assistant office	X	
	Rehabilitation room	X	
	Sample room		
	Ergo therapy room		X
	Computer room		X
	Sports room		X



*Notation of the architectural physical components in each room in studied cases.*

Establishment E01	Floor		Ceiling texture		Walls texture		Openings		
	texture	Colour	Texture	Colour	Texture	Colour	Type	number	Shape
Waiting area	Cement tile	Light brown	Paint	White	Painted wall	Light blue	Door	01	
Play Room	Cement tile	Light brown	Paint	White	Painted wall + ceramic tile	Wait paint +light ceramic tile	Door	01	
Tv room	Cement tile	Light brown	Paint	White	Painted wall + ceramic tile	Wait paint +light ceramic tile	window	05	
Bedrooms	Cement tile	Light brown	Paint	White	Painted wall + ceramic tile	Wait paint +light ceramic tile	window	01	

Establishment E02	Floor		Ceiling texture		Walls texture		Openings		
	Texture	Color	Texture	Color	Texture	Color	Type	Number	Shape
Large bedrooms	Cement tile	Light brown	Ceiling panels	White	Painted wall	Dark blue	Window	2	
Medium size bedrooms	Cement tile	Light brown	Ceiling panels	White	Painted wall	Light blue	Window	1	
The isolation room	Cement tile	Light brown	Ceiling panels	White	Painted wall	purple	Window	1	
TV room	Cement tile	Light brown	Ceiling panels	White	Painted wall	Pink	Window	5	
Corridor	Cement tile	Light brown	Ceiling panels	White	Painted wall	Pink	Door	1	

*Photographic documentation of studied cases*

*Establishment, E01*









*Establishment, E02*





*Establishment, E03*

