USER PARTICIPATION IN THE EVALUATION AND DESIGN OF THE

ORAL HEALTHCARE ENVIRONMENTS

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Approval sheet of the Thesis

This is to certify that we have read this thesis entitled **"User Participation in the Evaluation and Design of the Oral Healthcare Environments"** and that in our opinion it is fully adequate, in scope and quality, as a thesis forthe degree of Master of Science.

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

USER PARTICIPATION IN THE EVALUATION AND DESIGN OF THE ORAL HEALTHCARE ENVIRONMENTS

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Oral Healthcare plays a vital role in overall health and well-being, and the design of oral healthcare environments significantly impacts the quality of care and user experience. This research explores the significance of involving users in the evaluation and design processes of oral healthcare environments, aiming to improve patient satisfaction, enhance treatment outcomes, and ensure the provision of patient-centered care. It analyzes end-user satisfaction and design approaches centered on their requirements. In terms of psychological perception and behavioral action, it is also important to look into how dental physical elements might be designed to promote a good transition and flow of users through the various spaces in the dental clinic.

Integrating the multidisciplinary knowledge of patient comfort, privacy, and staff-patient interaction into the design of the physical environment is a challenge that requires extensive research analysis and integration. For this purpose, the thesis evaluates and compares three dental clinic environments based on their importance for oral health settings in different contexts, designs, and typologies. The literature on users' perceptions of physical surroundings in the context of oral healthcare is limited. Furthermore, the relationship between care services and facility architecture is frequently overlooked, in part because there isn't enough data. This study attempted to fill the gap by examining outpatients' perceptions of design elements relevant to the dental center areas they frequently visited.

To achieve this, participatory design techniques were utilized in this study to encourage the user's involvement right from the outset of the design process. In the

user evaluation group of 97 users, 94 patients and 3 dental professional staff of the 3 respective selected clinics in Tirana, Albania participated. The process took place from March to May 2023. These included surveys, interviews, open discussions, group meetings, and the walking-through method. Some general concepts were discovered through analysis: personal experience, dental anxiety, physical environment, and physical features, regarding their perceptions, preferences, and needs. However, it was observed that there is a lack of public awareness regarding the value of user involvement in the design decision-making process. The variation in users' needs was found to be influenced by the frequency of usage and duration of stay, leading to differences in design priorities between patients and dental staff. Understanding these factors can aid in reducing patient anxiety and creating a patient-centric strategy. Design interventions, such as enhancing waiting areas, improving lighting, creating private consulting rooms, and incorporating biophilic elements, can contribute to a more positive and calming dental environment.

The thesis provides specific design suggestions and recommendations for dental clinics as a whole and offers proposals for dental settings within each clinic type. By implementing these design recommendations, dental clinics can be transformed into more comfortable and effective spaces for both patients and staff, ultimately promoting user satisfaction and social sustainability for oral healthcare environments.

Keywords: *oral healthcare environment; healthcare design; participatory design; users' participation;*

ABSTRAKT

PJESËMARRJA E PËRDORUESVE NE VLERËSIMIN DHE PROJEKTIMIN E MJEDISEVE TË KUJDESIT SHËNDETSOR ORAL

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Kujdesi Shëndetësor oral luan një rol jetik në shëndetin dhe mirëqenien e përgjithshme, dhe projektimi i mjediseve të kujdesit shëndetësor oral ndikon ndjeshëm në cilësinë e kujdesit dhe përvojën e përdoruesit. Ky hulumtim eksploron rëndësinë e përfshirjes së përdoruesve në proceset e vlerësimit dhe projektimit të mjediseve të kujdesit shëndetësor oral, duke synuar të përmirësojë kënaqësinë e pacientit dhe te profesionistit, të përmirësojë rezultatet e trajtimit dhe të sigurojë ofrimin e kujdesit me në qendër pacientin. Ai analizon nevojat e përdoruesit dhe qasjet e projektimit të përqendruara në kërkesat e tyre. Për sa i përket perceptimit psikologjik dhe veprimit të sjelljes, është gjithashtu e rëndësishme të shikohet se si elementët fizikë te mjedisit dentarë mund të dizajnohen për të promovuar një tranzicion dhe rrjedhje të mirë të përdoruesve nëpër hapësira të ndryshme në klinikën dentare.

Integrimi i njohurive shumëdisiplinore të komfortit te perdoruesit, privatësisë dhe ndërveprimit staf-pacient në projektimin e mjedisit fizik është një sfidë që kërkon analizë dhe integrim të gjerë kërkimor. Për këtë qëllim, teza vlerëson dhe krahason tre klinika dentare bazuar në rëndësinë e tyre për mjediset e shëndetit oral në vendodhje, projektim dhe tipologji të ndryshme. Literatura mbi perceptimet e përdoruesve për mjedisin fizik në kontekstin e kujdesit shëndetësor oral është e kufizuar. Për më tepër, marrëdhënia midis shërbimeve të kujdesit dhe arkitekturës së mjedisit shpesh anashkalohet, pjesërisht për shkak se nuk ka të dhëna të mjaftueshme. Ky studim u përpoq të plotësonte boshllëkun duke ekzaminuar perceptimet e perdoruesve, si te pacientëve ambulatorë për elementët e projektimit që lidhen me hapësirat dentare që ata frekuentojnë.

Për të arritur këtë, disa teknika të projektimit me pjesëmarrje u përdorën në këtë studim për të inkurajuar përfshirjen e përdoruesit që në fillim të procesit të projektimit.

Në grupin pjesëmarrës të përdoruesve prej 97 përdoruesish, morën pjesë 94 pacientë dhe 3 staf profesional stomatologjik të 3 klinikave përkatëse të përzgjedhura në Tiranë, Shqipëri. Procesi u zhvillua nga marsi deri në maj 2023. Këto përfshinin sondazhe, intervista, diskutime të hapura, takime në grup dhe teknikën e "Diskutimi duke eksploruar ". Përmes kerkimeve u zbuluan disa koncepte të përgjithshme: përvoja personale, ankthi dentar, mjedisi fizik dhe veçoritë fizike, në lidhje me perceptimet, preferencat dhe nevojat e tyre. Megjithatë, u vu re se ka mungesë të ndërgjegjësimit të publikut në lidhje me vlerën e përfshirjes së përdoruesve në procesin e vendimmarrjes së projektimit. Ndryshimet në nevojat e përdoruesve u zbuluan se ndikohen nga shpeshtësia e përdorimit dhe kohëzgjatja e qëndrimit, duke çuar në ndryshime në prioritetet e dizajnit midis pacientëve dhe stafit dentar. Kuptimi i këtyre faktorëve mund të ndihmojë në reduktimin e ankthit të pacientit dhe krijimin e një strategjie të përqendruar te perdoruesi. Ndërhyrjet e projektimit, të tilla si permirësimi i zonave të pritjes, përmirësimi i ndriçimit, krijimi i dhomave private të konsultimit dhe përfshirja e elementeve biofile, mund të kontribuojnë në një mjedis dentar më pozitiv dhe qetësues.

Kjo tezë ofron sugjerime dhe rekomandime specifike të projektimit për klinikat dentare në tërësi dhe ofron propozime për 3 rastet e mjediseve dentare te analizuara. Duke zbatuar këto rekomandime gjatë projektimit, klinikat dentare mund të shndërrohen në hapësira më komode dhe efektive si për pacientët ashtu edhe për stafin, duke promovuar kënaqësinë e përdoruesit dhe qëndrueshmërinë sociale për mjediset e kujdesit shëndetësor oral.

Fjalët kyçe*: Mjedisi i kujdesit shëndetësor oral; pjesëmarrja në projektim; perdoruesit, mjedisi fizik, komforti.*

Dedication goes to my family!

ACKNOWLEDGEMENTS

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CHAPTER 1

INTRODUCTION

1.1   Problem Statement

People spend more than 90% of their time in built environments that influence their feelings, actions, and behavior (Evans, 2003). The World Health Organization (WHO) (2001), argues that the physical environment is a critical component of quality healthcare. The literature has demonstrated that the physical environment has a significant impact on how users behave and interact in an oral healthcare environment. As a result, the majority of people find that visiting the healthcare setting is stressful. This is a problem that frequently is faced in oral healthcare environments, in the case of Tirana, Albania. Due to unpleasant emotional responses to particular procedures or the setting of dental care, people are hesitant to use dental services. That happens usually because the main users of the facilities are not considered during the design of their environment. Here a crucial point starts with the need to understand the concepts of evaluation and participatory design.

Dental anxiety and fear are common problems that people experience around the world, and they have a big impact on both their oral health and general wellbeing. Furthermore, Albania is not exempt from this issue, so it is crucial to understand the prevalence and underlying factors contributing to dental fear and anxiety among Albanians. Our families and social circles have noted a significant prevalence of dental stress and anxiety among Albanian residents, which emphasizes the urgent need for comprehensive research and intervention techniques to address this common issue.

Albania's dental healthcare system consists of a wide range of clinics, some of which are among the most popular facilities in the nation. The physical structure, internal organization, and operational features of these clinics differ significantly. The ability of the current oral healthcare facilities in Albania to adapt to various patient types and their particular demands has been made clear through personal observations and experiences.

Avoiding dental care is caused mainly by fear and anxiety about visiting the dentist and receiving dental treatment. Patients who experience dental anxiety may not fully cooperate during treatment, this anxiety is usually brought on by a feeling of pain and discomfort related to the oral environment. (Appukuttan, 2016). In a dental environment, sensory responses include the noises of drilling, the smell of eugenol, the sensation of high-frequency vibrations, and any dental feature that can cause anxiety. Thus, it's crucial to find strategies for promoting dental clinic visits by reducing dental anxiety. Even though the dental team has a variety of approaches to support the effective management of a dentally anxious user, it has been accepted that behavioral therapy and environmental psychological interventions can affect the anxiety of the patient. Fear can present itself in two different ways: through one's own experiences, or through those of others. The treatment itself is the particular factor that causes fear. The psychological effects included a variety of negative perceptions, beliefs, and worries. The physiological effects included signs and symptoms of the fear response and exhaustion following a dental appointment. For many years the dental anxiety of the users has been a real barrier to dental procedures.

1.2 Thesis Objective.

This project aimed to provide a collection of design recommendations to build an interior design brief for oral healthcare spaces using a user-participatory approach and evidence-based research. The major goal of this study is to find out the role of the users with the oral healthcare facilities. To explore together with the patients and dental staff professionals, the built elements that are needed in these environments in order to assist patients to feel safe, comfortable, and relaxed while they wait for their appointments or during their treatments. It will assist them in changing from a negative and anxious emotional state to a healthier and happier one. To achieve this, the thesis divides the findings from the literature review and workplace research conducted at dental clinics into two categories: first, the workspace feature examined, and second, the type of outcome measure or research result identified. In order to apply participatory design, examine how patients in Tirana's three oral healthcare facilities perceive their care and surroundings. With regard to the trends and difficulties in dental

health centers, this would be really helpful. So, by creating oral health environments that are physically comforting and mentally helpful, the design will benefit both patients and professionals. It will further search answer for the following questions:

- What are the features of Participatory Design in designing an oral healthcare environment?
- What is the relationship between the perceived environmental quality and its users?
- Which are the "best" design healthcare environments, and what to consider while designing such environments that can help in reducing patient anxiety?
- How does the dental clinic' sound, views, light, and nature, influence patients' emotional states and evaluations related to their dentist visit?
- How does the dental clinic' sound, views, light, and nature, influence dental staffs' work in the dental environment?

1.3 Scope of works

The analysis of user evaluation and participation in the usage and design of oral healthcare environments is the main emphasis of this thesis, as mentioned in the thesis objectives. The purpose of the study is to look into three distinct contexts, each of which presents a distinctive typology of dental clinics. By concentrating on these contexts, a comprehensive understanding of the wide range of typologies observed in the environments of oral healthcare in Tirana can be obtained.

It begins with an in-depth study of the residential unit dental clinic type. This context examines the integration of dental clinics into residential settings, taking into account factors like approaches to the design, circulation, and layout, dental functional areas, physical characteristics, functional requirements, and user experience. By analyzing the special qualities and architectural issues of a dental clinic example located inside a residential unit in Tirana, it is possible to get crucial insights into the challenges and opportunities associated with this particular typology. The second area of the scope focuses on the type of hospital unit-dental clinic. In this context, the particular requirements and variables involved in designing dental clinics in hospital settings are examined. It examines how dental and medical services are coordinated,

how dental facilities are functionally integrated into the greater healthcare environment, and how these factors affect workflow and user experience. The third component of the scope is about the typology of the biophilic unit dentistry clinic. In this context, the application of biophilic design principles and elements in dental offices is examined. Biophilic design gives a lot of importance to the use of organic elements and features to enhance customer comfort and well-being. By investigating a dental clinic in Tirana that uses biophilic design, the thesis explores the potential benefits of bringing patients closer to nature, generating healing environments, and highlighting positive user experiences. Through the investigation of functional and spatial features, user assessment and engagement, and stakeholder interaction, the project is focused on obtaining relevant information that can direct the design and enhancement of oral healthcare facilities.

1.4   Methodology

In order to evaluate the impact of participatory design to improve the users health outcomes in the oral healthcare context, my research combines a variety of methodologies to gather and analyze the necessary data. There is an appendix with this thesis' tools added at the end of the report.   These tools using quantitative and qualitative data from structured surveys and interviews to provide an associated narrative that is seen through the eyes of users, patients, and professionals to comprehend their needs and environmental issues. For designers and architecture firms who concentrate on the "social good," it can be useful to comprehend the principles of people-first design and how they affect the healing and recovery processes.

Literature Review

This literature review combines findings from prior studies, theoretical frameworks, and practical tactics that have been used to enhance user participation in the oral healthcare setting. It utilizes academic databases like PubMed, Scopus, or Google Scholar to do an in-depth search using terms like "user participation," "patient engagement," "oral healthcare," "patient empowerment," "functional areas," and "physical features"

Qualitative Data Selection

Three dental clinics in Tirana, Albania, that were representative of the three respective clinic typologies that are observed in the city—residential, hospital-based, and biophilic or standalone units—were chosen as the initial research subjects. In the first case, a dentist office located in a residential building changed the arrangement of the existing apartment to meet clinic requirements. Measurements, an evaluation of the surroundings, and photography were done on-site. The dentistry clinic that was a part of the "Hygea Hospital" was the focus of the second typology that was examined. Contact was established with the hospital's director, who helped with the investigation by providing access to the necessary information, including the designs for the dental environment. The third case study centered on a stand-alone biophilic dentistry office that was located in a serene environment. The leadership team provided the necessary plans of the clinic for the analysis.

After carefully examining each case study, the research moved on to conducting structured questionnaires and interviews with patients and dental professional staff of the respective clinics. The survey tool was specifically created to capture various facets of patient experience within the context of the dental clinic. It included sections for personal information to gather relevant demographic data, ensuring a through grasp of the characteristics and background of the respondents and questions regarding the experiences of the respondents before to, during, and after their clinic appointments. The last part of the survey includes participants' views on the physical features of the clinic. It evaluated these characteristics in an effort to figure out how the physical environment affected the users' treatment experiences. This section focused on their feedback of the clinic's facilities, including their thoughts on items like the layout, lighting, colors, cleanliness, noise levels, privacy, and comfort.

In addition to the survey, interviews with the three dentists working in the respective dental clinics were carried out. These interviews were conducted to obtain their professional opinions on a variety of subjects including their work environment, interactions with patients, and the effect of their physical characteristics on their professional lives. First, the doctors were advised to think carefully about the design and spatial organization of the dental clinics, including the arrangement of the

treatment rooms, waiting areas, and support spaces. The interviews also looked at how the doctors handled dealing with patients in a clinic setting. The dentists were questioned on how the outside design of the dental clinic affected patients' trust, comfort, and privacy. The goal of these interviews was to gain a deeper understanding of the dentists' perspectives as important "players" in the field of oral healthcare. By providing ideas and recommendations to improve user participation in the oral healthcare environment from an architectural perspective, the research aimed to create a connection between architectural design and oral healthcare practice.

The other tool used is the idea of conducting a participative walking-through to understand how the physical features of the dental environment affect the experience of patients. As part of the participative work process, a small group of patients (3-4) users were gathered in the dental environment, to encourage a discussion about their needs and their preferences for the dental environment.

The information gained from the case studies, questionnaires, and interviews was reviewed throughout this two to three-month research process in order to look for developments, patterns, and connections. Overall this methodology assisted in the creation of an in-depth understanding of user experiences, preferences, and challenges in the context of dental clinic environment.

1.5 Organization of the thesis

This thesis is organized in 5 chapters. The organization is done as follows:

In Chapter 1, are presented the problem statement, thesis objective and scope of works. The study questions, objectives, and methods used to accomplish the research aims are also described in the chapter. Chapter 2, includes the literature review. It critically evaluates previous studies on user-centered design concepts, the function of stakeholders, and the influence of design on the user experience. For the purpose of creating a theoretical framework for the next analysis and case studies, this chapter creates the relevant scientific literature. Chapter 3, consists of the analysis of individual case studies within three different contexts. The collected data of the literature review and the case studies are analyzed and summarized in Chapter 4. The information gathered is carefully evaluated in this chapter, with connections made and structures, concepts, and design principles extracted from the study. Conclusions and recommendations for further investigation are given in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

2.1   Participatory Design

In accordance with the studies conducted by Jenkins (2010) and Curl (2006), the concept of "Participatory Design" can be broadly defined as follows:

"*Participatory Design (PD) is an approach and practice that actively involves all relevant stakeholder groups, especially collective end-users, in the process of designing and making decisions.*"

The central focus of the participatory design is to prioritize human action and the rights of individuals to participate in shaping the environments in which they operate. Participation in this context refers to the fundamental shift of users from being mere sources of information to being recognized and legitimate participants in the design process (Robertson & Simonsen, 2013, pp. 4-5). Participants may include non-designers, community members, and any users who traditionally have not been involved in decision-making processes that impact them. This methodology has been applied across various fields such as education, healthcare, software development, information technologies, product design, city planning, urban design, architecture, and environmental design. The history of Participatory Design has evolved in response to the distinct social and political conditions of each field. It enables users to personalize and adapt products to their specific needs, resulting in more efficient and effective functioning of the products. Designers previously believed that the idea of "design for users" was at the center of participatory design. They suggested that human aspects should be the main determinants of the design process. According to this viewpoint, designers would deal with design issues, come up with solutions on behalf of consumers, and offer items that met users' needs. Allowing users to have control over their own future might lead to situations where essential technical knowledge was overlooked—for example, users might not be aware of safety, efficiency, or comfort issues that could arise. However supporters of "design by users" argued that

considering only human factors in the design process failed to fully represent the diverse perspectives and true ideas of individuals (Eason, 1995; Kujala, 2010).

In cases where specific users were the intended audience for the products, their input could significantly influence the design (Eason, 1995). Designers were not users themselves when they engaged in the design process. They were not decision-makers with the authority to determine what was good or beneficial for others.

Architecture has recently adopted the idea of participatory design as a paradigm that uses research findings to guide building and environment design. This theory respects the demands of clients and users while simultaneously emphasizing the value of objective facts (Hamilton & Watkins, 2009; Ban et al., 2016b). Its guiding principles are intended to help designers, customers, users, and other stakeholders throughout the design process define their requirements for the built environment. By using the participatory design conceptual model (Figure 1.) in architectural contexts, a focus is placed on improving building design, functioning, and management to maximize human connectivity. Participatory planning in the field of built environmental design can facilitate effective communication and interactions, benefiting people of various ethnic groups, social classes, and age ranges in various environments, according to the book "HANDBOOK OF ENVIRONMENTAL PSYCHOLOGY" (John Wiley & Sons, 2002).
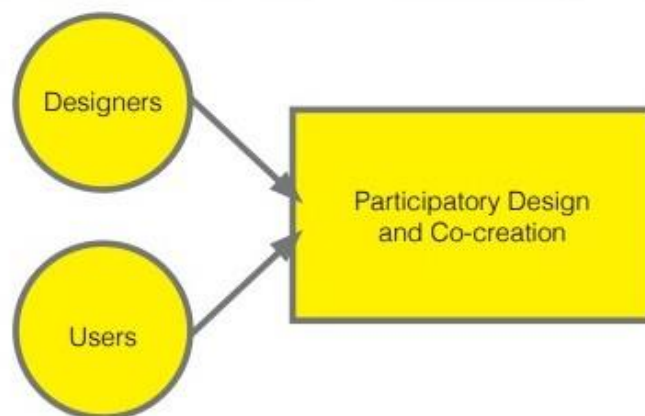
Figure 1. Participatory design in general (Hamilton & Watkins, 2009)

2.1.1 Advantages and benefits from Participatory design

The benefits of both "design for users" and "design by users" can be utilized throughout the participative process. Enhancing user pleasure, according to Eason (1995, p. 1671), involves not obediently responding to all of their wants, but rather encouraging productive interaction between users and designers. Architects should make an effort to comprehend the best interests and unique needs of the users when they interact with such places in order to apply the principle of "design for users with users" in the design of built environments (Figure 2). It is crucial to note that end users frequently express themselves in terms of a general vision of comfort rather than explicit expectations with predefined solutions because they typically have less specialized knowledge in the field of built environment design (Eason, 1995, p. 1668; Vischer, 2008; Ban et al., 2018).
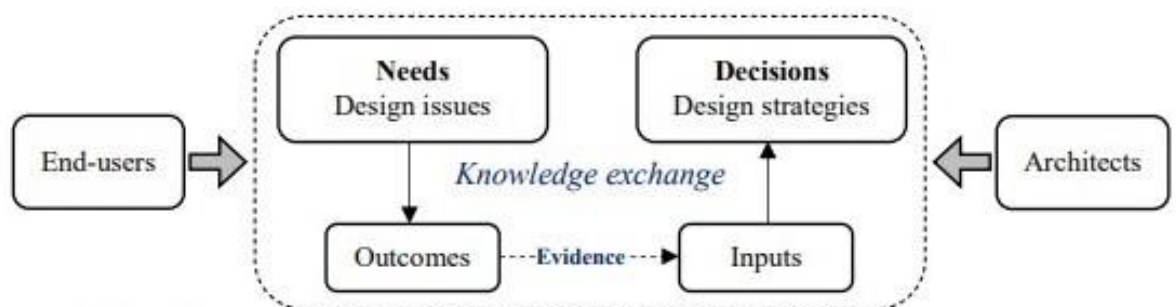
Figure 2. The knowledge based on the participatory design. (Eason, 1995)

The utilization of participatory design aims to foster a design process that is more democratic, inclusive, and responsive, taking into account the needs, principles, and goals of the individuals who will utilize and experience the structure or area. To ensure effective and efficient participation in the design process, efforts should be made to enhance people's understanding of the planning aspects. According to recent research (Schroeder, 2022), participatory design in architecture also presents challenges. For instance, managing stakeholders' expectations and striking a balance between their desires and financial/technical limitations can be difficult.

Additionally, power imbalances between stakeholders may exist, with some

exerting more influence over the design process than others. Nonetheless, the literature suggests that participatory design can be an effective approach to creating architecture that meets stakeholders' needs and contributes to community well-being. Careful management of the design process and the involvement of all stakeholders are crucial for ensuring that the resulting architecture is sustainable and meaningful (Dulgeroglu, 1997). The participatory design technique offers the best means of obtaining design solutions that cater to the needs and demands of end-users.
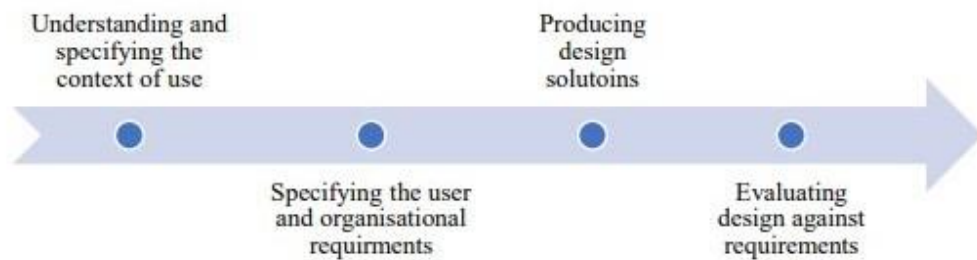
Figure 3. Activities of a typical user in participatory design process. (Schroeder, 2022)

2.1.2. Techniques and methods of Participatory design

Various techniques are commonly employed in participatory design to facilitate the active involvement and engagement of all participants. There many different examples of these techniques. Firstly is mentioned the Workshops and Co-Design Sessions by (Eason, 1995). It presents the structured workshops and co-design sessions bring together designers, users, and stakeholders to explore ideas, gather insights, and collaboratively generate design solutions. Activities such as brainstorming, sketching, role-playing, and group discussions are conducted. Another method stated by (Bødker, 1993) is related to Contextual Inquiry and Observation. Researchers or designers observe and interact with users in their natural environment to gain a deeper understanding of their needs, workflows, and challenges. This technique allows designers to uncover valuable insights and identify opportunities for improvement.

Nowdays, we use more method of interviews and surveys, which are in-depth

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interviews and surveys in order to gather detailed information about users' preferences, requirements, and experiences. Structured or semi-structured interviews elicit specific insights, while surveys collect quantitative data from a larger user base.

By (Muller, 2003), prototyping and feedback is a crucial element of participatory design. Designers create low-fidelity or high-fidelity prototypes to visually represent design concepts. These prototypes are shared with users and stakeholders for feedback and evaluation, ensuring that the design aligns with their expectations. Users and designers engage in sketching and visualizing design ideas together. This technique allows users to express their preferences, suggest modifications, and actively contribute to the design process by participating in the creation of visual representations. Another approach is dedicated to the online platforms. Using Online collaboration platforms are increasingly used to facilitate remote participatory design. These platforms provide spaces for sharing ideas, exchanging feedback, and collaborating on design concepts, enabling asynchronous collaboration and engaging geographically dispersed participants.

So, once a design solution is implemented, participatory evaluation techniques involve users and stakeholders in assessing its effectiveness. This can be accomplished through usability testing, user feedback sessions, or co-evaluation workshops. Their feedback is valuable for identifying any issues or areas for further improvement. Related with the participatory workshops, another approach is that method of Transcent Walks. In a setting, the walking-through or transect walk stands out as a useful participatory design technique that optimizes data collection. This strategy includes a pre-planned walk carried out by individuals or small groups, with a clear aim decided upon at the beginning. Participants learn a great deal about the topic by exploring the physical surroundings and viewing it through the perspective of the intended purpose. (Hague, Transect Walks as a Participatory Way). By utilizing these techniques and methods, participatory design can effectively involve stakeholders throughout the design process and contribute to the development of user-centered and contextually appropriate solutions.

2.2. User Participation as a Method for Evaluating Healthcare Environment

The design of healthcare environments plays a crucial role in shaping our attitudes and experiences within these spaces. It is essential to create healthcare settings that are user-centric in order to enhance user outcomes and promote the effective utilization of healthcare services (Douglas & Douglas, 2005). By incorporating user perspectives and actively involving them in the design process, we can improve the experiences of patients, employees, and visitors alike. User participation can also contribute to the overall effectiveness of the healthcare system. When patients are empowered to take an active role in their own healthcare, they are more likely to identify their specific needs and requirements. As a result, well-designed spaces that effectively communicate their value and purpose can enhance the overall experience for patients (Olmos, Spring 2022).

The fundamental principle that effective healthcare service design must simultaneously address all three elements of "good design"—performance, engineering, and aesthetics—is the basis for emphasizing the experiences of patients and employees (Berkun, 2004). It is crucial to keep in mind that aesthetics—which includes elements like utility, usability, and interactivity—is not only a "soft" feature but rather a crucial component of any good or service (Bate & Robert, 2007). While architects and designers frequently use human-centered concepts to evaluate the usefulness and practicality of a space, it is as important to take healthcare professionals into account when making design decisions. It is crucial to assist them in their task rather than prevent it. A framework for creating healthcare environments that address the difficulties faced by patients, visitors, and staff when accessing these facilities has been made available by the rise of participatory design and people-first methods. This strategy combines user experience design and participatory design to promote quality advancements in healthcare organizations.

2.2.1. Different Perceptions of the users in the oral healthcare center

Through perceiving the environment, not just sensation—information obtained via the senses—but also perception—the information after it has been processed and experienced—are necessary for understanding the environment. The perceptual system gives us the ability to take in, comprehend, and develop conclusions from the data gathered, that an environment give to its users. (Fig. 5.0). Oral healthcare environments require careful consideration of sensitive issues, particularly the psychological needs of both users involved: the healthcare professionals and the patients. Research emphasizes the distinct perspectives and perceptions of these two user groups. Increasingly, the significance of the physical healthcare environment on the healing process and overall well-being is being recognized by both healthcare workers and patients.
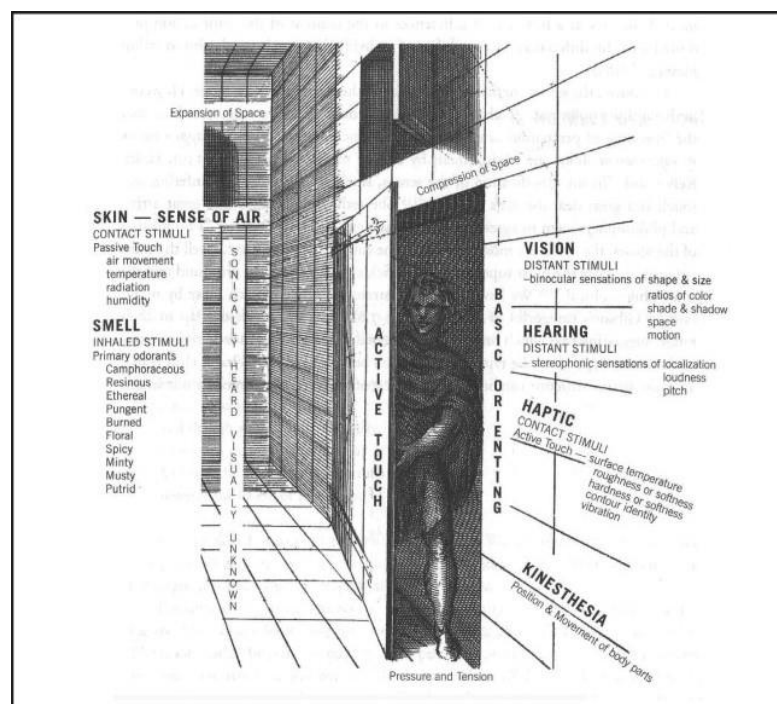
Figure 4. Perceptions of the user in the environment. (Yvonne Osei, 2014)

Neuroscientists and psychologists have provided evidence of how environmental design influences the human experience, highlighting the impact of buildings and cities on mood, well-being, and the specialized cells in the hippocampal region of the brain that respond to spatial geometry and arrangement (Bond, 2017).

Considering patient preferences, literature suggests that factors such as indirect lighting, mechanical ventilation rates, access to natural light, modern furnishings, and acoustic elements can influence their overall experience (Vischer, 2008). Creating a healthcare environment that resembles a comfortable home can enhance patient well-being, but it may pose challenges for the professionals or the healthcare team. Conversely, an efficient and professional environment may be beneficial for the workers but may not provide the same level of comfort for patients. Thus, an ideal dental environment should aim to accommodate the requirements and preferences of both groups simultaneously.

The behavior of each user is influenced by their individual experiences. In the case of dental clinics, patient behavior can be observed starting from their time spent in the waiting room (Andrade et al., 2017). The waiting area significantly impacts patients' perceptions of healthcare quality, satisfaction with treatment, and health outcomes. A clinic that incorporates positive distractions and creates a comfortable atmosphere can not only reduce stress levels but also provide higher levels of mental stimulation for patients (Kearns, Neuwelt, & Eggleton, 2020).

Aside from architectural factors, other indoor elements contribute to the well-being of patients in oral healthcare environments. These include an open and friendly reception desk, unique ceiling designs, indirect lighting, a warm appearance, and the inclusion of natural views and sounds (Xuan et al., 2021).

Patient expectations of oral healthcare providers and the healthcare system as a whole are crucial in determining patient satisfaction. By comparing their experiences with their expectations, patients enable providers to assess satisfaction levels. Patient experiences serve as strong predictors of overall satisfaction. It is important to note that patient satisfaction levels vary significantly between states and even among countries with similar health systems and infrastructure, with patient experiences explaining 10% of the variance in satisfaction levels. Achieving a balance between the perspectives and preferences of healthcare professionals and patients is crucial in creating satisfactory oral healthcare environments. By incorporating evidence-based design principles and considering the psychological, sensory, and functional aspects of the environment, oral healthcare settings can optimize user experiences and enhance overall satisfaction.

2.3. Oral Healthcare Context, Design and Typology

Ensuring the physical design of oral healthcare environments supports the well-being of both healthcare professionals and patients is of utmost importance. The design of these environments plays a significant role in the healing processes of individuals. Patients, who require quick recovery or adaptation to specific conditions, and healthcare personnel, who need to perform their duties effectively, have different requirements for the physical healthcare environment. The impact of the physical environment on users can be categorized into three main areas. Firstly, there is a contextual physiological influence, where the effects are primarily direct and not influenced by psychological processes (Hickman, 2003). Therefore, understanding the context of oral healthcare environments is crucial for architects and designers to create spaces that cater to the unique needs of oral healthcare practices and provide optimal care to patients. The context of these environments is influenced by a variety of variables, including the healthcare industry, oral healthcare practices, patient demographics, technological improvements, regulatory needs, and societal influences (Stichler, 2001). Different design issues are relevant depending on the typology of the oral healthcare facility, which can be residential-based, hospital-based, or biophilic-based. Orthodontics, endodontics, periodontics, and oral surgery are just a few of the dental specialties that have different equipment, workspace, and workflow needs. To improve patient care and achieve successful clinical results, surroundings must be designed to meet these specific needs (Taylor, 1997).

2.3.1 A Residential Based Unit

A residential-based dental clinic, as defined by Wachtel (2016), refers to a dental practice that is located within a residential property or in a space specifically designed for residential use. The architectural design of such a clinic should prioritize functionality, comfort, and creating an inviting environment for patients, while also ensuring the availability of necessary dental facilities and equipment. Antonelli (2017) highlights several architectural considerations for a residential-based dental clinic

environment. In contrast to clinical or institutional settings, residential-based dentistry clinics frequently look to create a more informal and homely environment. Warm colors, friendly waiting spaces, and comfy furnishings can all be included into the interior design to make patients feel more at ease and less anxious about their dental appointments. These clinics may be renovated variants of existing residential buildings, such as homes or apartments, or they may be newly constructed buildings made especially for dental offices. They are often located in residential neighborhoods where housing is the main land use. By blending in with the nearby homes, the clinic becomes an integral part of the neighborhood.

In a residential zone, adherence to special restrictions governing commercial activity is crucial. The neighborhood's current residential aesthetic should be taken into account in the clinic's design and architecture. According to Caminiti (2019), in order to preserve the residential character of the region, the outside of the building should blend in with the other residential buildings. The layout and design of the space should be optimized to accommodate dental equipment, treatment rooms, waiting areas, and administrative spaces, while also maintaining a residential aesthetic.

The table below, (table1.) demonstrates some dimensions required for each dental space needed in the residential-based dental clinic. The table is adapted from the book "International Health Facility Guidelines" (Part B – Health Facility Briefing & Design). The table presents some remarks related the functional areas,

Table 1. Required dimensions and remarks for the residential-based clinic. (Adapted by author from the Part B – Health Facility Briefing)

ROOM/SPACE	Qty x m2 1 CHAIR			Remarks
Entry/Reception				
Reception	1	x	3	Referred to the number of the users.
Waiting	1	x	5	Based on three people per dental chair,1.2 m2 per suit. This may be reduced.
Play Area	1	x	3	In waiting Area
Storage	1	x	4	Optional
Toilet	2	x	3	May shared with main entry.
Treatment Area				
Dental Treatment	1	x	7	
Dental Sterilising	1	x	3	Maybe separated from treatment area or a combined area with one entry from the treament room
Dental Laboratory				
Dental Workroom	1	x	4	Optional
Store-General	1	x	4	Optional
Staff Areas				
Meeting Room				
Office- Dentist	1	x	3	Maybe separated or integrated with the working room.
Office-Workstation				
Staff Room				
Toilet Staff				

Dental treatment rooms at residential-based clinics should be equipped with everything necessary to deliver complete dental care, according to Mobach's (2016) research. These spaces might have dentist chairs, specialist equipment, and suitable illumination.

There are several types of dental clinic layouts that are frequently used:

1. *Linear Layout Typology*: This design arranges the dental office in a straight line. At the entrance are the reception desk and waiting area, and a row of treatment rooms are arranged beyond them. With supporting spaces like consultation rooms and sterilizing stations placed along the walkway, this provides a clear flow of patients from the reception to the treatment areas.

2. *Central Core Layout Typology*: According to this typology, the dental clinic's core contains the lobby, waiting room, and office spaces. Radiating out from the center core are the treatment and consultation rooms. With the core acting as a focal hub, this design makes it easy to move between various spaces.

3. *Cluster Layout Typology*: In the cluster layout, support areas and treatment rooms are grouped together. A few treatment rooms, a consultation room, and a sterilizing space could make up each cluster. For offices with several dentists or experts who wish to collaborate closely, this typology can be useful. It enables effective space usage and encourages dental professionals to work together.

4. *Zoned plan Typology*: Based on utility, the zoned plan divides the dental clinic into various zones. For instance, the reception and waiting area might be in the front zone, the treatment rooms might be in the middle, and the staff and administrative areas might be in the back zone. This design ensures privacy and effective workflow by clearly separating staff and patient areas.

5. *Mixed-Use Layout Typology*: In certain dental offices with residential locations, the layout may combine dental and residential facilities. This can entail designating a special entrance and waiting room for dental patients while reserving other parts of the structure for domestic use. According to Mobach (2016), careful design is necessary to provide the privacy and separation of residential and dentistry facilities.

2.3.2. A hospital Based Unit

Specialized dental care services are offered in hospitals by hospital-based dental clinics. These dentist offices were created with an emphasis on efficiency and practicality in order to provide dental care that is both safe and comfortable for patients. These clinics' architectural plans include a number of necessary spaces, including private treatment rooms, waiting rooms, a sterilization area, staff workstations, and office space (Table 2). The layout is intended to maximize patient flow, protect patients' privacy during procedures, and comply with accessibility standards to provide access to patients with disabilities. Infection control measures are paramount in dental offices, with separate sterilization areas, appropriate air systems, and easy-to-clean materials being key design considerations. Being part of a larger

healthcare facility, hospital-based dental clinics have unique advantages and considerations. The layout should support efficient workflow and provide a comfortable environment for both patients and dental professionals (Miho, 2022)

Table 2. The required dimensions and remarks for the hospital-based clinic. (Adapted by author from the Part B – Health Facility Briefing)

ROOM/SPACE	Qty x m2 8+ CHAIRs			Remarks
Entry/Reception				
Reception	1	x	24	Referred to the number of the users.
Waiting	1	x	20	Based on three people per dental chair,1.2 m2 per suit. This may be reduced.
Play Area	1		15	In waiting Area
Storage	1		12	Optional
Toilet	2	x	6	May share with Main Entry of the hospital if located close.
Treatment Area				
Dental Treatment	7	x	14.5	Also referred to as Dental Surgery room.
Dental Sterilising	1	x	14.5	Maybe separated from treatment area or a combined area with one entry from the treament room
Dental Laboratory	1	x	20	Optional
Dental Workroom	1	x	12	
Store-General	1	x	12	For clinical records.
Staff Areas				
Meeting Room	1	x	20	Optional , may be shared.
Office- Dentist	1	x	9	
Office-Workstation	1	x	12	
Staff Room	1	x	16	May be shared with adjacent Unit, with hospital.
Toilet Staff	2	x	3	May be shared with adjacent Unit.

The following typologies are commonly used for hospital-based dental clinics:

1. *Integrated Layout Typology*: Often with a separate area or department, the dental clinic is integrated into the larger hospital building. (Smith, 2019). There is a separate entrance, a waiting area, a reception area, and treatment and consultation rooms. Due to the layout's smooth interaction with other hospital departments, multidisciplinary cooperation and effective patient care are encouraged.

2. *Hub-and-Spoke Layout Typology*: In this design, the dental clinic acts as the main hub, which is encircled by outlying clinics or treatment rooms positioned all across the facility. (Johnson, 2017). The hub portion has a

welcome area, waiting areas, offices, and a few therapy rooms. In order to provide easy access to dental treatments and to foster collaboration with other medical specialties, satellite clinics are placed strategically close to other hospital departments.

3. *Corridor Layout Typology*: In this structure, the treatment rooms and consultation rooms are grouped around a central corridor (Anderson & Thompson, 2015). With treatment rooms on either side, the corridor serves as the primary route for traffic (Figure 5). This layout makes it simple to access various treatment rooms and promotes effective patient flow. Additionally, it permits prospective clinic expansion or modification in the future.
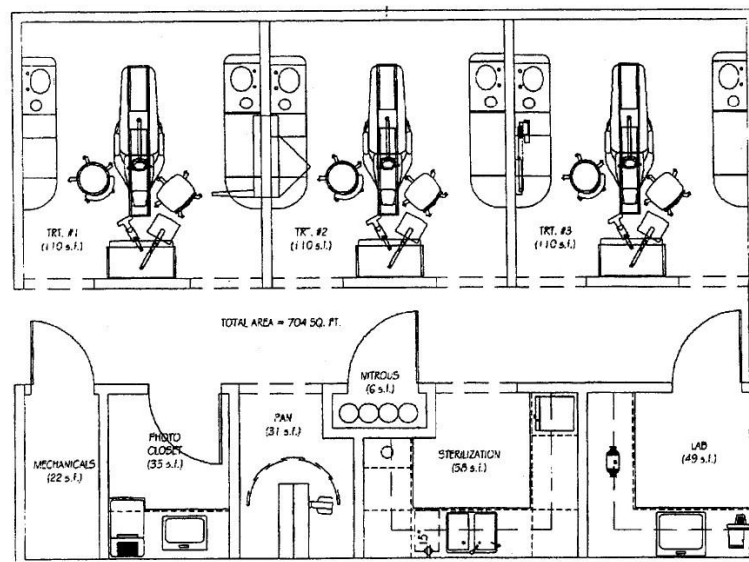
Figure 5. Hospital-based clinic layout typology. (Miho, 2022)

4. *Cluster Layout Typology*: In this design, support areas and treatment rooms are arranged in clusters (Baker & White, 2013). Multiple treatment rooms, consultation rooms, sterilization areas, and staff spaces could be found in each cluster. Clusters might be devoted to particular dental specializations or treatment types, encouraging specialized care and fostering professional teamwork.

5. *Floor-based Layout Typology*: A distinct floor or level may be occupied by the dental clinic in larger hospital facilities. Reception and waiting areas,

treatment rooms, consultation rooms, sterilizing sections, and administrative spaces are frequently included in this structure. (Garcia & Lee, 2011). It provides an organized and exclusive area for the dental clinic while continuing to be immediately reachable for patients and hospital workers.

2.3.3. A biophilic Based Unit/stand-alone

In order to create a strong connection with the natural world, biophilic dental building design comprises the purposeful inclusion of nature-inspired components and natural materials (Figure 7). The goal of this design strategy is to produce a healing atmosphere that encourages overall wellbeing, lessens stress, and improves the patient experience. A sense of connection to the natural world, which has been shown to have beneficial benefits on health and well-being, can be fostered in the dental clinic by incorporating biophilic features such natural light, views of nature, indoor plants, and natural materials. A single dentist office may become a calming and welcoming space that encourages healing, lowers anxiety, and improves the entire patient experience by embracing biophilic design concepts. (Johnson, 2019).
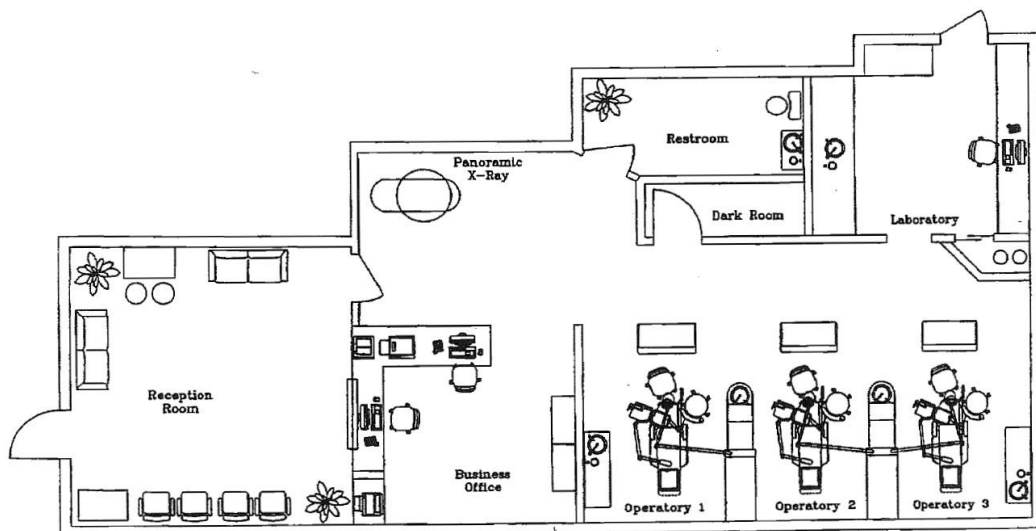
Figure 6. Stand-alone dental clinic typology. (Ryan & Browning, 2018).

The following factors can be taken into account while designing a stand-alone biophilic dentistry clinic:

1. Linear Layout: The clinic spaces are placed in a linear layout in this design, and typically include a reception area, consultation rooms, treatment areas, and support spaces. By ensuring a sequential movement of patients and personnel, this arrangement maximizes effectiveness and reduces cross-traffic.

2. Cluster Layout: In this design, comparable spaces are grouped together to form clusters or modules inside the clinic. The reception area, consultation rooms, and treatment areas, for instance, might all be arranged differently. A more cooperative and team-based approach to patient care is made possible by this setup.

3. Modular Layout: Modular design uses adaptable, modular components that can be expanded or altered to meet the needs of the clinic. With this strategy, the clinic is able to change with the times and keep up with new developments in dental technology. (Ryan & Browning, 2018).

4. Garden-Integrated Clinic Typology: The typology of a dental clinic that is smoothly integrated with outside gardens or green areas is known as a "garden-integrated clinic" (Terzidis & Vorano, 2020). The surrounding vegetation can be viewed in great detail through large windows, glass walls, or sliding doors, giving patients and employees access to natural light, fresh air, and views of the outdoors. Outdoor gardens can be used as rest places or recuperation areas, fostering a calm and biophilic environment.

5. Courtyard-Centric Clinic Typology: This typology is centered on a courtyard inside the dental clinic, which is brimming with natural elements like wood, stone, and water features. Patients and employees have visible and practical access to biophilic components thanks to the placement of treatment rooms, consulting spaces, and waiting areas around the courtyard (Maller et al., 2008). The courtyard becomes the center of attention, promoting serenity and a sense of connection to nature.

6. Atrium Layout: This layout places a strong emphasis on including an atrium or courtyard inside the clinic, bringing in natural light, plants, and views of the outside. A focal point, the central atrium offers patients and workers a restful and visually engaging atmosphere.

Table 3. The required dimensions and remarks for the stand-alone based clinic. (Adapted by author from the Part B – Health Facility Briefing)

ROOM/SPACE	Qty x m2 6+ CHAIRs			Remarks
Entry/Reception				
Reception	1	x	20	Referred to the number of the users.
Waiting	1	x	10	Based on three people per dental chair,1.2 m2 per suit. This may be reduced.
Play Area	1		10	In waiting Area
Storage	1	x	8	Optional
Toilet	2	x	6	Optional, as visitor amenities may be shared with other services
Treatment Area				
Dental Treatment	6	x	14	Additional Area for acces by patients on a trolley/bad for surgery or a dental treatment.
Dental Sterilising	1	x	15	Adjacent to dental clean-up.
Dental Laboratory	1	x	20	This is not itended as a major laboratory. May include storage of dental molds.
Dental Workroom	1	x	8	Optional, only occurs in large size clinics.
Store-General	1	x	10	
Staff Areas				
Meeting Room	1	x	15	Adaptable for healthcare staff education and work organization. Also used for cultation with patients
Office- Dentist	1	x	9	Maybe part of the meeting room
Office-Workstation	1	x	5.5	Optional
Staff Room	1	x	20	Includes kitchen, changing rooms. Maybe shared with adjacent Unit.
Toilet Staff	2	x	3	May be shared with adjacent Unit.

2.3.4. Compare between 3 respective typologies.

Through the perspectives of patient comfort, privacy, and user satisfaction, the three types of dental clinics—residential-based clinics, hospital-based clinics, and standalone biophilic dental clinics—are compared. This comparison indicates different considerations regarding their physical characteristics and the surrounding physical environment.

Taking the home-based clinic as an example, it is distinguished by its setting within a residential building or a room created especially for residential use. These clinics' architectural plans place a significant value on practicality, patient comfort, and the setting up of warm environments.

In contrast, efficiency, practicality, and patient safety are given priority in hospital-based dentistry clinics, which are found in larger healthcare institutions. These clinics come with private treatment rooms, waiting areas, sterilizing areas, staff

workstations, and office space. They are also built to handle specialist dental care services. The design strives to improve patient flow, safeguard patient confidentiality during treatments, and conform to accessibility requirements for people with disabilities. Separate sterilizing zones, suitable air systems, and materials that are simple to clean are all incorporated into the design as infection control measures, which are of the utmost importance. The architectural designs are centered on establishing a setting that promotes effective workflow and guarantees a relaxing environment for both patients and dental staff (Miho, 2022).

By incorporating biophilic design ideas and attempting to connect patients with nature, the standalone biophilic dentistry clinic differentiates out. The physical atmosphere of the clinic includes natural features like vegetation, natural materials, and lighting to promote tranquility and wellbeing. This design strategy helps patients feel comfortable and satisfied by creating a relaxing environment that lowers stress. Independent biophilic clinics place a high priority on patient privacy by creating individually customized therapy rooms.

The standalone biophilic clinic uses biophilic design to provide a relaxing setting, whereas the residential-based clinic concentrates on establishing a homely and informal atmosphere. Hospital-based clinics work to provide the necessary specialist care while maintaining patient safety and efficiency.

2.4 Functional Areas and Design

Enhancing efficiency and productivity within dental clinics is greatly helped by the design of the functional spaces. Numerous studies that concentrated on various functional spaces, (Figure 8 and Figure 9) within these environments investigated the effect of design on the operation and effectiveness of dental clinics. Dental offices are frequently divided into the Team Zone, Clinical Zone, and Public Zone to cater to various demands, according to Smith.J (2010).
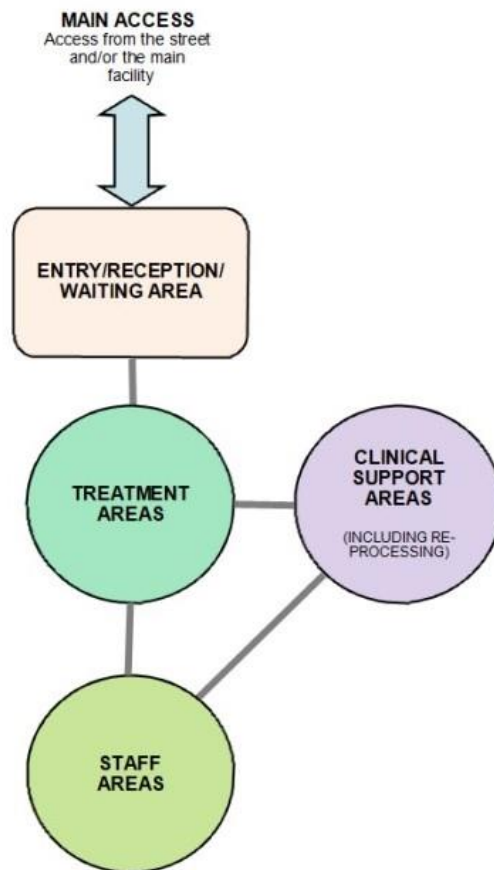
Figure 7. The diagram shows the relation between the functional areas. (The ADA practical book)

The administrative team and dentistry team are the focus of the Team Zone. It has areas for staff offices, conference rooms, and staff amenities, which facilitate everyday tasks and teamwork among dental specialists. A plant room for utilities, a store room for supplies, a room for generating x-rays, a sterilizing room, and a cleaner's room are all included in this zone as necessary support facilities.

Dental procedures and treatments are carried out in the clinical zone. It has clinical treatment rooms, often known as surgeries, where dental specialists carry out a range of dental procedures. The Clinical Zone may also have areas allocated for the precise handling and storage of medical imaging materials.

The entrance, reception, and waiting areas—which operate as the first points of contact for patients and guests—come under the heading of the Public Zone. In order to lessen patient anxiety and improve the entire experience, this area is intended to

provide a welcoming and serene atmosphere.
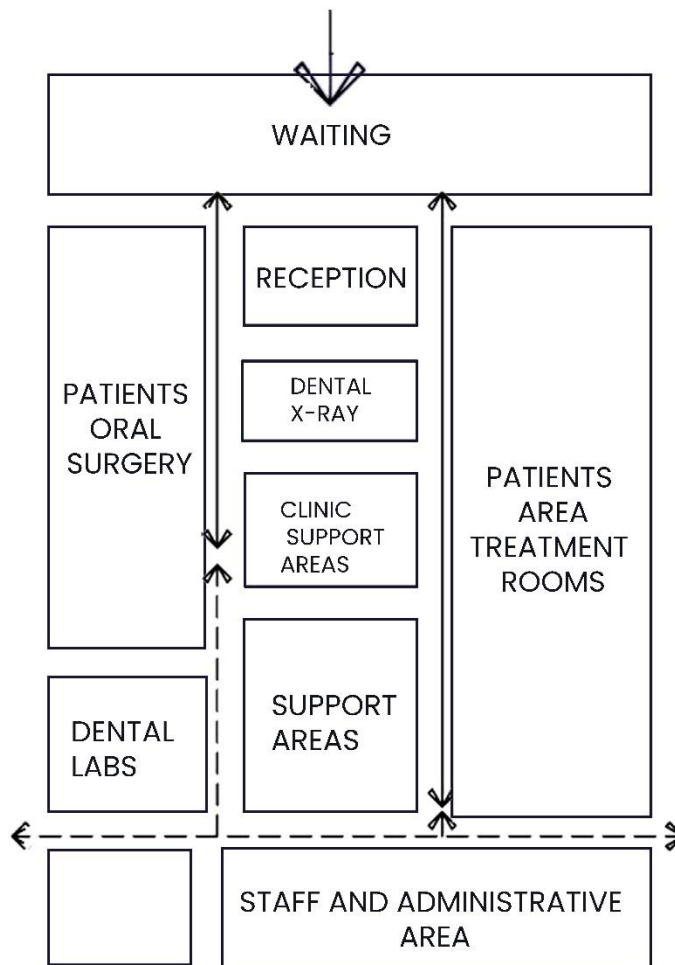
Figure 8. Dental Functional Areas. (Adapted by the author)

2.4.1 Waiting Area

The waiting area in a dental clinic is where users will first come into contact with the facility, claims "The ADA Practical Guide to Dental Office Design" (Product, 2013). Processes for registering, waiting, and chances for patient information are all included in this category. In order to effectively manage patient flow and provide access control, the reception control room should be positioned so that the receptionist has a full view of the waiting areas. A pleasant patient experience is largely influenced

by variables like communication, service, and technology in addition to the physical layout of the waiting area.

The waiting room, referred to as "Waiting Areas," should be set up with small seating groups to promote privacy and create a cozy ambiance in order to improve the patient experience. This design aims to generate a cozy, homey, and welcome atmosphere by resembling a family living room. The main purpose of the staircases and hallways is to connect the clinic's many functional departments. Even though the waiting room is frequently used during the day, there are two things to keep in mind about the natural light in this space. To start, patients might be assisted in acclimating to their environment by using soft lighting. Second, having natural light has a particular orienting and guiding impact, and the design of the waiting area can affect how various patients behave.

2.4.2. Reception Area

The arrangement of the welcome area in dental clinics should be open and welcoming, according to Chapter 6 of VA. Some clinics additionally employ "greeters" who offer concierge services like drinks or "treatment coordinators" who give office tours and manage all patient transactions throughout the patient's stay. To give patients the impression they want to have of the clinic, design elements in the reception room such the ceiling height, doors, woodwork, lighting, and colors can be used. To give the receptionist a clear view of the patients in the area, circular reception room seating is advised. Numerous clinics also provide kid-friendly zones in their waiting rooms. According to studies cited by Debajyoti Pati (2011), patients' views of care and the quality of medical professionals are significantly affected by the standard of waiting rooms. Patients' perceptions of wait times are influenced by the waiting room as well, and this in turn affects how satisfied they are with the care they receive. The influence of positive distractions on children in two clinic waiting spaces was studied in 2011 and shown to be related to greater perceived service quality, decreased anxiety, and positive relationships with staff.

According to research by Becker and Douglass, waiting rooms' physical surroundings have a bigger impact on patients' anxiety levels and opinions of the

quality of their care than actual wait times do. According to Zakay, foreground interruptions in a waiting situation can interfere with a person's ability to keep track of time by drawing their focus away from it. While the waiting area's design features can improve mood and affect how the wait is viewed, they may not always have an impact on how long the wait is really considered to be (Upali Nanda, PhD).

2.4.3. Staff and Administrative Area

The team collaboration area within the administrative spaces should be easily accessible to personnel and connected to the procedure area. These rest areas play a crucial role in helping dental professionals manage stress and provide superior care, especially during demanding times. With the recognition of the dentist's need for private spaces to take mental breaks throughout the day, the design of private offices has gained increasing importance. In contrast to the past prevalence of small offices, they are now being designed larger. Incorporating large windows in the private office design offers a serene and psychologically rejuvenating environment.

2.4.4. Dental Treatment Rooms

The dental treatment rooms, where most dental procedures take place, should be designed to accommodate the needs of multi-functional and special needs patients. These areas should be equipped with patient lifts, either movable or fixed on the ceiling. To optimize the layout, the dental chair's head should be positioned along the room's corridor side, while the chair itself should be placed in the center of the room for both multi-functional and special needs treatment rooms. Dental lights can be mounted on the ceiling using either a tracking mount or a ceiling mount. It is ideal to maximize the use of outside windows for natural illumination and views of the outdoors. The physical layout of all areas should comply with VA-adopted standards and guidelines (Product, 2013).

In terms of design, treatment rooms should integrate high-tech dental equipment and transition from a clinical atmosphere to a more welcoming and comfortable space. The use of sophisticated materials, including upholstery, cabinetry,

flooring, wallcoverings, and window treatments, adds decorative elements to the design. Dental chairs play a significant role, with thinner and narrower designs reducing physical stress on the dental team by minimizing neck bending, rotation, and arm extension. All treatment rooms should be the same size, configuration, and facilities to promote optimal efficiency. This will enable dentists to execute any routine service in any treatment room. This reduces delays in seating patients when a room is occupied or being prepared and prevents scheduling bottlenecks around certain "preferred" rooms. Being able to move between treatment rooms more quickly and with greater efficiency is made possible by placing the rooms next to one another. If there are more than four treatment rooms, careful planning is required to ensure a smooth traffic flow.
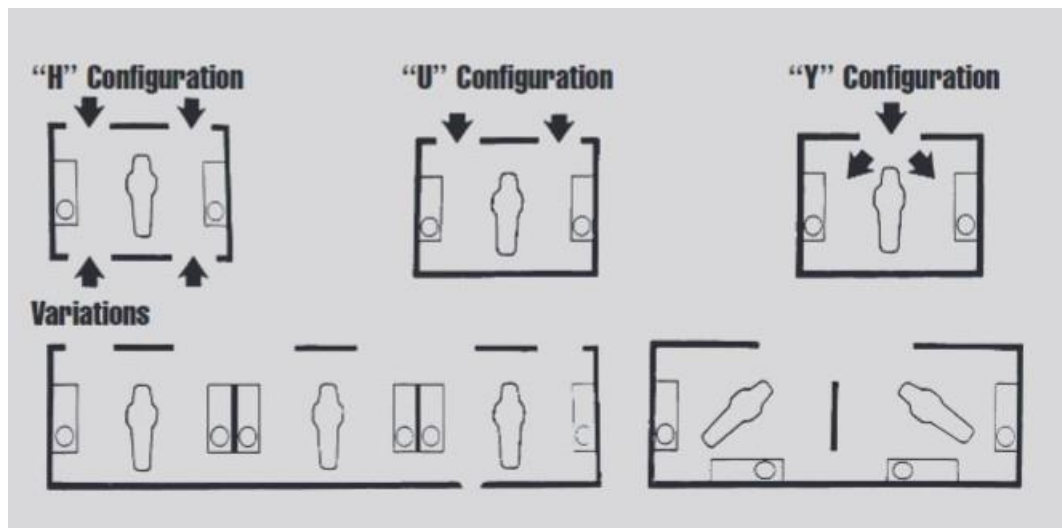
Figure 9. Sample Treatment Room configurations. (Healthcare Design guidelines,2016)

There are three main room arrangements for dental treatment rooms, according to the ADA's Dental Office Design (Figure 10): the "H" configuration, the "U" configuration, and the "Y" configuration. The "H" configuration is favored by many architects because it has four entrances for each treatment room, making it simple for dentists, patients, and staff to enter and exit. The patient's perspective while waiting may be restricted by this design, which necessitates two different halls and raises the cost of the facility because of the additional hallway needs.

A modified version of the "H" arrangement, the "U" concept does away with

the doors at the foot of the chair. Both entry points, one behind the chair for employees and one for patients and dentists, are accessible. This arrangement gives room for carts, tubing, and other mechanical requirements while allowing the dental chair to face a window while keeping the head of the chair out of the way. Due of their convenience in getting to and from the dental chair, which is an important consideration in treatment room design, the "H" and "U" designs are both well-liked.

A single doorway leading into the treatment room is featured in the "Y" design. It can be accessed from the side or the foot of the chair. Through this door, all traffic enters the treatment room and flows to the relevant locations. Although common, this arrangement could require dentists and staff to travel a little further between treatment rooms. The fundamental "H," "U," and "Y" layouts can be modified to fit particular requirements and preferences.

For accessibility purposes, ensure that the treatment room is spacious enough to accommodate a wheelchair next to the dental chair, allowing for easy patient transfer. Dental professionals should be positioned slightly higher than the dentist to ensure adequate visibility. Additionally, work surfaces, materials, and facilities should be within an assistant's average reach radius of approximately 60cm, minimizing unnecessary motions and reducing stress and time consumption. To prevent excessive heat in treatment rooms, it is advisable to orient them to the North, as this side of the building does not receive direct sunlight. East-facing treatment rooms are also acceptable as they benefit from the early, cooler part of the day's sunlight.

2.4.5. Arrangements / Circulation

To ensure optimal functionality and privacy within the dental office, strategic placement of rooms and proper circulation are crucial. The consultation room should be positioned in a way that does not require the doctor to pass through a high-traffic area, such as the front desk or payment area, to access it (Johnson R. &., 2018). This arrangement minimizes interruptions from users or staff members passing by.

Similarly, the case presentation room should be designed to allow both patients and staff members to enter without passing through the treatment area.

The location of the patient's restroom should be controlled by the receptionist, ensuring that it is conveniently situated between the waiting room and the treatment area. This allows patients in either segment to access the restroom without having to pass through the other area. As one moves from the office entry toward the treatment area, the need for privacy increases. The treatment area should be designed in such a way that it is not directly visible from any public area, such as the reception or greeting areas. This creates a sense of privacy and comfort for patients. Support facilities like central sterilization and the laboratory can be positioned in the space between the public and private zones, close to the treatment area. To maintain patient comfort and privacy, the dental office's flow should be carefully organized. In order to prevent patients from worrying that others will see their compromised grin, the patient chair should be placed such that it faces away from the treatment hallway. Windows that are positioned at the foot of the chair can offer a controlled view that enables patients to see the outdoors without allowing passersby to see inside the treatment area.

2.5. Physical features of oral healthcare design

As they may impact patient comfort, safety, and access to care, physical aspects of oral healthcare design are crucial for enhancing patient outcomes and experiences. Dental facilities may improve the general health outcomes and standard of care for their patients by combining environment design concepts, suitable lighting and color schemes, enough ventilation, and efficient infection control techniques (Molly Pierce, 2019). By focusing on particular illustrations of physical elements in oral healthcare design that have been demonstrated to affect patient outcomes, this literature study is further explored.

2.5.1. The effect of Light

Louis Kahn, a renowned American modernist architect, once stated that natural light is what gives architectural space its sense of authenticity. Unlike artificial light,

which often comes from various distant sources and creates overlapping shadows known as visual noise (Knoop et al., 2020), natural light enters through windows and skylights, enhancing color perception and visual clarity, ultimately adding to the serenity of a space (Knoop, 2019). Daylight serves as an excellent source for supporting visual performance in the work environment. Flickering light, often associated with artificial sources, can induce headaches, eye strain, and has been linked to attention deficit disorder and poor visual performance (Knoop et al., 2020). Studies have shown that individuals have varying sensitivities to flicker, and it can also lead to discomfort or dizziness, raising heart rates (Karanovic et al., 2011; Sunlight Inside, 2020). On the other hand, daylight, with its broad spectrum, offers superior color rendering and allows for better color discrimination compared to most electric illumination. Research has demonstrated that incorporating such lighting features positively influences participants' perceptions of a room's appearance, as well as their feelings of stress, anxiety, and mood, particularly in waiting areas (Knoop et al., 2020).

Examining various factors of room quality, it becomes evident that large windows and ample daylight are crucial for creating a pleasant, engaging, dynamic, accessible, cohesive, and enjoyable environment. Additional findings from social psychological studies have shown that exposure to natural light is associated with mood-enhancing effects. Increased access to daylight and the environment has been shown to result in healthcare facility workers expressing more positive reactions toward break rooms (Knoop et al., 2020).Staff members in dental offices are often subjected to intense lighting due to the nature of their work, and improper lighting can negatively impact visual function and contribute to stress-related physical symptoms such as headaches, pain, and eye fatigue. To minimize contrast, it is important to ensure even distribution of lighting in dental offices and laboratory spaces. Measurements have revealed that natural lighting in private treatment offices may not be optimal for accurately matching shades. Therefore, it is crucial to consider the design of a natural light environment to reduce negative effects in the dental office, (Figure 10) (Liu, 2022).
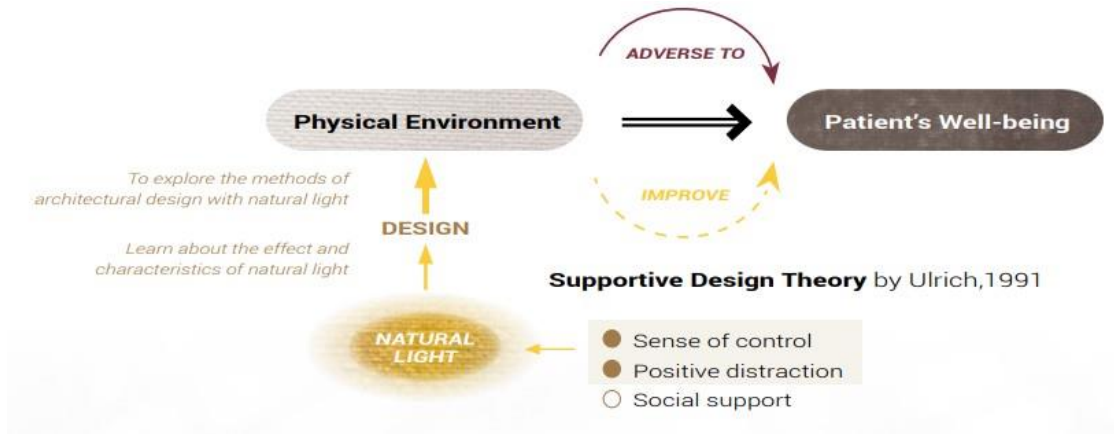
Figure 10. The natural light effect in the healthcare environment. (He Liu, 2022)

2.5.2. The effect of Sound

The architecture of the dental treatment rooms must consider how to provide acoustical isolation because they are open to the halls. to compile information on the emotional and practical impacts of sound, music, and noise in dentistry offices. Both patients and dental staff hear a variety of noises in the dental setting. Depending on how it is perceived, such as when it is understood as noise, sound can have a good or negative effect. Anxiety is the most extensively researched effect of noise on dental patients. The most frequent excuse for skipping dental appointments is fear or anxiety brought on by the loudness made in the dental setting.

The dentist office is usually seen by patients as an unwelcoming, uncomfortable, and anxiety-inducing environment with loud noises. (Ullmann, Fodor, & Schwarzberg, 2008) assert that music has positive effects on the personnel who operate in operating rooms. People who listen to music are 78.9% more at ease and productive. Classical music is the most widely-listened-to genre (58%). According to the study's findings (Gupta & Ahmed, 2020), the majority of patients (92%) reported that listening to music made them feel less nervous, in pain, and uncomfortable. Nearly half of respondents (48%) stated that music made communication with the dental staff easier, and 90% of patients indicated they would want music during their subsequent

dental session. Most dental specialists don't usually take any steps to reduce noise levels at work. In particular, the majority of them don't complain or call for changes to the workplace or the noisy equipment. This is perhaps because they are accustomed to the acoustical settings seen in dental hospitals. Overall, a workplace that is quieter, like a dentist clinic, can provide better services. The dental staff will produce more as they put in more effort. The employees will be more content, and issues with time management will be more successfully handled. It's crucial to keep in mind that while establishing a new dental office or operating room, practical noise management considerations should be taken into account right once.

2.5.3. The effect of Smell

The impact of smell on patients' dental experiences is significant. Dental offices can have distinct smells that evoke various emotions in patients, ranging from worry to calmness (Pradikaa, 2021). This is because the sense of smell is closely linked to our emotional well-being. Certain aromas have the ability to promote happiness and influence mood due to their association with our mental state. The strong connection between smell and memories plays a crucial role in this phenomenon. According to an Experimental Study Design Approach by Hultén et al. (2009), our perception of a scent is intricately tied to past experiences. Traditional medicine and aromatherapy have long recognized the psychological effects of fragrances derived from essential oils (Tisserand, 1988). Findings from experiments, primarily involving female patients, have shown that the aroma of oranges has a calming effect when used in dental offices (Lehrnera, 2000). The presence of the orange fragrance leads to increased relaxation, improved mood, and reduced anxiety levels among patients. Even smell has the power to influence customer behavior and confidence. As mentioned by Hultén et al. (2009) on page 171, "specifically, the aromas of vanilla and clementine unconsciously influence clients' behavior, making them stay longer than they otherwise would." Numerous studies have confirmed that smell enhances memory, affects one's state of mind, and has the potential to influence user behavior and levels of trust.

2.5.4. The effect of Sight

The behavior of both dentists and patients in healthcare settings is heavily influenced by their sense of vision. The majority of their attention is focused on what they can see, and they make decisions based on their perceptions of their surroundings (Mler 2003, pp. 374–376). Research findings indicate that perception plays a significant role in dental anxiety. The visual experience in dental environments can be influenced by both tangible elements such as interior design and style, as well as intangible elements like light and color. For example, certain colors such as blue and green are often perceived as cool, while red and orange are associated with warmth (e.g., Fenko, Schifferstein, & Hekkert 2010).

The perception of warmth in visual cues has the ability to create a sense of physical warmth in individuals. Consequently, when patients perceive a dental clinic as warm rather than cold, they tend to experience less fear and anxiety. This suggests that an aesthetically pleasing design for a dental clinic, incorporating warm colors and surface materials, can contribute to reducing patient anxiety and making them feel more comfortable about visiting the dentist.

2.5.5. The effect of Nature

Numerous studies have consistently shown a strong correlation between the presence of green spaces and the perceived sense of healing. Both verbal and physiological assessments have revealed that individuals exposed to natural and non-urban environments tend to experience faster and more complete recovery. The patterns observed in the physiological data indicate the significant role played by the parasympathetic nervous system in natural responses. Presently, it is widely accepted that being in nature has healing effects on the body by increasing physiological activity, reducing stress, and inducing a shift towards a more positive emotional state. Incorporating natural elements into dental settings can create a familiar ambiance and promote relaxation.

Despite the proven effectiveness of biophilic design in creating a sense of place in various environments, there is a lack of research on its implementation in healthcare

settings, particularly in the context of nature-based design (Peters & D'Penna, Citation2020). Stephen Kellert developed the framework for Biophilic Design Characteristics in 2008, which allows for a connection with nature within built environments. Biophilic design can encompass visual connections to nature, such as views of trees, as well as auditory connections, such as the sound of the wind. It can also involve elements such as fresh air and natural lighting inside healthcare buildings, the use of natural materials like wood in construction, and the creation of spaces that evoke feelings of possibility, refuge, and mystery. The underlying assumption is that exposure to natural settings and features has positive effects on human health and well-being. Examples of biophilic design elements include direct exposure to nature and the incorporation of natural materials, forms, and themes, all of which contribute to restoring patients' psychological well-being and coherence due to their inherent natural qualities.

Research has demonstrated that environments incorporating biophilic design elements, such as ample daylight, strategically placed windows that frame outdoor views, appropriate variations in lighting levels, the use of natural materials, indoor plants, green roofs, and the maximization of green spaces around buildings, have positive physiological and psychological effects on health (Delauer, 2022). Another study by Kim et al. (2021) specifically examined the inclusion of plants in dental clinics and found that their presence improved patient satisfaction and reduced stress levels. The study also highlighted that plants can enhance the visual appeal of the environment, serving as a distraction from any discomfort or anxiety patients may be experiencing. In addition to enhancing patient experiences, biophilic design can also benefit dental clinic staff. A study conducted by Park et al. (2021) revealed that incorporating biophilic elements in a dental clinic resulted in increased job satisfaction among staff members. The authors noted that features such as natural lighting and views of nature help reduce stress levels and improve overall well-being for both patients and staff.

CHAPTER 3

CASE STUDY

Based on the literature review with the focus on the 3 typologies of Oral healthcare enviornment used in three different contexts, (Figure 12), the main aim of this chapter is to carefully examine and evaluate three dental clinic case studies that are located in Tirana, Albania. This is accomplished in order to determine their impact on variables like the experiences of patients and dentists staff as well as the overall clinical and professional surroundings. The research will go into further depth regarding the significance of factors like light, sound, sight, and color to the general layout and functionality of dental clinics. The findings of this analysis will help to produce the development of evidence-based design guidelines and recommendations for architects and healthcare professionals, supporting the designing of dental clinics that put the needs and wellbeing of users first.

Figure 11. Geographical map of the 3 respective clinics. (By author)

3.1 Clinic A

The first case concentrates on an existing dental clinic situated in the residential area of ST. "Frederik Shiroka" in Tirana, Albania, as shown in the (Figure 13).

Figure 12. Map of the residential-based dental clinic. (By author)

The clinic is operated by two dentists who provide a range of services, including dental aesthetics, dental implantations, digital dentistry, orthodontic treatment, and restorative dentistry. As shown in the (Figure 13). The clinic is situated on the second floor of a residential building that is less than ten years old. Its total area spans 34 m², with a floor plan illustrated in (Figure 14). It shows the geographic location of the dental clinic within the residential building. The clinic's layout features dimensions of 5.7m x 6m and adopts an open layout typology, seamlessly integrating the public zone, team zone, and clinical zone.

Figure 13. Residential-based clinic Floor plan. (By author)

3.1.1 Approaches to the design layout.

The typology of this residential-based clinic is the Cluster-Layout typology. In this cluster layout, the support areas and treatment room are grouped together. The clinic has an open plan typology that encourages a feeling of transparency and accessibility. In order to retain a sense of separation between the public and clinical spaces while continuing to provide connection and visibility between these two areas, a glass divider acts as a visual separation. Interior dividers made of glass were effectively utilized to optimize the small space and allow for the controlled entry of sunlight, resulting in a comfortable, effective dental clinic atmosphere. The public and clinical zones are visually connected while still feeling separate due to this intentional design aspect.

3.1.2 Approaches to the dental functional Areas

As shown in the (Figure 15), description about the dental functional areas of the clinic is analyzed. The analyze is structured in Public Zone, Clinical Zone and Team Zone.

Public Zone: From the main entrance, the patient can see the waiting room on the right and the reception desk to the left. The two areas are designed in a small size.

A clear glass partition properly separates the treatment room from this open-plan public space. Those areas are shown in the Figure, with number 1 and 2.

Floor
1. Waiting and Reception Area
2. Treatment Room
3. Sterilization Lab
4.Toilet-Storage.

Figure 14. Functional Organization Floor Plan. (By author)

The reception is designed with only a table desk for providing the needed information for all the visitors of the clinic. Its area is 2.4 m2. The second area of the Public Zone is the waiting area. It is designed in a small size, with only two chairs and its area is 3.6 m2, (Figure 16).
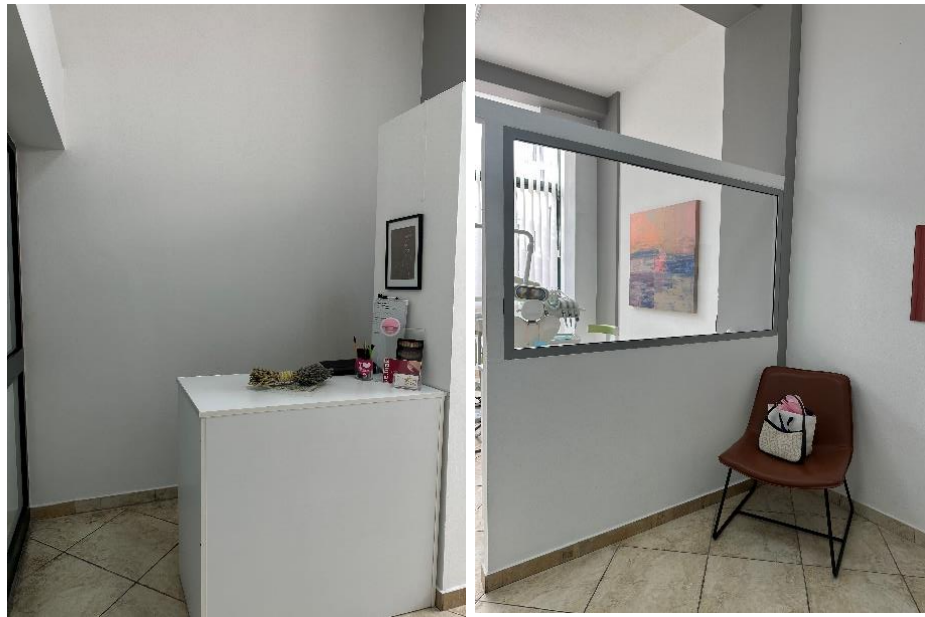
Figure 15. The public Zone of the res-based clinic. (Captured by author)

In the Clinical Zone, as shown in the (Figure 17), is only one consultation room in the clinical zone, but it has been designed to accommodate both consultation and therapy in the same space. The ambiance of the room is improved by a large opening that faces the front of the treatment chair and provides an abundance of natural light and stunning views.

Figure 16.The Clinical Zone. (By author)

The size of the windows in the consultation room was carefully selected, taking

into account the neighboring residential neighborhood. This approach aims to establish a friendly and comfortable environment for both patients and dentists.

The Team zone is a dedicated lab/sterilization room, (Figure 18) where the use of and access to natural light have been carefully considered. Inside glass barriers have been carefully included into the design in order to maintain the necessary isolation and practicality while permitting a seamless flow of daylight.

Figure 17. Dental Sterilization Area. (By author)

Another area of this small residential-based dental clinic is the restroom. It is designed outside of the clinic, inside the residential building. Its' function is the restroom and sometimes functions as a storage.

3.1.3 Approaches to the physical features

The main entrance of the natural light in the clinic is made only by a wide window facing the dental treatment chair. It contributes to its open design and enables a smooth transition between the outdoor and internal space of the clinic. The clinic

decision is using only the white color in the environment. The design is also illustrated by any at feature in the wall. Regarding the integration with the greenery elements, in this modest size of the clinic, is found only one plant that acts as a subtle but important connection to nature.

Below, in the (Figure 19) , is shown the importance of that only one opening to the dental environment, and its relation with the user.
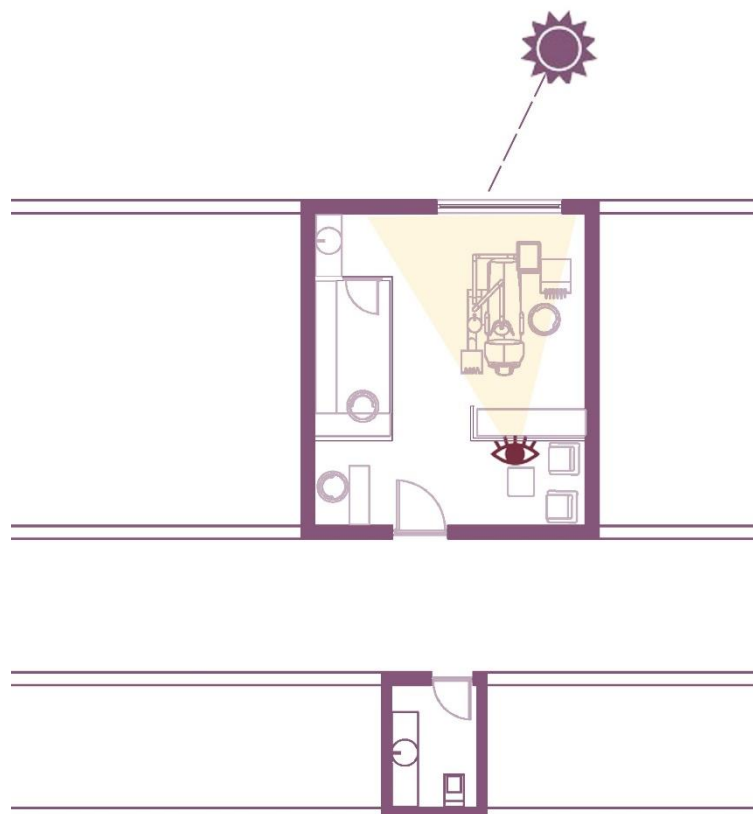
Figure 18. Biophilic Features Analyze. (By author)

3.2 Clinic B

This typology of "Implantus Dental" involves integrating the dental clinic within the larger hospital facility. This hospital-based dental clinic is located in the "Hygea hospital", is a private hospital in the Kashar, Mezez Tirana. The geographic map is shown below in the (Figure 20).
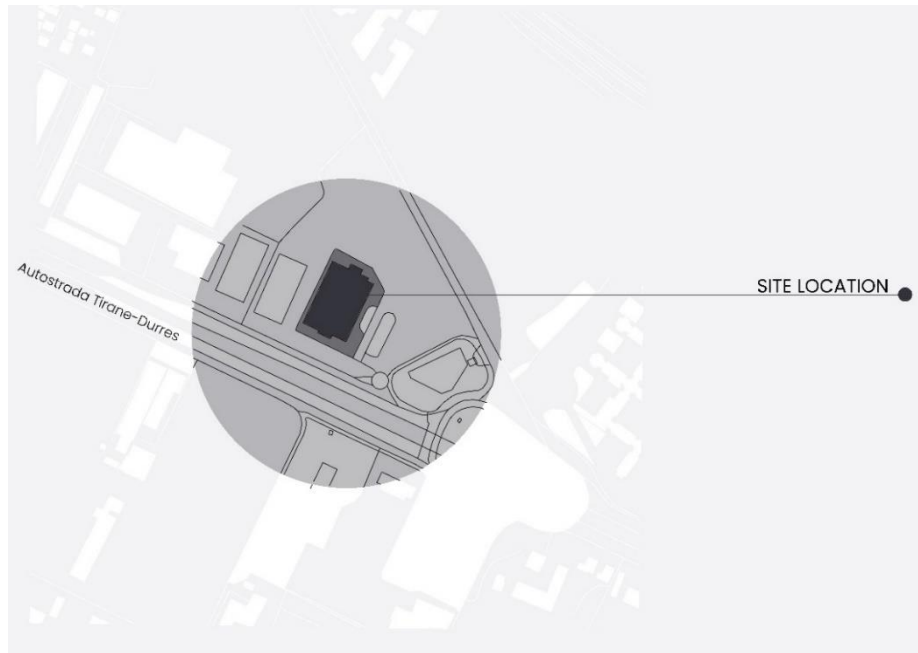
Figure 19. Map of the hospital-based dental clinic. (By author)

It offers an unique opportunity to provide patients with a comprehensive range of medical services under one roof is presented by a dentistry clinic located within a hospital complex. The dental clinic operates independently and creates a distinctive ambience inside the hospital setting with its own lobby and waiting room. (Figure 21). The design and layout of the dental clinic will be looked at in this case study, with a focus on circulation strategies, functional areas, and physical aspects.
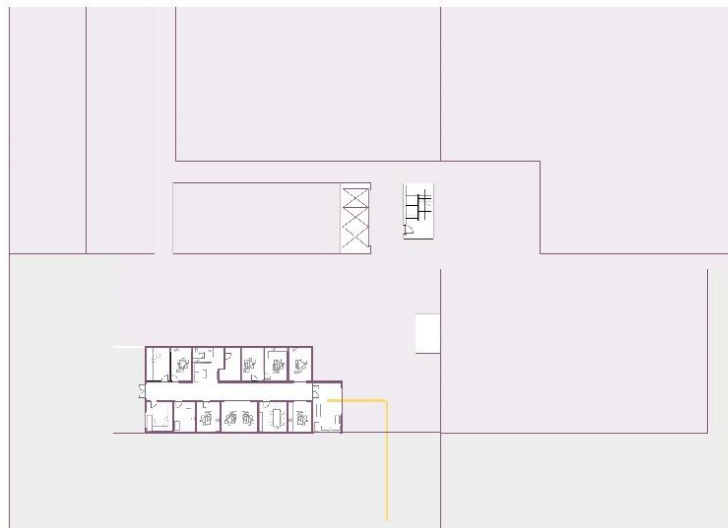
Figure 20. The physical design layout of Clinic B. (By author)

3.2.1 Approaches to the design layout.

This dental clinic provides the Corridor Layout Typology. In this typology, the treatment rooms and consultation rooms are grouped around a central corridor. So the most important physical element is the long corridor. With the treatment rooms on either side, the corridor serves as the primary route for traffic, as shown in the (Figure 22). This layout makes it simple to access various treatment rooms and promotes effective patient flow. All clinical areas that are housed in the hospital are placed along a hallway. Below is shown a photo that presents the long corridor of that dental environment and shown as the main circulation element that the clinic provides.

Figure 21. The corridor layout of dental clinic. (By author)

3.2.2 Approaches to the dental functional areas.

The lengthy corridor serves as the primary flow path and connects the numerous clinic spaces. To accommodate diverse parts of patient care, the functional areas of the

dental clinic are set up in a number of different ways. These locations include, among others, treatment rooms, consultation rooms, sterilization areas, staff offices, and support areas. The organization of the dental functional areas is shown in the (Figure 23).

Floor
1. Reception
2. Waiting Area
3. Costemic Dentistry Veneers
4. Meeting Room
5. Braces and Invisalign Room
6. Endodental
7. Dentist Office
8. 5 star Dental Lab

9. Reception
10. Treatment Room
11. Restroom
12. Waiting Area
13. Changing Room
14. Dental Sterilization
15. Oral Surgery Room
16. Prosthetic Room
17. Hall

Figure 22. Floor Plan Clinic B. (By author)

In order to promote staff collaboration, patient privacy, and efficiency, great consideration are given to the design of these practical areas. This dental clinic is designed with 16 dental functional areas.

The patient and staffs first point of interaction is in the Public Zone. The welcome room serves as a clear point of orientation based to its thoughtful placement in front of the door. It offers a warm setting where patients can check in and get the information they need. A room with three couches for patients is located next to the reception area, and in the left side from the entrance. In front of the entrance is placed the reception area, with a large desk. In the right side of the reception area is placed the opening that orient the patients to the other dental rooms. Below, in the (Figure 24), are shown the photos of the Waiting and the Reception area.

Figure 23. The Public Zone. (By author)

Regarding the Clinical Zone, nine different rooms make up the clinical zone and are intended to accommodate various dental operations and laboratory tasks. The dental treatment rooms are furnished with the required chairs, instruments, and equipment, making them a practical and effective setting for patient care. The layout of these rooms is intended to streamline the process and ensure smooth changes between the methods of treatment. The clinical zone, (Figure 25) also includes specialized lab rooms where dental practitioners can do important laboratory tasks including prosthetic preparation and restoration production. Additionally, a dedicated workspace is set aside to handle the other dental methods of a new technology. The Figure, represents some photos of the Clinical Zone. Additionally, a surgical intervention-friendly oral surgery room is placed to the clinical area and furnished with specific tools and facilities. The (Figure 26), below presents that patients receiving oral surgery can relax in a private setting while waiting in the open waiting room next door.

Figure 24. The Clinical Zone. (By author)

Figure 25. The second waiting area. (By author)

The team zone was created to meet the requirements of the personnel and dentistry professionals. It has necessary spaces like the main dentist office, a conference room, and a restroom. The primary dentist's main dental office is a designated workstation for administrative chores, patient consultations, and treatment planning. The dental team can collaborate in the conference room to discuss situations, share knowledge, and have formal conversations. The personnel can change into their work clothes in the allocated changing room, which also provides storage for personal items, as shown in the (Figure 27). This maintains a professional image. Additionally, a restroom with easy access for staff workers and a small storage area is ideally situated close to the team area.

Although they are located inside the hospital, the patient restrooms are located outside the dentistry clinic. Patients would have easy access to care while keeping their privacy and good cleanliness. The patient's demands are taken into consideration when designing the restrooms, which also adhere to accessibility guidelines and have the proper fixtures and amenities.
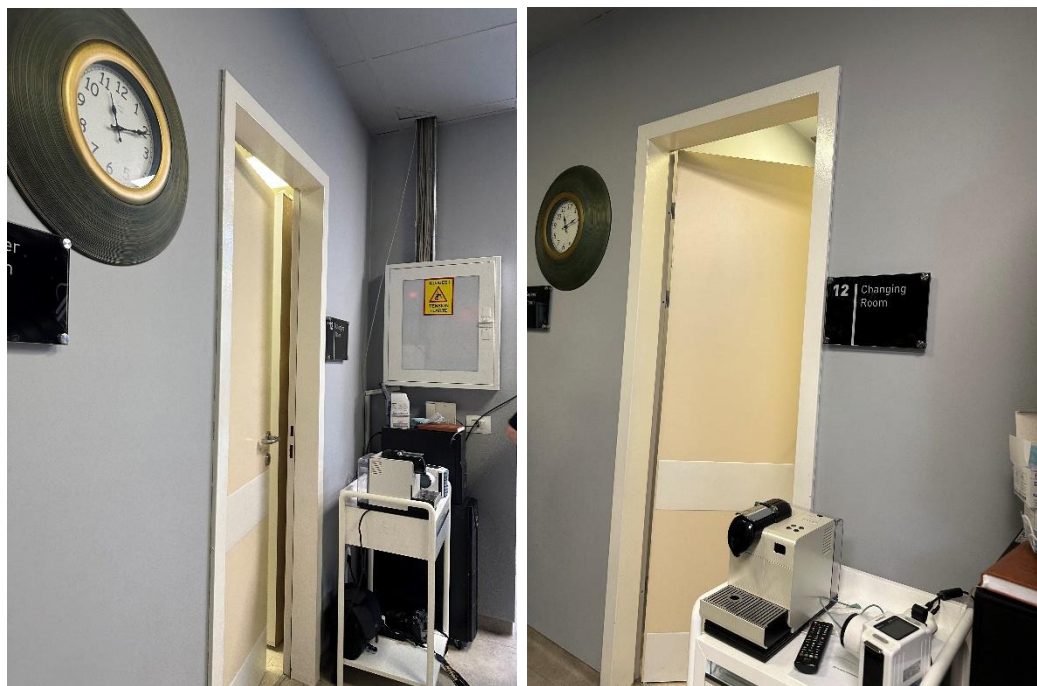
Figure 26. The Storage Zone in the dental Clinic. (By author)

3.2.3 Approaches to the physical features

Large windows that are placed in strategic locations throughout the clinic's design offer broad views of the hospital grounds. This strategy not only allows for lots of natural light to enter the room, but it also enables patients to interact with the outside views. The use of big windows creates a visual connection between the dentist office and the hospital, harmonizing the dental facility with the larger healthcare environment. According to the dental smell physical feature,(Figure 28). The dental clinic's corridor frequently has a strong dental stench, which might have a detrimental effect on patients' perceptions and experiences. So, lastly for a constant fresh airflow throughout the corridor, appropriate ventilation systems, including air filtering and extraction mechanisms, are put in place. The color scheme chosen has a significant impact on how the dental office looks and feels. The predominance of white in a space conveys a sense of cleanliness and sterility as well as professionalism, both of which are crucial in a hospital setting. Cold colors like dark grey or blue are used as accent colors in wall paint, furniture. Paintings, photos, sculptures or the Tv screen that have been carefully chosen and placed are used as focus points, igniting dialogue and giving patients a visual break too. In the aesthetic of the clinic's interior are integrating some potted plants.
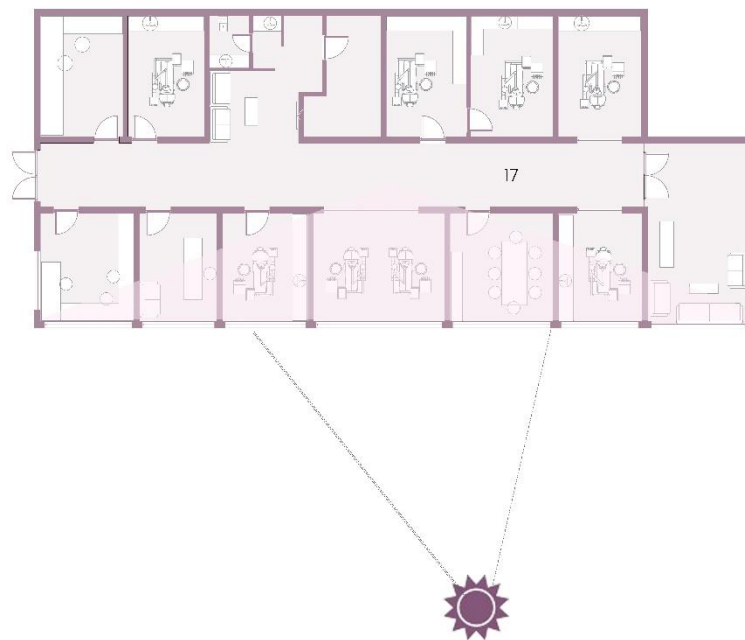
Figure 27. The Biophilic Features analyze. (By author)

3.3 Clinic C

The third case concentrates on "the BIODENT" dental clinic, a stand-alone facility located in a quiet neighborhood of ST. "Rruga Ilo Mitkë Qafzezi" in Tirana, Albania, shown in the (Figure 29). This dental clinic a biophilic-based approach, in which the transformation of an old structure into a facility for oral healthcare gives the building's architectural form new vitality. The clinic provides a wide range of dental services, including general dentistry, orthodontics, oral surgery, and cosmetic dentistry. This biophilic-based dental practice seeks to create a friendly atmosphere, protect patient information, improve operational efficiency, and uphold the strictest hygiene standards. In order to visually create a smooth contour and a strong impression of cleanliness and freshness, white hues and curved shapes were employed both inside and outside.
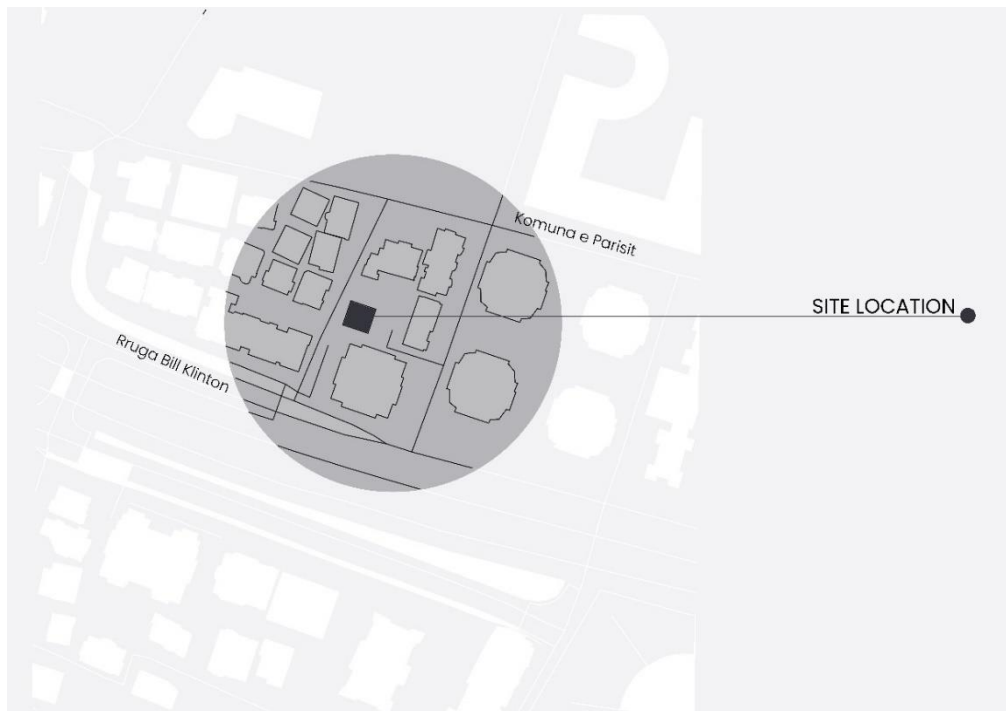
Figure 28. Map of the Clinic C. (By author)

3.3.1 Approaches to the design layout.

Dental clinics' architectural layouts are very important in establishing a healthy environment for oral treatment. The "BIODENT" dental clinic is examined in this

chapter, which emphasizes the crucial part lighting plays in the design of dental healthcare facilities by using a biophilic lighting clinic typology. The design concept of the clinic places a high value on integrating natural light as the main source of illumination and taking advantage of its therapeutic advantages. In order to do this, the architectural design includes skylights, sizable windows, and light wells that are placed strategically to maximize the amount of daylight entering the clinic. Additionally, the greenery elements are used in this typology to do the dental environment more dynamic.

3.3.2 Approaches to the dental functional Areas.

In the terms of functional areas, the analysis focuses on the Public Zone, Clinical Zone, and Team Zone. These areas are distributed across the three levels of the building, with the first floor mainly dedicated to the Team Zone. Despite the distribution, user accessibility is ensured throughout all three levels. The Public Zone is including the reception and waiting area on the right side of the ground floor which is easily connected to the hall/circulation area. The main function of the stairs and halls in this zone is to connect the various functional areas of the clinic. A detached waiting area's organized placement enhances acoustic separation and has the added advantage of allowing personnel to greet and engage with patients before their appointments. In this area, chairs are arranged in a curved approach. The Team Zone acts as a special area for the workers and is mostly found on the first and second floors. It provides secluded spaces that allow for mental breaks throughout the day as well as essential facilities like the kitchen and changing rooms. These locations are clearly divided into staff and guest domains and distinguishably isolated from the patient regions. The Clinical Zone, which covers all three floors, is where the majority of dental treatments are performed. Some of these spaces have open and semi-open layouts. Each treatment room has a dental chair with the chair itself in the middle and the head along the room's corridor side. All that information is illustrated with the floor plans in the 3 Figures below. (Figure 30, Figure 31, and Figure 32).

Ground Floor
1. Reception
2. Waiting Area
3. Panoramex
4. Storage
5. Restroom
6. Surgery
7. Hall
8. Garden
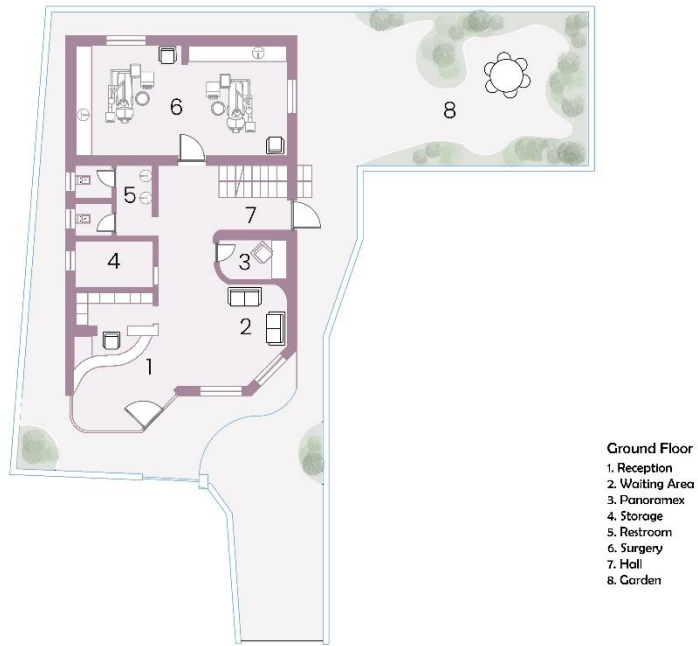
Figure 29. Ground Floor plan Clinic C. (By author)

First Floor
9. Orthodontics
10. Restroom
11. Orthopedics
12. Sterilization
13. Additional Balcony

Figure 30. First Floor plan. (By author)
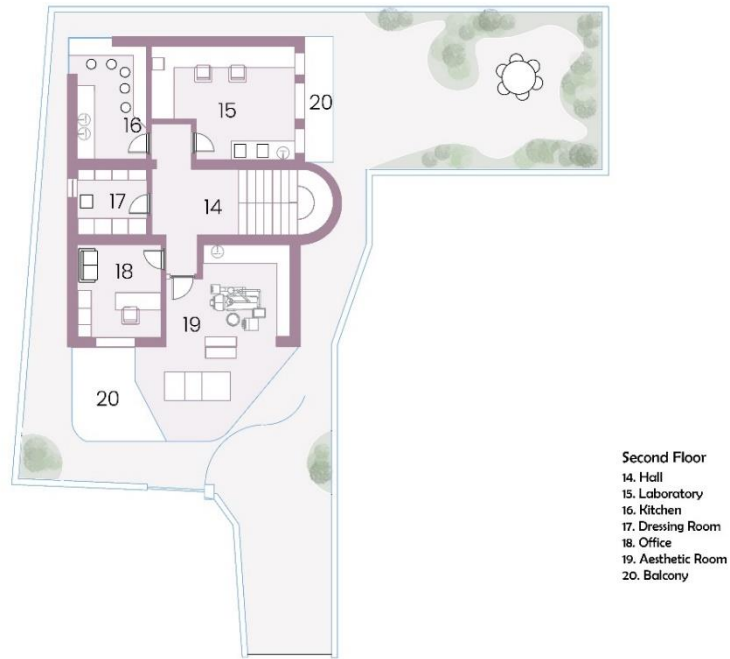
Figure 31. Second Floor Plan. (By author)

All treatment rooms keep unity in terms of size, furnishings, and design to improve operational effectiveness. Depending on the dental treatment typologies, they are arranged in "Y" or "U" configurations. The corridor and other important areas are connected to the Clinical Zone by a single point of entry. Regular examination spaces and treatment rooms are the two categories into which the consultation rooms can be divided. While the treatment suites cover both consultation and treatment tasks, the normal exam rooms are used for general operations. (Figure 33).
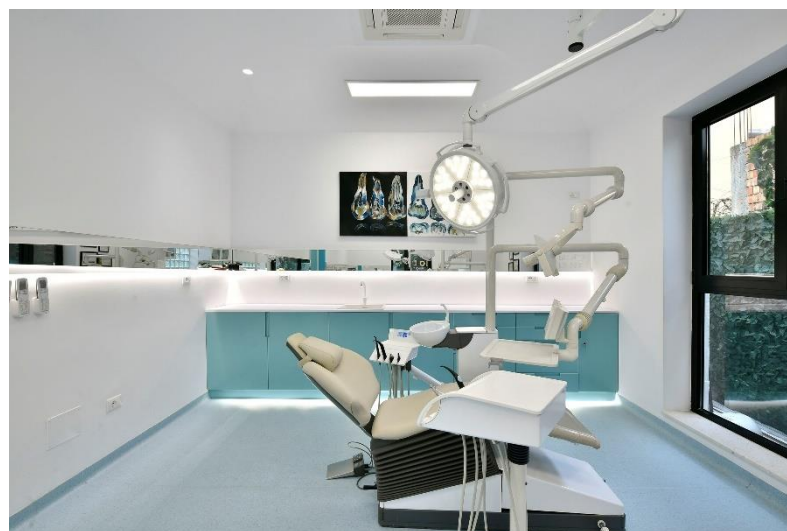
Figure 32. The typical dental treatment room. (By author)

55

3.3.3. Approaches to the physical features.

In terms of the interior design, the integration of natural light is one of the main design ideas that supports this dental environment. The structure uses a skylight and big windows as its main sources of lighting to accomplish this, as shown in the waiting area (Figure 34). The presence of natural light in every part of the building was a critical factor because of the close proximity of neighboring buildings. In order to let light into the interiors while keeping privacy, glass blocks were strategically used. Without compromising the need for privacy, these transparent components provide the appropriate illumination.

Figure 33. The Public Zone. (By author)

The distribution of openings and windows was significantly influenced by the site's orientation. For the purpose of placing openings and windows in public places, the northeastern side of the site was chosen since it benefits from outstanding direct light. On the other hand, the southwest side of the property was chosen for situating openings and windows in treatment spaces since it has kind diffused light and an attractive plant landscape. (Figure 35)

Figure 34. The northeast openings of the clinic. (By author)

Additionally, a tree that already stood on the site's north side gave designers the chance to include courtyards, which allowed patients and staff members to interact with nature and benefit from its therapeutic qualities. A calming palette of pastel shades and white tones dominates in the interior design, creating a cozy and inviting atmosphere. The needs of both patients and the professionals are met by this purposeful use of color, which contributes to the space's lightness and calm. The analysis of biophilic elements are described in the figures below in the (Figure 36, 37 and 38)

Figure 35. Biophilic features Analyze, Ground floor. (By author)

Figure 36. Biophilic Features, First Floor. (By author)

Figure 37. Biophilic Features, Second Floor. (By author)
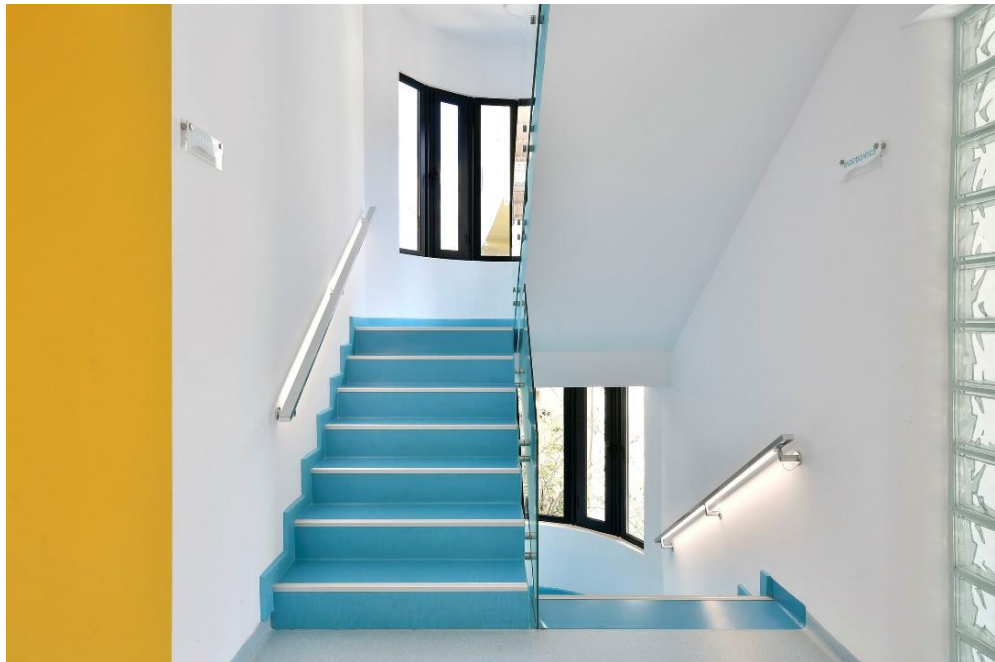
Figure 38. Biophilic elements (By author)

CHAPTER 4

RESULTS AND DISCUSSIONS

This section provides a thorough study of three dental clinics using a comparative analysis method utilizing knowledge information from the literature review. An extensive review of the response analysis data gathered from the users of the dental settings supports the evaluation. This section's beginning part describes the evaluation procedure for the three case dentistry clinics. Tables are used to simplify the evaluation results presentation and enable for a systematic review of each clinic's performance. The evaluation results are organized in these tables, allowing for a thorough investigation of numerous dental clinic elements. The evaluation results are also compared to the guidelines book's defined standards, (Part B – Health Facility Briefing & Design) which act as a standard for evaluating the effectiveness of dental clinics in relation to various typologies.

4.1 Evaluation of the 3 respective clinics by the author.

Table 4. Clinic A, is residential based. (By the author)

ROOM/SPACE 1 CHAIR	Qty	x	m2	Remarks	Observations	m2	
Entry/Reception	Qty	x	m2			m2	
Reception	1	x	3	Referred to the number of the users.	●	2.5	For only two users, in an appointment.
Waiting	1	x	5	Based on three people per dental chair,1.2 m2 per suit. This may be reduced.	●	4.3	Merged with the reception area. 2 chairs
Play Area	1		3	In waiting Area	✘		Missing
Storage	1		4	Optional	●	1.4	Adapted within the restroom.
Toilet	2	x	3	May shared with main entry.	✔	3.8	Only 1. Shared with dental staff.
Treatment Area							
Dental Treatment	1	x	7		✔	11	It is inside the requirements.
Dental Sterilising	1	x	3	Maybe separated from treatment area or a combined area with one entry from the treament room	✔	4.3	Designed as a semi-open area.
Dental Laboratory							
Dental Workroom	1	x	4	Optional	✘		Missing
Store-General	1	x	4	Optional	✘		Missing
Staff Areas							
Meeting Room					✘		Missing
Office- Dentist	1	x	3	Maybe separated or integrated with the working room.	✘		Integrated with the working room.
Office-Workstation					✘		Missing
Staff Room					✘		Missing
Toilet Staff					✔		Shared with the patients of the clinic.

✔ correct   ● adapted, not fully correct   ✘ missing

Table 5. Clinic B, is a hospital-based clinic. (By the author)

ROOM/SPACE	Qty	x	m2	Remarks		m2	Observations
Entry/Reception	Qty	x	m2			m2	
Reception	1	x	24	Referred to the number of the users.	●	16	Not enough/ requirement space.
Waiting	1	x	20	Based on three people per dental chair,1.2 m2 per suit. This may be reduced.	●	18	Based on two people per dental chair.
Play Area	1		15	In waiting Area	✖		Missing
Storage	1		12	Optional	●	2.5	Adapted in a small space
Toilet	2	x	6	May share with Main Entry of the hospital if located close.	✔		Shared with the hospital.
Treatment Area							
Dental Treatment	7	x	14.5	Also referred to as Dental Surgery room.	✔	15	Designed as the requirements.
Dental Sterilising	1	x	14.5	Maybe separated from treatment area or a combined area with one entry from the treament room	✔	15	Designed as the requirements.
Dental Laboratory	1	x	20	Optional	✔	17	
Dental Workroom	1	x	12		●		Adapted in the dental areas.
Store-General	1	x	12	For clinical records.	●		Adapted in the dental areas.
Staff Areas							
Meeting Room	1	x	20	Optional , may be shared.	✔	17	Designed as the requirements.
Office- Dentist	1	x	9		✔	12	Designed as the requirements.
Office-Workstation	1	x	12		✖		Missing
Staff Room	1	x	16	May be shared with adjacent Unit, with hospital.	✔	12.4	Designed as the requirements.
Toilet Staff	2	x	3	May be shared with adjacent Unit.	✔	4.7	Only 1 restroom.

✔ correct   ● adapted, not fully correct   ✖ missing

Table 6. The clinic C, stand-alone/biophilic-based clinic. (By the author)

ROOM/SPACE	Qty	x	m2	Remarks		m2	Observations
Entry/Reception	Qty	x	m2			m2	
Reception	1	x	20	Referred to the number of the users.	✔	17	Referred to the 2 number of the users per dental chair.
Waiting	1	x	20	Based on three people per dental chair,1.2 m2 per suit. This may be reduced.	●	18	
Play Area	1		10	In waiting Area	✖		Missing
Storage	1	x	6	Optional	✔	7	Designed as the requirements.
Toilet	2	x	6	Optional, as visitor amenities may be shared with other services	✔	10	Designed as the requirements.
Treatment Area							
Dental Treatment	6	x	15	Additional Area for acces by patients on a trolley/bad for surgery or a dental treatment.	✔	18	Designed on the requirements.
Dental Sterilising	1	x	15	Adjacent to dental clean-up.	●	6.5	Designed on the small area.
Dental Laboratory	1	x	20	This is not itended as a major laboratory. May include storage of dental molds.	✔	25	Designed on the requirements.
Dental Workroom	1	x	8	Optional, only occurs in large size clinics.	●	15	Designed on the requirements.
Store-General	1	x	8		✔	6.7	Designed on the requirements.
Staff Areas							
Meeting Room	1	x	15	Adaptable for healthcare staff education and work organization. Also used for cultation with patients	●		Integrated with the main dental office.
Office- Dentist	1	x	9	Maybe part of the meeting room	✔	14	Designed on the requirements.
Office-Workstation	1	x	5.5	Optional	✔	5	Designed on the requirements.
Staff Room	1	x	20	Includes kitchen, changing rooms. Maybe shared with adjacent Unit.	✔	22	Designed on the requirements.
Toilet Staff	2	x	3	May be shared with adjacent Unit.	✔	7	Designed on the requirements.

✔ correct   ● adapted, not fully correct   ✖ missing

These criteria are used to create a thorough comparison that shows how closely the examined clinics correspond to the specified requirements. After careful consideration, it becomes clear that the majority of issues found during the review process are primarily centered in the dental clinics' Public Zone. This particular area,

which includes places open to patients and visitors, displays additional problems and opportunities for development.

4.2 Descriptive Statistics for response analysis

This section explains the response analysis performed using patient group data. Target groups were chosen at randomly from individuals who received medical attention at the three oral healthcare facilities designated as case studies in Chapter 3 (March 2023–May 2023) for the surveying process. By conducting surveys and distributing questionnaires, the study recommends learning about and comparing the different goals and points of view of these two user groups. In earlier chapters (Chapters 1-3), the entire study project's methodology—including the literature review and field investigations (the survey-interview-participant process)—was described. The users' preferences for their needs in the design of oral healthcare environments are examined. As a result, 94 copies of the Questionnaires for Patient Group and 3 copies of the Interview for Dentist Professional Group were reviewed at Tirana's three clinics. I supervised the conduct of this in-person questionnaire survey to assure its accuracy.

4.2.1 Analysis for the response Patient group

A. Patients Background

The information in this section is presented as statistical analysis about respondents' individual backgrounds (such as gender, ages, and education) in the 3 respective clinics. The respondents are identified by the numbers 63 women (67%) and 31 men (33%) are respectively shown in Table 7. The participants varied in age from 36-45 (41%) in Clinic A, from 46+ (50%) in Clinic B and from 26-35 (45%) in Clinic C. Additionally the most frequented age is (36-45), as shown in Table 8, 33% of users in the 3 respective clinics. In the Table 9. is displayed the information about education of the patients group. From the education level, 37% of users had a high school education, and 56% had a university degree. 6% of respondents indicated a different level of education than what was asked for in the survey, while 1% of respondents from the Clinic A did not offer this information.

Table 7. Patient group genders. (By the author)

Characteristic	Category	Clinic			Total
		A	B	C	
Gender	Female	18	20	25	63
	Male	11	14	6	31
Total		29	34	31	94

Table 8. Patient group Ages. (By the author)

Characteristic	Category	Clinic			Total
		A	B	C	
	18-25	5	2	2	9
	26-35	5	4	14	23
Age	36-45	12	12	9	31
	46+	7	17	6	30
Total		29	34	31	94

Table 9. Patient group Education. (By the author)

Characteristic	Category	Clinic			Total
		A	B	C	
	High School	11	15	9	35
Education	Graduate	15	16	22	53
Total		29	34	31	94

B. Patients Dental Experience

From the patients' dental experience, focusing on how important their experiences in the dental clinic were, the information in this section can be used as (Table 10). It concentrates on how frequently they go to the dental office. their visit to the dental clinic at that time in their emotions. The survey's goal was to find out more about the aspects of the dental clinic environment that patients valued most when selecting an environment that would meet their needs and how these aspects affected their overall experience.
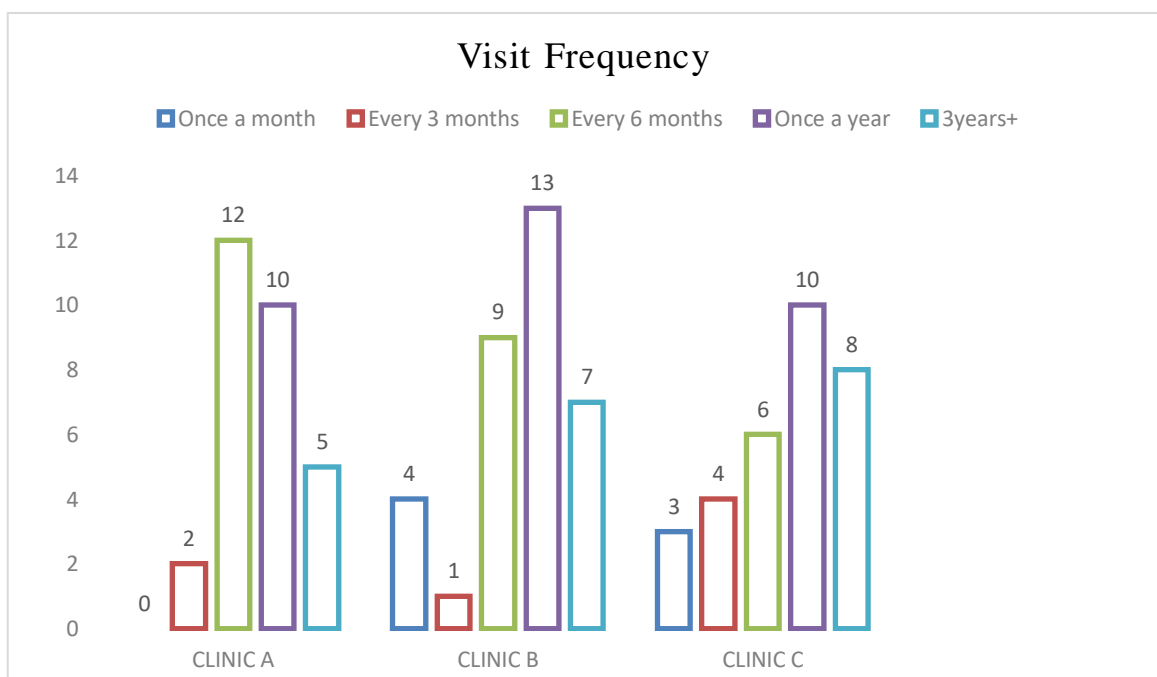
Figure 39. The visit frequency of patient group.

As shown in the (Figure 39), the most frequency time of the dental visits is the answer "once a year" (35%) respectively in the 3 clinics. The results shows that the majority of respondents in Clinic A (41.3%) had every 6 months since beginning treatment. In Clinic B, (38.2%) had once a year since beginning treatment, and 32.2% of Clinic C had a year since beginning dental treatment. In this part, it was determined the duration of time, the patients had spent receiving the dental treatment.
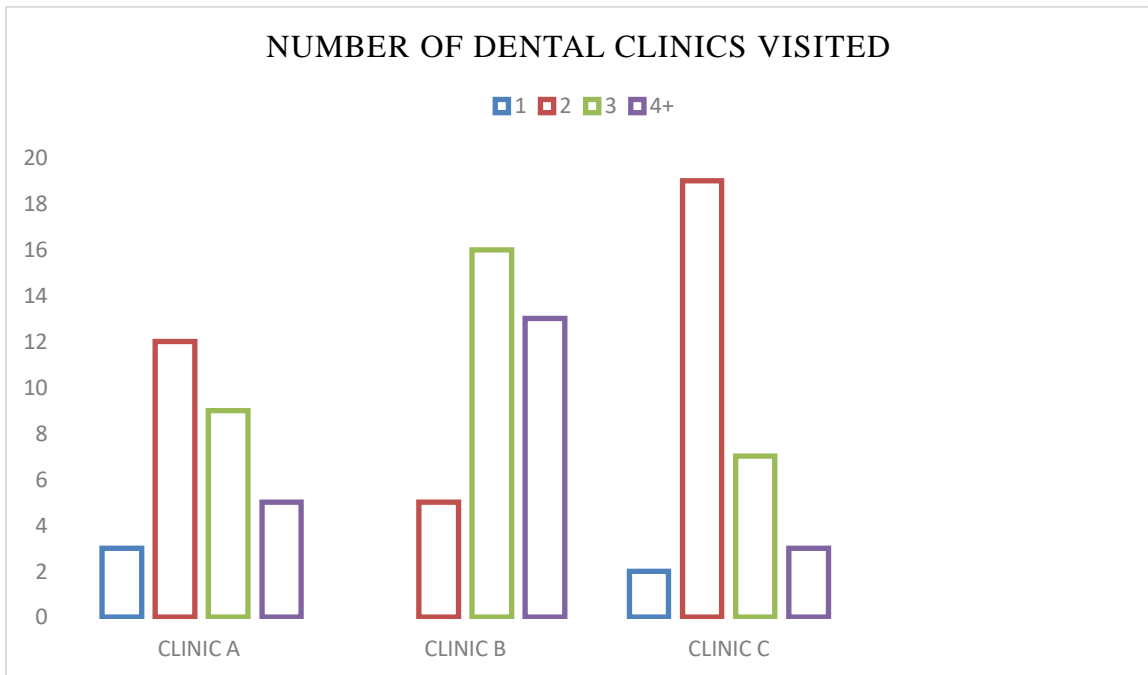
Figure 40. The number of dental clinics used by patients.

The figure 40 demonstrates the quantity of dental clinics that the respondents have visited. In the 3 respective clinics the most answers were "2 clinics" (37.2%) and the answer "3 clinics" (35.5%).
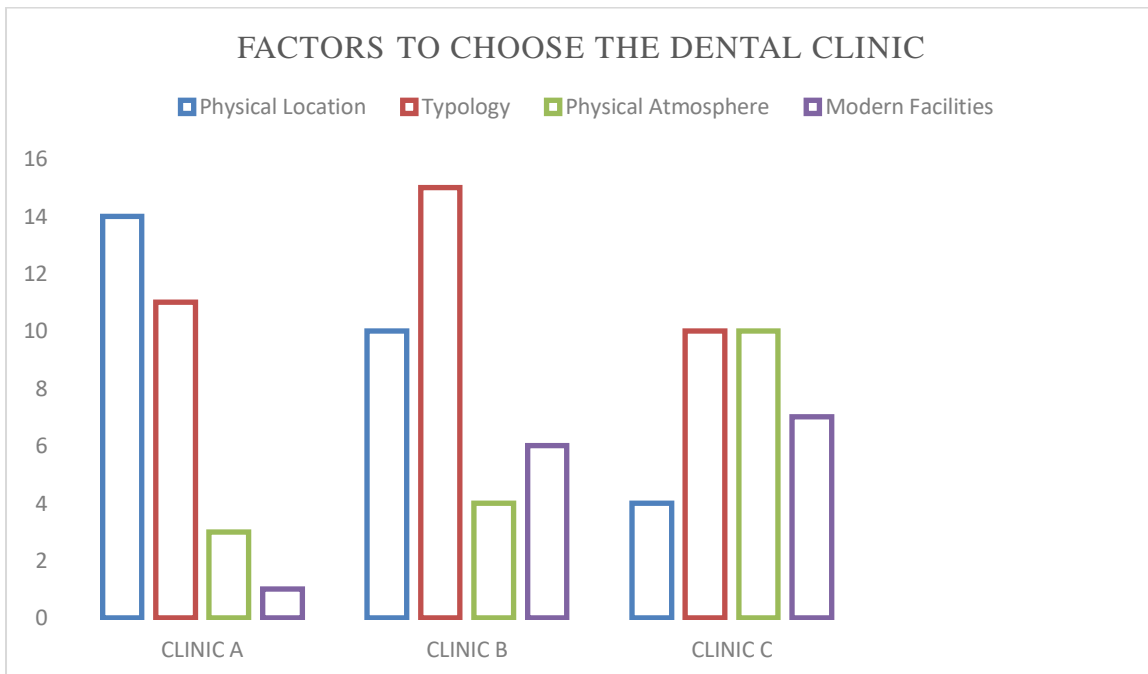
Figure 41. Factors for choosing the dental clinic.

From the patients answers in Figure 41, demonstrates in the 3 respective clinics, the "typology" (38.2%) has the most importance for choosing the dental environment.

(Residential-based, Hospital-based and Stand-alone-based) In Clinic A, (48.2%) of the respective participants choose the "physical location" as an answer, whereas Clinic B responds with the "typology" with (44%). The patients of Clinic C choose "the typology and physical ambience" as the most important factors, with (32 %) for each of the two factors.

The section B demonstrates 2 open questions related to the behaviors of visiting a dental clinic. Q1. How do you prefer to visit the dental clinic? (Alone or with Somebody). A significant number of the patients questioned in the 3 respective clinics, preferred to go to the dental clinic alone. There two main reasons about this responds. First of all, a significant amount of respondents said they had no one to accompany them to the clinic. Second, the value of privacy showed up as a main factor in choosing to go to the dental clinic alone.

Q2. Are you scared/stressed when you go to the dental clinic? (Yes or No). The second open-ended question aimed to learn how anxious or stressed out patients were about going to the dentist. According to the responses, 74% of the participants, or a significant number, said they were afraid or stressed out when visiting the dental clinic. The remaining 26%, in contrast, stated that they did not feel such negative emotions during their visits.

C. Relative Importance of Design Issues in the Physical Environment.

Standard statistics can be used to evaluate the relative importance of these design problems and then prioritize them because this research aims to learn more about the preferences of the participants for design issues related to their requirements.

As shown in the Figure 43, the respondents are identified by "the dental smell" (35%) as a dental anxiety source in the 3 respective clinics. The second one was dental noise with (28%). The results shows that the (n=11) respondents in Clinic A, identified the dental smell as a source, (n=9) identified the dental noise, (n=5) identified the artificial light from the dental equipment and (n=4) identified the colors. In Clinic B, the patients (n=12) identified the artificial light, the patients (n=10) the dental smell, (n=8) the dental noise from the dental facilities and (n=4) the colors of the physical environment. In clinic C, the dental smell was responds by (n=11), the dental sound

by (n=8), artificial light by (n=8) and the colors by (n=2).
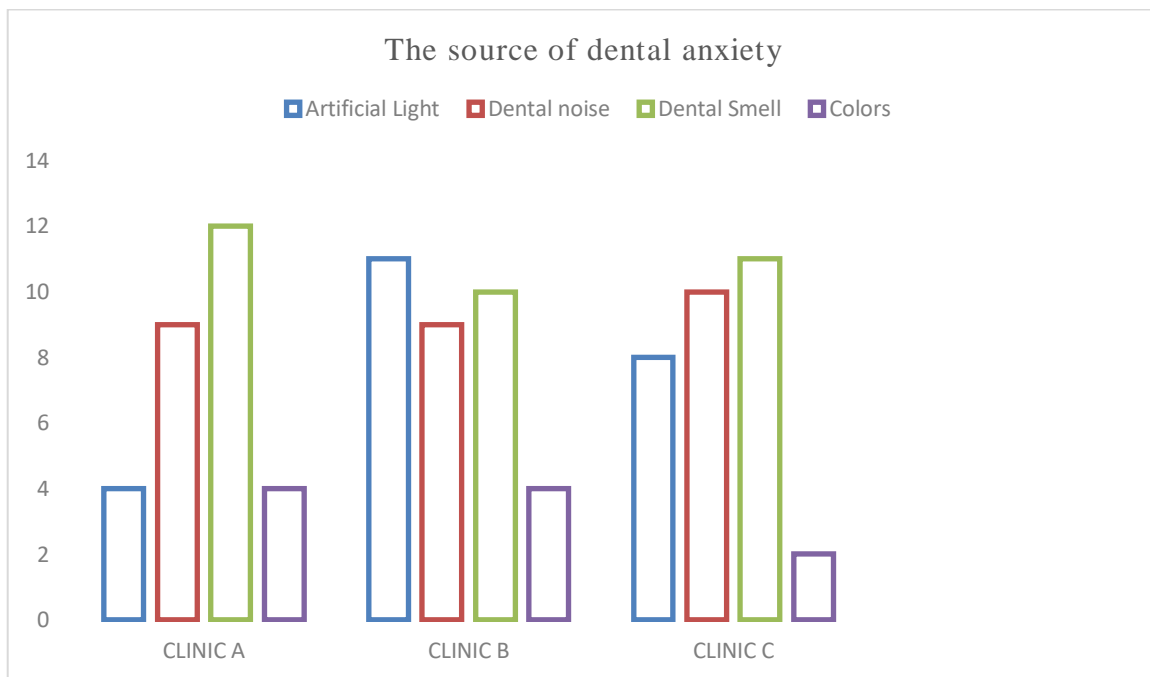
Figure 42.Physical Factors of Dental Fear.
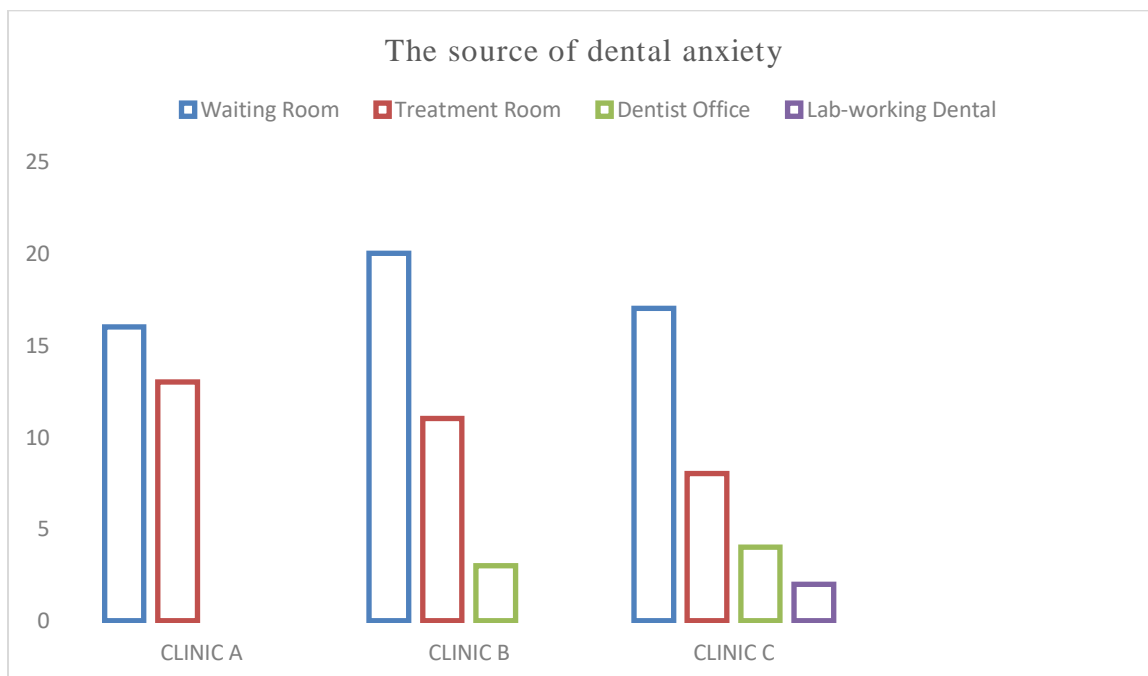
Figure 43.Functional Areas that cause dental fear.

The Figure 43, demonstrates the functional areas of the dental environment that

cause Anxiety or Stress. Based on the results, it is visible that the Waiting Area with (57.4%) is the most frequent answer by the patients of the 3 respective clinics.
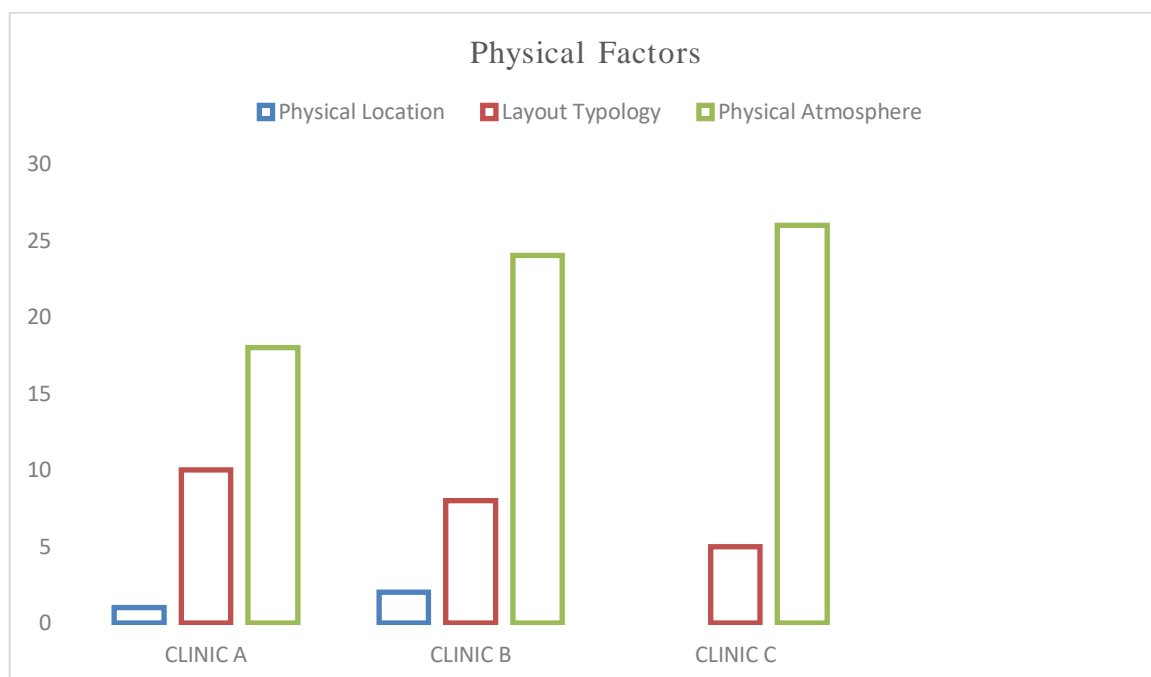
Figure 44. Dental issues that cause dental anxiety/fear.

Based in the findings of Figure 44, the physical factors that most of the responding answers was the Physical atmosphere as an issue in dental clinics with (72.3 %). The answers were more related to the physical ambience of the dental clinics or the typology than the geographic location.

In section B are included 2 open questions, regarding the comfort and emotions of the patients in the dental clinic. Related to privacy and importance of comfort in the dental physical environment. Regarding the Q1, focused on how the physical atmosphere of the dental clinic impacted patients' emotional states and general comfort. The responses' analysis showed that the physical environment performed, in fact, have a significant impact on patients' perceptions of comfort with (93%) of the respective patients. An intense belief that the physical atmosphere is important, attributing this to their general sense of peace and relaxation throughout their dental visits, because it made for an additional comfortable visit. The second question focused on the value and importance of privacy in the dental clinic. According to the analysis

of the replies, patients' value of privacy greatly affected how they felt about their overall dental visit and how comfortable they were with it.

D. Relative Importance of the Dental Clinic environment.

As shown below, in Table 16, the patients in Clinic A responds more about the clinic environment in a residential building, because of commodity with (58.6%). The Clinic B choice was the typology of the clinic as Stand-alone or biophilic based (41%), with a little difference of that in hospital-based clinic with (38.2%). The patients of Clinic C chose the Stand-alone or biophilic dental clinic typology with (80%). Overall in the 3 respective clinics the most frequent answer was the Biophilic Stand-alone based clinic with (52%).
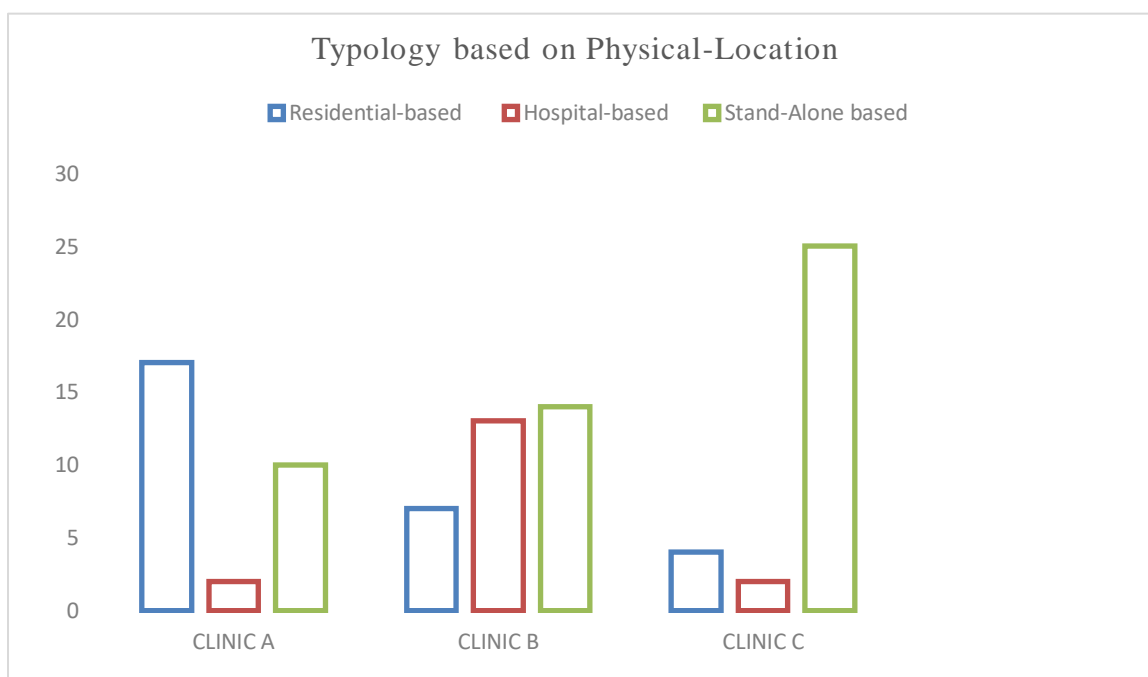
Figure 45. Typology based on Physical-Location.

Based in the Figure 45, it means to explore the most preferred layout typology of the dental clinic. In the 3 respective clinics the most frequent answer was the closed layout typology with (49%). In Clinic B it was the most visible choice, but in Clinic C it has a little difference with the semi-closed layout, this last one with (42%).

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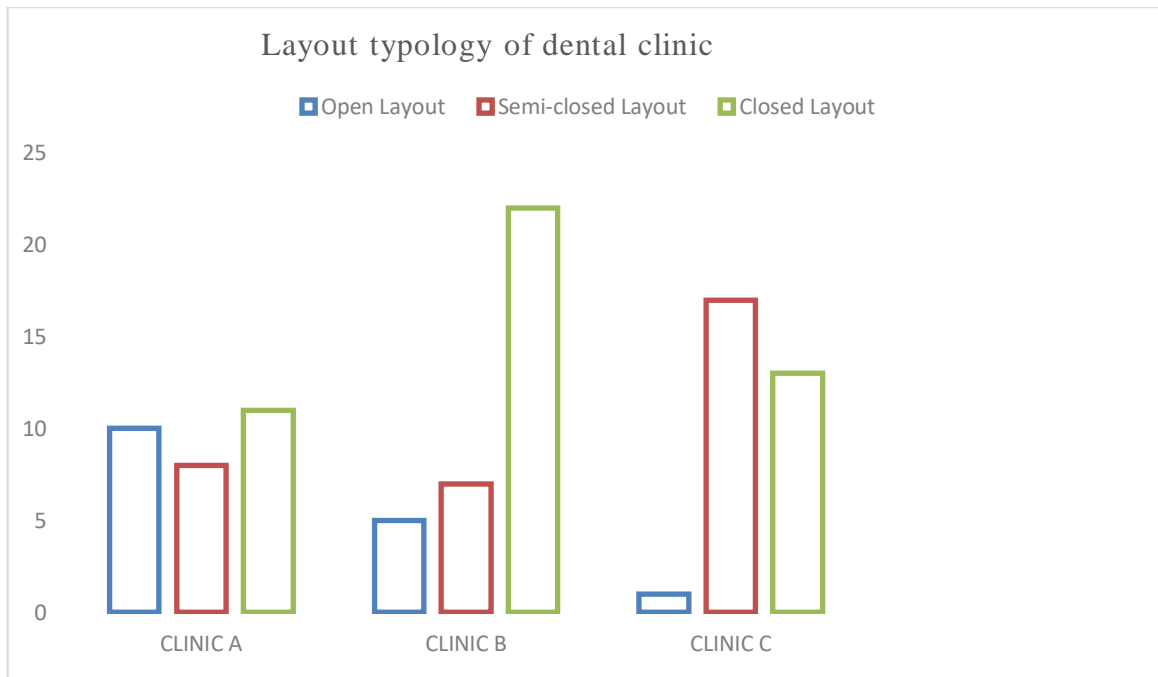
Figure 46*.Preferred Layout typology.*

After that the answers are evaluated with the chosen atmosphere of the selected chosen typology, in (Figure 46,47,48). In the Open Layout typology, the patients chose the home-like atmosphere as the most wanted ambience of the dental clinic with (56.2%). In the Semi-open Layout typology, the most responding answer was the modern ambience of the dental clinic with (50%). The home-like atmosphere was selected by (47%) of the patients. The patients of the closed layout typology choose the modern atmosphere with (40%), as the type of the physical dental environment wanted.
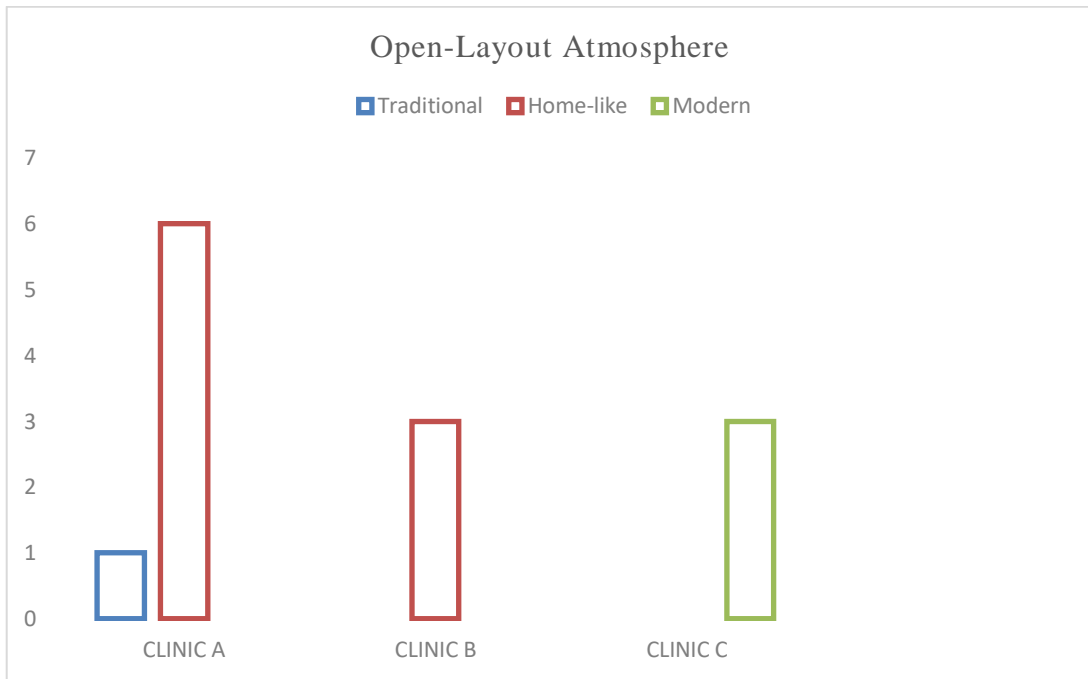
Figure 47. The open layout atmosphere.
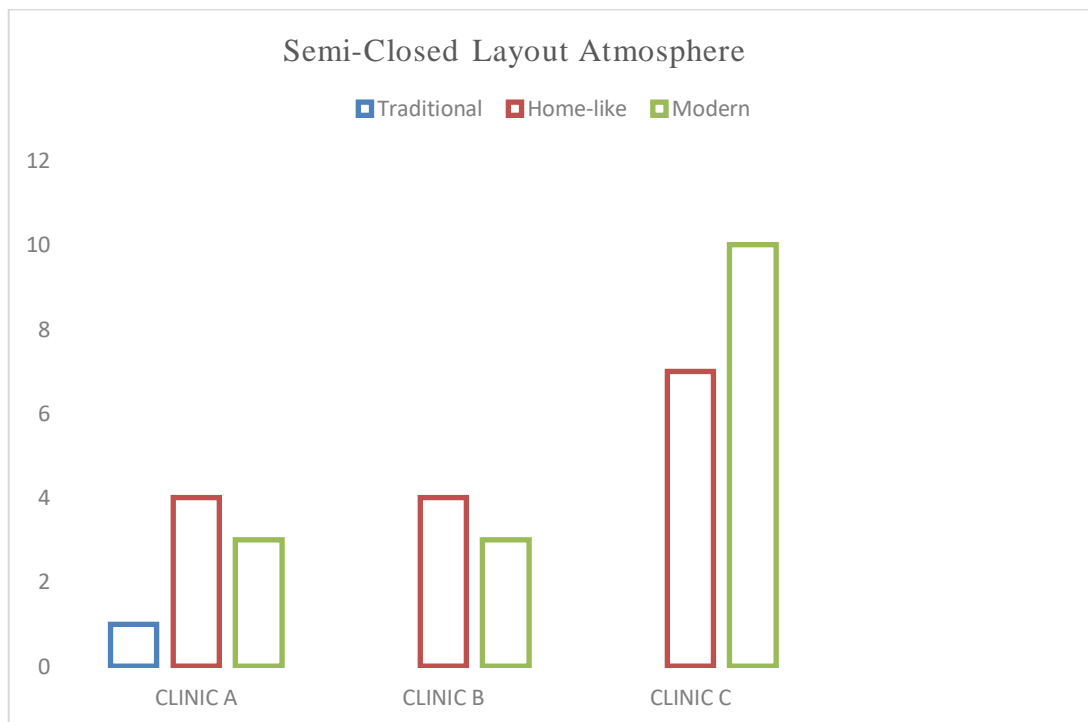
Figure 48. The semi-closed Layout atmosphere.
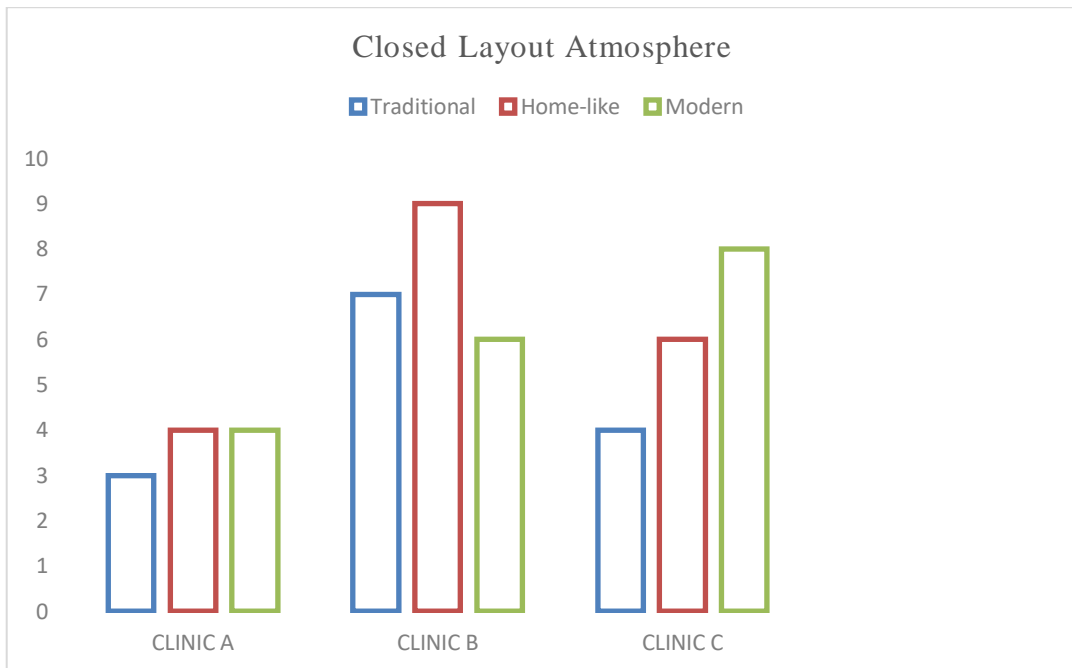
Figure 49. The closed layout atmosphere.

In the Figure 49, it is shown that the most frequent answer as the directed view during the dental treatment is the opening with (45.7%). The different choice was that one of the patients in Clinic B, it was the Color of the dental treatment room with (50%) of the patients of the respective clinic.
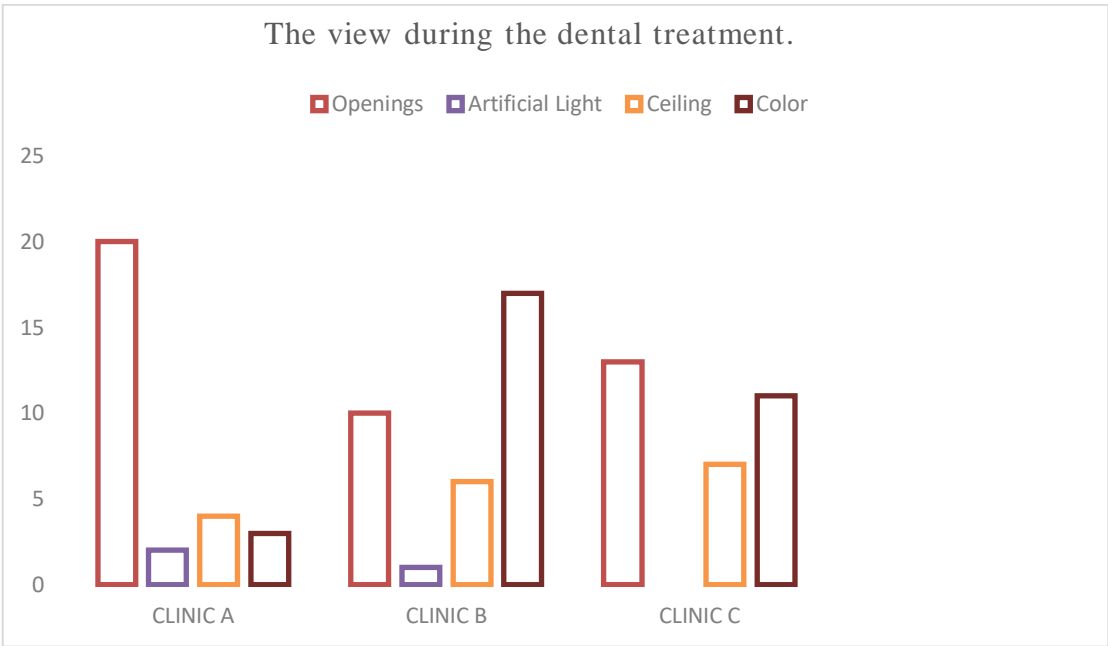
Figure 50. The sight during dental treatment.
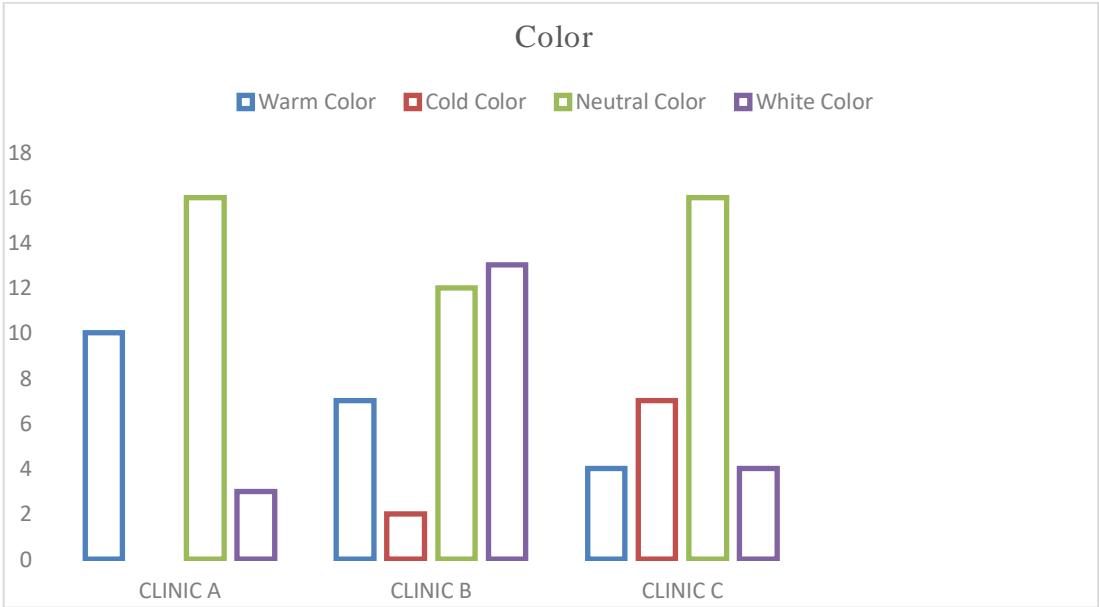
Figure 51.The colors of the dental treatment Area.

The Figure 51, demonstrates that the preferred color for the 3 respective dental clinics is the Neutral Color, but in the Clinic B with a small difference of the answers, the patients of the clinic choose the white color as the preferred one with (38%).

E. Relative Importance of the Dental Physical Factors.

The section D used to express the satisfaction level during the analysis of the questionnaires were based on the items that represented a favorable or negative view regarding the dental physical factors of the environment. The items or statements were rating from strongly agree, agree, neutral, do not agree, strongly not agree and no idea. All of the evaluations that indicated levels of satisfaction and dissatisfaction were divided, added up, mentioned as a percentage, and displayed in a (Figure 52).
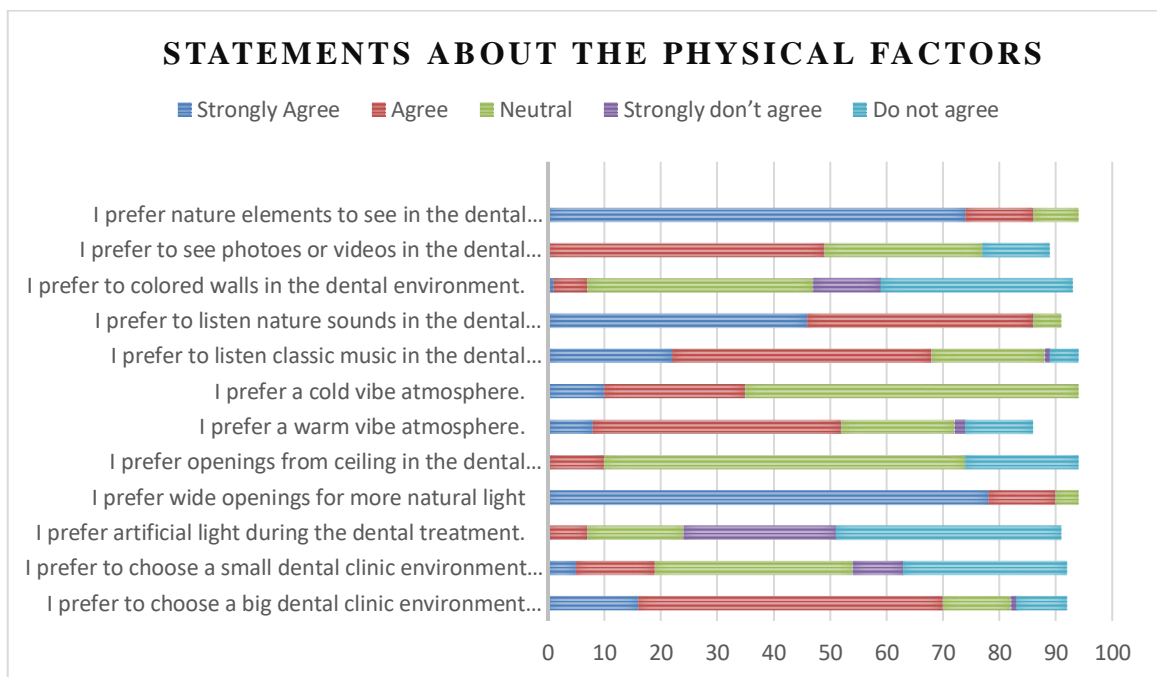
Figure 52. The statements about dental treatment area.

These will be described in a general way about the 3 respective dental clinics. The replies obtained and provided crucial information on the preferences and expectations of patients regarding the environment and physical elements of dental clinics. There was agreement among participants regarding the scope of the physical dental environment.

According to the findings, the majority of patients (57.4%), showed that they preferred larger dental settings because they felt more comfortable, airy and had the possibility to offer innovative technology and services. Others, (20%) on the other hand, preferred more personal and individualized environments. Regarding the other part of the patients, they were neutral about the dimensions of the environment.

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Most survey respondents (82%) stated that they preferred natural light in the dental clinic when asked about their preferences for lighting in the dental environment. About 25% of the patients favored the artificial light used during their treatment or had no preference. The majority of patients (76%) responded that large windows are preferable than ceiling openings. However, just 18% of respondents were in favor of having openings in the ceiling.

When questioned about the ideal atmosphere in the dental clinic, the vast majority of participants favored a pleasant setting. They connected warmth with comfort, peace, and a welcoming environment. On the other hand, a smaller proportion of respondents (37.2%) preferred a cold-feel environment, comparing it with a tidy and clean atmosphere.

The participants preferred classical music (78%) and they strongly agree for the nature sounds (92%) as the audio in the dental practice. It was believed that using these meditative music elements would make dental procedures more pleasant and peaceful.

About the statement of the ideal atmosphere, the patients that were considering color walls in the dental environment were only (19%). The majority of the patients (61%) were neutral in the opinion about wanting the strong colors or not. Additionally, patients (54%) thought that having photos or portraits in the dental clinic would help to personalize and warm up the environment.

The results show that the most of patients (93%) also expressed a preference for using biophilic natural components in the dental environment. Only a small group (7%) had neutral opinions about the biophilic elements. They underlined the advantages of utilizing natural components like plants, greenery, and organic materials in the clinic setting. These elements were thought to enhance the environment and promote a connection to nature, which would enhance the wellness of the patients.

The survey's findings provide crucial details about what patients' value in terms of the general environment of dental offices. Although patient preferences for the size of the space was mostly that big one, sometimes artificial lighting and rooms with lots of windows for natural light were typically preferred. They also remarked that they loved the addition of biophilic natural materials not colored walls, a warm atmosphere, and nature sounds, and some of them wanted classical music. These findings can be used to inform dental clinic design and help create environments that take patient preferences into account, enhance the patient experience, and promote a sense of comfort and wellness.

F. Open-ended Question related to the patients' perceptions.

The last section of the questionnaire will handle the qualitative data collection. One open-ended question that also analyze participatory design ideas for healthcare facilities examine patients' awareness of oral healthcare services. In contrast to the questions in the earlier sections, this one is optional and is framed broadly in terms of dental functional areas. As a result, 61% of respondents chose to respond, while 39% preferred to leave the question open-ended. The in-depth responses demonstrate how knowledgeable patients are about dental treatments and facility layout. Some people don't have a good understanding of healthcare environment design and participatory design process.The aim of the question is to understand the patients' opinion regarding the sensations that they perceive or experience in the respective area of the frequented dental clinic.

The answers are summarized below…

In Clinic A, a group of patients (58%), who received dental treatment at a residential-based clinic described the dental environment, as a space with great sensory experience. They mentioned of feeling comfortable and at "home" in this environment, which is probably because of residential features that this kind of dental environment offers. However, some of the patients claimed in their observations on how they perceived the dental field that the clinic settings always produced anxiety and stress. This was because the environment had particular characteristics that did not promote such positive emotions.

In Clinic B, Patients who took dental care at a hospital-based clinic experienced a special set of emotions related to this type of environment. The users felt the environment was more clinical, which they attributed to the hospital setting as a whole. They expressed a sense of professionalism and modern medical technology, as well as a sharpened awareness of the clinical atmosphere in the room. The hospital-based clinic caused some patients to express a minor level of fear or anxiety, which is likely a result of how they saw the medical environment and its relationship to more involved medical treatments. However, it was acknowledged that having access to the hospital's numerous facilities was advantageous in this situation.

In Clinic C, the stand-alone clinic was commended by patients as providing a satisfying and well-balanced sensory experience. The responders appreciated the specific dental setting, which was different from other medical facilities and promoted a sense of professionalism and attention on dental treatments. Patients appreciated the biophilic or stand-alone clinic's quiet atmosphere and well-thought-out architecture, saying it enhanced their whole experience. It was also emphasized that patients could concentrate totally on receiving dental care and felt quieter because there were none of the distractions typical of hospital environment.

Therefore, it may be assumed that the responses' qualitative content represents patients' opinions about the environment's design principles for providing oral healthcare. It illustrates how some patients prioritize and are aware of their frequent oral surroundings. Some patients believe that their comfort and behavior before, during, and after dental treatment might be influenced by t dental setting. However, most people are uninformed of this approach.

4.2.2 Analysis for the response Dental professional group

The responses of the interview from the dental professional's Group are discussed in this section. It is important to understand what dentists requires for oral healthcare facilities as well as their preferences for the design difficulties linked to their requirements and experience levels. According to the research question, (What are the users' preferences for various design techniques in relation to their requirements for dental healthcare environments?), the relevant design techniques can then be ranked according to their relative importance, and the issue can then be approached from the perspective of dental staff professionals. The dental professional group is another essential end-user of healthcare surroundings. They spend a lot more time at oral healthcare environments than with actual patients because of their professional obligations. They have to deal with a variety of risks at work every day that could be harmful to their health and well-being. To within the scope of the research, the responses from the dentist group are conducted in-deep interview with 3-dentists of respective selected clinics. The interviews were conducted between March and May 2023. Two of them were conducted in their working place and the third one

was conducted through writing, because it was inaccessible to conduct in-deep. In the summary of the responses are highlighted the keywords that will provide the results of the designing principles. The method for collecting the information is from "Coding".

An overview of the conclusions drawn from interviews with three dentists who practice in three different clinic environments: residential, hospital, and stand-alone based clinics, is provided in this section. The dentists focused on the patient's experience and the architectural components that contribute to it as they discussed their thoughts and observations on various parts of the dental clinic environment.

The need of treating patient fear and anxiousness during dental treatments was stressed by dentist 1, who works at a dental clinic with a residential feature. They admitted that the emotional state of the patient could affect the dentist's work. The clinic provides patients the option of having a partner, reducing their fears and promoting a sense of security. The waiting area's open design makes it possible to provide emotional support. The dentist also emphasized how relaxing natural views from the large window at the treatment area can be. Dentist 1 noted that accessibility is crucial for patients when discussing the relative significance of the context and location of the dental clinic, but he also underlined the value of a less chaotic and quieter setting outside of the city. Dentist 1 highlighted the value of an optimization of the artificial and natural light. The dentist emphasized the need of having adequate lighting to provide clear visibility during specific dental procedures, and he or she suggested using a combination of artificial and natural light along with shading tools.

Dentist 2, working in a hospital-based dental clinic, observed that although most patients appeared relaxed, dental fear was apparent particularly in younger patients. The dentist highlighted the value of having patients with them while explaining processes and used games to make the environment more kid-friendly. Dentist 2 highlighted the comfort of an integrated site with the hospital or a near proximity to an urban center for the clinic's context/location for both the doctor and patients. The dentist emphasized the value of modern surroundings and a closed layout for the working area. The dentist noted that while artificial light was necessary during dental procedures, natural light was preferred in sterilizing or laboratory settings to help identify colors. It was also observed that people appreciate broad openings, music,

and hygienic materials.

Dentist 3 emphasized the importance of taking patients' fear and anxiety into consideration when doing dental procedures at a biophilic standalone dental clinic. They emphasized the advantages of emotional support and recommended designating specific sections in the waiting area to house patients and their partners. Dentist 3 also emphasized the use of visually appealing artwork, naturally inspired details, and interactive screens as design elements to deflect focus away from stressful elements. Dentist 3 highlighted the effect of the dental clinic's physical environment on patients' perceptions, comfort, and contentment. They emphasized the requirement for soundproofing elements in treatment rooms to reduce noise interference and ensure patient privacy.

4.3 Walking-through Participatory design approach.

Design participation will lead to a better understanding of the needs, challenges, and desired outcomes in relation with the surrounding oral healthcare environment. If the operations and programs of the environment are better understood, the design can more accurately reflect the needs of usage and experience. To achieve this a transect walk or a walking-through is a simple technique for acquiring data.

A small group of patients—usually 3 or 4—who commonly go to the 3 respective selected clinics are chosen to conduct the walking-through. Patients are invited to explore the clinic, and conversation about their impressions, emotions, and experiences in each area is encouraged. Through this method, the physical environment may be examined in greater detail, and patients can express their thoughts on the clinic's advantages and possible growth areas. Patients are urged to freely share their opinions throughout the tour, encouraging a collaborative and participatory approach to design.

We discussed about their level of comfort, the efficacy of privacy, the impact of lighting and color schemes, the value of the functional areas, and any other variables they seem significant. The responses are recorded and summarized in order to fairly represent the opinions and concepts of the participants. It is organized as a process of exchanging knowledge between dental areas and discussing positive ang negative, and

giving some suggestions of problem solving. Four themes were identified from the walking-through; Atmosphere, Initial Points of Dental experience, Waiting Experience, and Dental Health Facilities.

As a summary of the process, how this participatory method is organized in each of the clinics.

Figure 53. Participatory Process developed in Clinic A. (By author)

C.A, two patients participated in the process and we discussed about the dental anxiety. Although the patients generally expressed a nice vibe with their dental visits, but also they pointed up a number of issues with the clinics architectural features. The size of the dental environment, the discomfort in the waiting area, the lack of privacy, the lack of greenery or other natural aspects, the difficult access to the restroom, and the lack of a specific consulting office were the main topics of these concerns.

One significant issue raised up during the participation process was the idea of a small dental workplace. Additionally, the participants commented about how the uncomfortable perception that the waiting area was. They specifically highlighted the lack of privacy and small space of the waiting area as a problems. Patients requested a

waiting area with more personal space and privacy so they felt comfortable as they awaited their dental appointments without feeling exposed or pushed in. The discomfort felt in the waiting area was made worse by the lack of any natural components, such as plants or openings, highlighting the potential advantages of applying biophilic design concepts to produce a more relaxing and welcoming environment. Additionally, it was found that access to the restroom was a source of discomfort. Patients complained that exiting through the front door was crucial to use the restroom, which disrupted the dentist experience and created unnecessary bother. Patients requested a private area where they could speak with their oral healthcare professionals in privacy.

Regarding on the walking-through developed in Clinic B, four patients participated in a walking-through at this clinic, a hospital-based dentistry clinic, as part of the participatory design process, and they gave their perspectives on the facility's architectural features. The waiting area, which was generally thought to be suitable, was where the tour started. However, participants called attention to several specific problems, like the use of dark gray colors and the lack of screens to shorten the long waits. Additionally, the way that spaces were organized, dental treatment rooms, views of hospitals, the inclusion of plants to distract from the typical hospital ambiance along the lengthy corridor, and worries about sound disturbances coming from the adjacent corridor were noted. The participants suggested exploring alternative color palettes that promote a sense of calm and comfort, potentially contributing to a more positive patient experience. The availability of a child-friendly treatment area was positively acknowledged, as it helps create a specialized environment that caters to the unique needs and anxieties of younger patients.

At Clinic C, a biophilic standalone dental clinic, a walking-through was done as part of the participatory design process. Three patients actively participated in conversations, offering their thoughts and experiences about the clinic's architectural layout. Starting at the entrance, the tour moved on to the waiting area.

One patient expressed worries with the content displayed on the big screen in the waiting area, which included dental treatments. According to this viewpoint, the visual representation of dental treatments on the television might have increased this

patient's dental anxiety or made their waiting experience unpleasant. It emphasizes how crucial it is to carefully choose and design visual content for waiting rooms so that it enhances patient wellbeing and doesn't raise anxiety levels.

Another patient expressed worries about the treatment rooms' lack of privacy. They noted that having to share the treatment room with someone else interfered with their right to privacy and might have increased their suffering. While another patient expressed pleasure with the shared treatment room experience, particularly when accompanying a child, opposing viewpoints also emerged.

Despite having different views on privacy, everyone present thought that the biophilic standalone dental clinic's ambiance was the best. The addition of biophilic components, such as organic materials, vegetation, and lighting, produced a welcoming environment that connected with the patients. The clinic's overall experience was likely improved by the biophilic design approach, which places an emphasis on fostering connections between people and nature. This approach is likely to have led to a feeling of serenity and tranquility.

Figure 54. Participatory process developed in the Clinic C. (By author)

4.4. Discussions for responses findings and literature review.

The needs of users for the design of the oral healthcare environment have been investigated based on the response analysis from the patient group (Chapter 4) and the dentists group. Different responses from each target group were noticed and recorded. This chapter discusses cross-comparative research, which examines the issues that could possibly give rise to variations between target groups.

The difference between the response analysis and the literature review is a second point of comparison. This is being held to better understand the objectives that patients and medical professionals have in relation to the specifications for environments focused on oral healthcare.

This chapter also discusses the data that can be utilized to update the three individual dental clinics with regard to their capability to satisfy the social and psychological needs of users in the sustainability assessment process for environments based on oral healthcare.

4.4.1 Discussions about the Survey-patients and Interview-dentists' findings.

The analysis of the target groups' responses showed that part of the same stakeholder group, the three oral healthcare needs related to the environment could vary significantly according to personal factors (such as gender, age, and job experience). In order to create an in-depth understanding of end-users' needs for the surroundings, it is critical to go deeper into the significant behavioral variations between patients and dentists. The chapter compares their choices for the design issues related to the user needs. It is important to note that statistical methods are used for the comparison between patient group and dentist group in cross-comparative studies because their opinions on healthcare environment design at a community level have been gathered using an identical standard in the surveys and interviews. The information collected can be utilized to determine the priority variants of participators requirements and guide the design of the healthcare environment.

According to the comments, the Dental Professional Group has a much greater

understanding of participatory design than the patient group. The results demonstrate that there are substantial cognitive differences. Dental staff and patients have different knowledge levels, it has been found. Their choices for many design components differed according to the Conceptual Literature collecting information for Healthcare Environment Design.

In terms of personal background, the majority of patients (36-45 years old) frequented the three clinics. The majority of the dentists who were interviewed were between the ages of 35 and 45 and had more than 10 years of experience providing dental healthcare. Patients had typically visited 2-3 clinics, while the dentists considered their current workplace as their second professional workplace.

The clinic's typology (residential, hospital, or biophilic standalone) had a big impact on the choice of dental environment. Even though it was not their first time, patients visiting dental clinics stated feelings of stress and anxiety. Patients' and dentists' privacy was a key consideration.

The dental smell was the primary cause of dental anxiety mentioned by patients, followed closely by dental noise and artificial light. However for the dentists professionals, the light was the primary physical feature for the working place. For the patients, the first one was the waiting area and the treatment area were shown to be the two sections of the clinic where anxiety was highest.

The majority of patients (58%) at Clinic A, a residential-based clinic, said the dental facility provided an enjoyable sensory experience. They felt cozy and "home" in this environment, probably as a result of the available local facilities.

Patients at Clinic B, which was located in a hospital, went through a varied range of feelings typical of this kind of setting. They attributed the feeling of the environment being more clinical to the hospital setting as a whole. The clinical setting was acknowledged by the patients as having a sense of professionalism and utilizing innovative medical technologies.

Patients stated about the Clinic C, that it offers a pleasurable and well-balanced sensory experience. Due to the absence of distractions frequently present in hospital settings, patients could fully concentrate on obtaining dental care and experienced better calmness. Overall, patients appreciated Clinic C the most.

The physical location was also crucial for dentist professionals; Dentist 1 emphasized the accessibility of a residential clinic while acknowledged the benefits of a stand-alone clinic. Dentists at Clinic B discovered that having the clinic integrated into a hospital allowed for more flexibility in their work and patient care. Dentists at Clinic C, however, claimed that a quiet area and a standalone facility were the ideal choice for their working method, producing a more comfortable environment. Due of the patients' anxiety, dentist 1 favored an open plan, whereas the two others chose a closed layout.

Physical characteristics made it obvious that a bigger dental clinic was favored and regarded as safer than a smaller one. Since patients frequently turned their heads towards these openings during treatment, large windows for natural light were crucial, especially in the waiting room. The importance of natural light over artificial light was emphasized by patients. Dentist professionals agreed that the waiting area needed larger openings, but they aimed to optimize both natural and artificial light in the treatment area by using shade techniques. Different functional areas resulted in different preferences.

Different functional areas resulted in different preferences. The most liked atmosphere was one that was warm. Both dental workers and patients preferred nature sounds, with classical music coming in second. Patients favored neutral or light colors the most, with white being a common choose because of its associations with cleanliness. Professionals like white as well, but they also valued the inclusion of soft, warm colors. The favored ornamental elements were pictures or TV shows projected on the walls. Particularly, the incorporation of biophilic components was the most admired physical aspect.

4.4.2 Operationalisation of the Findings regarding the literature and the responds.

A number of important finds are revealed when the findings from user responses are contrasted with the literature review on the physical environment of oral healthcare. Understanding the different physical components and qualities that compose the overall dental environment was made easier due to the literature review.

These elements are viewed and experienced differently by patients and dentists, according to the user comments gathered for this study. So an evaluated analysis is conducted between the literature data collected and the analyzes from the users' responses.

The literature review emphasized the significance of the dental clinic's typology, classifying it into stand-alone residential, hospital, or biophilic kinds. This classification provided a framework for comprehending how the physical environment of the clinic affected consumers' perceptions and preferences. The importance of typology was reaffirmed by user reactions, in which patients stressed out and expressed fear in the dental environment while highlighting the need for privacy. Dentists stated that typology had an impact on how they worked, with each style of clinic offering a different set of benefits.

The literature review looked at the main causes of dental anxiety or fear and identified artificial light, noise, and smell as the main causes. These findings were supported by the patient answers, with dental smell being the most often mentioned source of anxiety. While the light was supported by the dentists. The literature review placed a strong emphasis on the sensory experience and its impact on users' comfort and satisfaction while discussing the significance of the physical environment in the dental field. User comments offered insightful information on certain clinics and the environments in which they operate. In line with the literature's emphasis on a good sensory experience, Clinic A, with its residential-based typology, was described as a setting that gave patients a sense of comfort and "home." Patients considered Clinic B to be more clinical because it was located in a hospital, which is aligned with the literatures connect of hospital settings with professionalism and advanced medical technology. The independent clinic, Clinic C, received compliments for offering an enjoyable and well-balanced sensory experience, reflecting the literature's emphasis on sensory comfort and concentration.

The user responds offered insightful information about the physical characteristics, such as size, natural light, sounds, colors, and biophilic elements that were identified in the literature review. The emphasis on these aspects in the literature was supported by the need for larger clinics, wider openings for natural light, nature noises, warm atmospheres, neutral or nude colors with mild warm accents, and the

inclusion of biophilic elements. However, there were minor differences in the specific preferences between patients and dentists, particularly with regard to the enhancement of both natural and artificial light and the incorporation of pictures or TV shows on the walls. Also according to the literature review the dental treatment room was specified as the area where the patients feel anxiety, but from responds of the patients is understand that the waiting area is the most stressed of all functional areas in the clinic. The figure illustrates with some important keywords the collective information from the users during the participatory process.

Table 10. Participatory data collection. (By author)

KEYWORDS	WALKING THROUGH	PATIENTS	DENTAL PROFESSIONALS
PARTICIPATORY DESIGN	Lack of information	Lack of information	a much geater understanding
DENTAL ANXIETY	Important	Important	effects during their work
PHYSICAL LOCATION	Stand alone based clinic	Stand alone based clinic	stand alone based hospital based
CLINICS TYPOLOGY	closed layout	semi-closed closed layout	open layout closed layout
DENTAL SPACE	waiting area dental office	waiting area	treatment room
THE LIGHT	natural light	natural light	optimiztion of artificial and natural light
ATMOSPHERE	home-like environment	home-like environment	home-like environment
SENSES	dental sound and smell	dental smell	Importance of light
BIOPHILIC ELEMENTS	Importance of greenery	Importance of greenery	Importance of light

CHAPTER 5

CONCLUSIONS

5.1 Conclusions

An overview of the entire study, including its methodology, research strategy, and related findings, is provided in this chapter. It is expected that the research's findings will help designers of environments focused on oral healthcare better understand end users' needs and satisfaction. After that, a strategy can be created to enhance the social sustainability of three respective dental clinics and those environments that support oral healthcare in its entirety. To achieve the research goals, specific research questions have been answered in order to meet the research objectives.

Regarding the features of Participatory Design in designing an oral healthcare environment, its methodologies are essential to improving the design quality of healthcare facilities. The users recognized the value of participatory concepts for healthcare services, according to the questionnaires and interview replies. Most of them, however, were not aware of the importance of their involvement during the design decision-making process. Only a few of the dental personnel recommended that architects consult with the medical staff before beginning design work. This study shows that there is currently an absence of public awareness regarding public involvement in the development of environments for oral healthcare. It is crucial to raise this understanding in order to inspire end users to actively participate in the design process and express their own unique needs.

About the relationship between the perceived environmental quality and its users, it was shown that the reasons for these priority differences between patients and dentist staff were disparities related to the frequency of usage of healthcare facilities and duration of stay. It was found in the comparisons that people evaluated design concerns according to the consideration of their own benefits and interests. Dentist staff would want to provide an integrated consideration for the benefit of both patients and dentist professional staff. Some different approaches were used to accomplish this

goal of understanding the relation of the oral healthcare environment with the patients and dentists. In order gather information on users' impressions of environmental quality, including elements like aesthetics, comfort, functionality, and spatial layout, the quantitative aspect consisted of conducting questionnaires and interviews.

A thorough understanding of the complex interactions between architectural components, patient experience, and dental anxiety reduction is necessary for the development of "best" design methods in this environment. To successfully manage patient anxiety, a number of key factors must be taken into consideration when designing healthcare environments. First, a patient-centric strategy should be used, concentrating on developing areas that encourage comfort, peace, and a sense of control. Including natural components can create a relaxing atmosphere and reduce anxiety levels. Examples of these are plenty of daylight, greenery, and views of the outdoors. Additionally, allowing patients to personalize and enjoy a little quiet in their surroundings might improve their psychological well-being and sense of familiarity. Overall, by the literature data collection and from the responds of the users is understand that a biophilic environment is the best solution for a dental clinic environment.

The order of importance of the patient dental healthcare needs based on the environment mainly concentrate on building aesthetics (such as "the smell", "noise", "attractive colors and textures," and "light, natural light, and openings of the environment"), space allocation (such as "access to the outdoors," "staff-only places," "patient space," and "functional areas," respectively), patient comfort and privacy.

The order of importance of the dentists' professional dental healthcare needs based on the environment mainly concentrate on the Lighting of the working place. Such as the natural light, artificial light and its optimization based on different functional areas. Then coming such as ('noise", "attractive colors and textures," "the smell,"). Comfort and Privacy.

This section offers design suggestions and recommendations for dental clinics as a whole as well as particular proposals for dental settings within each of the conditions that have been examined in previous chapter. The dental environment, including the context, physical spaces and features of the clinics, is the focus of all of these advice and suggestions.

Additionally, the choice of suitable materials, colors, and lighting schemes that contribute to a cozy and aesthetically pleasing environment are taken into account. The clinics as a whole can be made into more comfortable and effective venues for both patients and staff by putting these design recommendations into practice. These design recommendations offer a useful guide for architects, designers, and healthcare specialists looking to improve the quality and efficacy of dental clinics, eventually serving the interests of both dental professionals and patients. In order to promote the user satisfaction and social sustainability for oral healthcare environments.

This research thesis recommended to the architects, designers and community healthcare centers may consider implementing the following interventions in order to improve user satisfaction to the Oral Healthcare Clinics:

1. The oral healthcare environment building should create a sense of place. Issues to consider:

• The building should be sited and designed with mind to a quiet and far from the urban center.

• The building should enhance the civic qualities of its setting.

• The design should promote a sense of belonging to and integration with the neighborhood and wider community.

THE PUBLIC ZONE.

2. There should be as much privacy as possible in waiting areas since people might be injured or distressed.

3. It is crucial that people can see the reception/staff area.

4. Toilets should be easily accessible and immediately apparent where they are located.

5. Seating should allow for people on their own as well as small groups.

6. Refreshment storage should be readily available and close to the waiting area.

90

7. There should be an adapted play children area.

8. The more visually appealing the environment, the higher the perception of the quality of clinical care and the lower the anxiety. The waiting room is mostly used during the day, and the need for natural light in this space can be divided into two directions. One method is to use soft lighting to help patients become familiar with their surroundings, and to make the space feel intimate, natural, and welcoming. The other is to receive a large area of daylight to allow the patient to view the outside world. It helps them to find positive things, boosting their courage and confidence.

9. The waiting areas should be improved to make them suitable for patients and their relatives as they wait to be attended at the clinic. This could be done by fitting comfortable furniture, regulate lighting, ventilation and fit Tv-screens for patients to catch up with news and reduce worrying about their conditions.

THE CLINICAL ZONE

10. It is vital to have at least one private consulting room, preferably more. (This will also change based on the service's expected visitor capacity.) Include different assessment areas with various privacy levels. Take into account visual and audio privacy by using soft, non-reflective, and appropriate soundproofing.

11. The introduction of natural light should be accompanied using shading devices such as blinds to avoid glare and to protect privacy. Dental patients are more sensitive to the artificial light and it affect the mood of the patients; the design should create a diffused, soft light.

12. All dental chairs should ideally be exposed to daylight.

13. Bedside controls of dental chairs and curtains helps reduce frustration and restores a sense of independence.

14. Artificial lighting should be of a variety of types and levels

to provide for different activities, mostly in the dental lab workspaces.

15. The domestic-style materials, finishes and décor help

    patients relax and feel more at ease.

15 Soft materials help absorb sound and reduce noise.

16. Low level task lighting should be provided for reading and watching TV.

17. The contribution of color to providing calmness and avoid dental fear, stimulation should be thought through the nude colorr schemes and assisting by the white color.

18. There should be special attention to creating patient, staff and public areas with pleasant views that include the greenery elements inside the environment.

Clinic A

- The entrance and lobby are very small, which does not make any sense of a good presence in a dental clinic.

- The Waiting Area is 3.5 m2, out of the requested dimensions.

- There are only two seats.

- The waiting Area does not have e good role in the privacy of the patients. There is no privacy between the dentist and patients in the waiting area.

- Administrative and support areas are not designed.

- There is not any small place for the children.

- There isn't any biophilic element in the atmosphere of the environment.

To improve the patient experience, extending the waiting area should be the primary objective. The modest entryway and lobby must be addressed first because they don't convey the image of a welcoming and professional dental practice. To make a larger and welcoming entrance that gives patients confidence and a good first impression, the architectural plan should be reviewed. The waiting area's size is also

unsuitable, measuring only 3.5 m2, making it unable to hold the projected amount of patients. To ensure enough room for patients and their comfort, waiting areas have to conform to the recommended dimensions specified in architectural guidelines. To accommodate the anticipated number of patients at any one time, there must be enough seating. By doing this, the clinic's patient flow will be improved and overcrowding and patient discomfort will be prevented.

Clinic B

• The organization of dental treatment rooms around the long hall.

• In the waiting area is defined as an issue the grey dark colors.

• The need of more biophilic elements.

• The openings show the entrance of the hospital.

First, it would be essential to rethink the arrangement of the dental treatment rooms around the main hall. Although this design may promote effective patient flow, it can also lead to a sterile and unfriendly environment. It is advised to implement design solutions that break up the lengthy hall's monotony and make the space more inviting and calming for patients. Second, it was noted that the waiting area's dark grey tones were an issue. The use of color may significantly alter how a space is seen and how it makes you feel. As a result, it is advised to consider lighter color choices for the waiting room. Warmer colors and softer hues can help create a more welcoming and pleasant atmosphere, reducing patient anxiety and improving their experience in general. Additionally, the integration of more biophilic elements is recommended. Also, the issue with the openings that display the hospital entrance needs to be considered. This can be achieved by using green elements or shadings to reduce the direct view of the hospital entrance.

Clinic C

- The organization of treatment rooms as semi-open spaces.

- Secondly, addressing the issue of dental smell on the first and second floors is crucial to creating a pleasant and comfortable environment for patients.

- The screens that show the dental procedures were not comfortable for visitors.

- The dental noise is disturbing mostly in the waiting Area.

Firstly, the organization of the dental treatment rooms as semi-open spaces can be explored. This approach provides a balance between privacy and openness, allowing for a sense of connection with the surrounding environment while ensuring patient confidentiality. Consider adding features that create a visual divide between treatment areas while still allowing natural light to enter the room, such as partial walls, translucent screens, or curtains. This design approach respects patients' desire for privacy while developing a biophilic environment. Second, it's essential to deal with the dental smell problem on the first and second levels in order to give patients a welcoming and comfortable environment. It is crucial to implement ventilation systems that are suitable for filtration and odor control. Additionally, it's critical to reevaluate the clinic's use of screens that show dental treatments. Although the purpose of these screens may have been to inform and entertain patients, some visitors may find them to be uncomfortable. Utilizing sound-absorbing materials, such as acoustic panels or wall coverings, can aid in minimizing disruptions and noise vibrations.

5.2 Limitations

The scope of this study is limited by the exclusion of many articles within the category of "public participation," which the literature search initially returned a significant number of articles that had their primary focus on public administration and management, political research, and policy studies. There is a lack of information in the literature review about the cases and typologies of dental settings and mostly in

Albania.

Regarding the participants, some of them were there for the questionnaires or interview and some weren't. At least the dentist professionals who assisted me with the information and materials regarding their dental clinics, they all expressed their support for the proposed future work. However, more specialists can be contacted. And the most difficult process for me was the development of participatory walking-through discussion. After visiting and talking with patients some of them agreed to assist in this process.

5.3 Recommendations for future research

The majority of the studies in this research utilized a single point in time for collection, and only the response analysis from patients and dentists. Future work will address the limitations of the research that have been identified. The research framework will be enhanced even more. A design-aided tool called End-user Centered Participatory Design for Oral Healthcare Environments has been digitalized to increase the impact of study findings and further validate the results. The viability and effectiveness of this method, coupled with building codes and post-occupancy evaluation from all stakeholders, will be put to the test in real-world projects. On the basis of data that is consistently obtained and examined by this participatory method in practice, the level of satisfaction with the built environment of healthcare institutions will be carefully examined. The continuous improvement of essential discoveries can aid in the advancement of Tirana's national healthcare reform as well as the enhancement of the design quality of environments for oral healthcare-based environments. Lastly, since the survey was given before the patients received their treatment, future studies could also give another test after the patients received their treatment to compare the results.

REFERENCES

Anderson, L. M., & Thompson, E. J. (2015). Planning and design strategies for hospital-based dental clinics. Healthcare Design Magazine, 7(1), 40-45.

Andrade, J. S., Lima, J. P., Perestrelo, M., & Sousa, T. (2017). Analysis of dental clinics using SERVPERF model and Importance-Performance Analysis. Journal of Facilities Management, 15(3), 262-278.

Antonelli, R. (2017). Architectural considerations for residential-based dental clinics. Dental Design & Construction, 15(3), 12-18.

Baker, C. S., & White, S. M. (2013). Creating efficient workflows in hospital-based dental clinics. Journal of Dental Practice Administration, 9(4), 78-93.

Ban, Y., Guo, C., Guo, Y., Li, X., & Li, Y. (2016b). Application of participatory design in school building design: A case study of Chengdu, China. Frontiers of Architectural Research, 5(4), 485-496.

Bate, P., & Robert, G. (2007). Bringing user experience to healthcare improvement: The concepts, methods and practices of experience-based design. Radcliffe Publishing.

Berkun, S. (2004). The art of project management. O'Reilly Media.

Bødker, S. (1993). Through the interface: A human activity approach to user interface design. CRC Press.

Bond, A. (2017). The neuroscience of architecture: How buildings shape thoughts and behavior. The Guardian. Retrieved from [URL]

Caminiti, L. (2019). Blending dental clinics with residential aesthetics: Maintaining the character of the neighborhood. Journal of Architectural Dentistry, 42(4), 112-125.

Curl, J. (2006). Participatory design: Why it matters. In M. Hakkarainen, P. Ilmonen, & K. Lyytinen (Eds.), Missing links in knowledge creation and retrieval (pp. 49-58). Springer.

Delauer, M. (2022). The physiological and psychological health effects of biophilic design elements. Journal of Wellness Design, 15(1), 76-92.

Douglas, C. H., & Douglas, M. R. (2005). Patient-friendly hospital environments: Exploring the patients' perspective. Health Expectations, 8(3), 185-196.

Dulgeroglu, E. (1997). Participatory design in architecture: Towards inclusive and sustainable outcomes. Architectural Science Review, 40(1), 45-52.

Eason, K. (1995). Participatory design: What is it? In Proceedings of the Fifth International Conference on Human-Computer Interaction (HCI International '93, pp. 145-154). Elsevier.

Fenko, A., Schifferstein, H., & Hekkert, P. (2010). Color associations in dental environments: A study of perceived warmth and coolness. Journal of Environmental Psychology, 30(3), 358-367.

Garcia, M. R., & Lee, K. W. (2011). The role of architecture in enhancing patient safety in hospital-based dental clinics. Journal of Healthcare Architecture, 9(1), 24-38.

Hamilton, A., & Watkins, C. (2009). Participatory design and the role of environmental psychology: A case study. Journal of Environmental Psychology, 29(4), 455-463.

Hickman, L., et al. (2003). Effects of oral healthcare environment design: A literature review.

Hultén, B., et al. (2009). Influence of vanilla and clementine scents on customer behavior. Journal of Consumer Psychology, 26(3), 167-183.

Hultén, B., et al. (2009). The connection between scent perception and previous experiences: An experimental study. Journal of Experimental Psychology, 34(2), 169-186.

Jenkins, H. (2010). Participatory culture in a networked era: A conversation on youth, learning, commerce, and politics. Polity Press.

John Wiley & Sons. (2002). Handbook of environmental psychology. Wiley.
Johnson, R. D. (2017). Architectural considerations for hospital-based dental clinics. Journal of Architecture and Dentistry, 14(2), 56-72.

Johnson, S. (2019). Biophilic design in healthcare: An evidence-based approach to improve the patient experience. Routledge.

Kaplan, R., & Kaplan, S. (1989). The experience of nature: A psychological perspective. Cambridge University Press.

Kearns, C., Neuwelt, P., & Eggleton, K. (2020). Dental environmental stressors: A review of patient comfort in the dental operatory. The Journal of Contemporary Dental Practice, 21(3), 320-326.

Kellert, S. R., & Calabrese, E. J. (2015). The practice of biophilic design. Biophilic Design Initiative.

Kim, S., et al. (2021). The impact of plants on patient satisfaction and stress reduction in dental clinics. Journal of Dental Practice Management, 28(4), 123-136.

Kujala, S. (2010). User involvement: A review of the benefits and challenges. Behaviour & Information Technology, 29(6), 577-597.

Lehrnera, J., et al. (2000). The calming impact of orange aroma in dental offices: An experimental study. Journal of Dental Anxiety, 18(4), 567-578.

Mler, A. (2003). The influence of visual perception on dental anxiety. Journal of Dental Behavior, 22(4), 374-376.

Mobach, M. (2016). Dental clinic layouts: Maximizing efficiency and patient comfort. International Journal of Dental Architecture, 9(1), 30-45.

Muller, M. J. (2003). Participatory design: The third space in HCI. In Proceedings of the 8th International Conference on Human-Computer Interaction (HCI International '99, pp. 34-41). Springer.

Olmos, M. (2022). Enhancing healthcare environments through user-centric design. Journal of Healthcare Design and Management, 3(1), 45-62.

Park, L., et al. (2021). Enhancing job satisfaction in dental clinic staff through biophilic design. Journal of Dental Management, 32(2), 78-93.

Peters, R., & D'Penna, J. (2020). Biophilic design and the creation of a sense of place. Journal of Environmental Architecture, 45(2), 89-104.
Pradikaa, S. (2021). The impact of smell on patient experiences in dental offices. Journal of Dental Research, 12(3), 45-56.

Product. (2013). The ADA Practical Guide to Dental Office Design.

Robertson, T., & Simonsen, J. (2013). Challenges and opportunities in contemporary participatory design. In Proceedings of the 12th Participatory Design Conference: Research Papers - Volume 1 (pp. 1-10). ACM.

Schroeder, R. (2022). Challenges and considerations in participatory design: Insights from architecture. Journal of Design Research, 10(1), 45-62.

Smith, A. (2019). Designing dental clinics in hospital settings: A focus on patient-centered care. Journal of Healthcare Design, 7(3), 112-128.

Stichler, J. F. (2001). Acute and chronic care environments. In K. Adams, L. H. Norman, & D. G. Moss (Eds.), Design for critical care: An evidence-based approach (pp. 51-72). Mosby.

Taylor, C. R. (1997). Contextual design for healthcare environments. In J. J. Duarte & J. L. Vargas (Eds.), Proceedings of the 3rd Design and Decision Support Systems in Architecture and Urban Planning Conference (pp. 25-38). Aveiro.

Tisserand, R. (1988). The psychological effects of fragrance: Traditional medicine and aromatherapy perspectives. International Journal of Aromatherapy, 5(1), 25-34.

Ulrich, R. S. (1984). Viewing through a window can affect recovery from surgery. Science, 224(4647), 420-421.

Vischer, J. C. (2008). Towards a user-centered theory of the built environment. Journal of Environmental Psychology, 28(2), 143-149.

Wachtel, C. (2016). Residential-based dental clinics: Creating functional and inviting environments. Journal of Dental Practice Administration, 28(2), 45-58.
Wilson, E. O. (1984). Biophilia. Harvard University Press.

Xuan, S., Lim, H. P., Zhang, Y., & Xiang, W. N. (2021). Enhancing the healing environment in dental clinics: A review of architectural and environmental factors. International Journal of Environmental Research and Public Health, 18(5), 2282.

APPENDIX

- Questionnaire

PYETESOR

Të nderuar pacient, ky pyetësor është duke u realizuar si pjesë e një studimi për nivel diplome ne degen e arkitektures. Me qellim te vleresojm mjedisin e punes te nje klinike dentare duke identifikuar parametrat kyç që përcaktojnë perceptimin e objekteve shëndetësore nga pacientët dhe profesionistet.

1.Gjinia

☐ Femer   ☐ Mashkull

2.Mosha

☐ 18-25   ☐ 25-35   ☐ 35-45   ☐ 45+

3.Arsimimi

☐ i mesem   ☐ i larte

4.Cila eshte frekuenca juaj e vizitave dentare?

☐ cdo 3 muaj   ☐ cdo 6 muaj   ☐ 1 here ne vit   ☐ cdo 3 vjet

5.Sa eshte numri i klinikave dentare qe keni provuar per sherbimet tuaja?

☐ 1   ☐ 2   ☐ 3   ☐ 4+

6.Cilet jane faktoret fizik qe ju ndikojne te vazhdoni te shkoni te e njejta klinike dentare?

☐ vendodhja e klinikes

☐ tipologjia e klinikes

☐ karakteristikat e ambientit

☐ objektet moderne

7.Si preferoni te shkoni ne klinike ?   Pse?

☐ vetem   ☐ te shoqeruar

Arsyeja _____

_____

8.A jeni i/e frikesuar kur shkoni per vizite ne klinike Pse?

☐ Po   ☐ Jo

Arsyeja _____

_____

9.Cili eshte burimi i ankthit apo stresit gjate sherbimit dentar?

☐ Drita e forte artificiale

☐ Aroma e produkteve dentare

☐ Zhurma e pajisjeve dentare

☐ Ngjyrat/Aparenca e dhomes

10.Cili ambient dentar ju jep me shume frike/ankth?

☐ Dhoma e pritjes

☐ Dhoma e sherbimit dentar

☐ Zyra e dentistit

☐ Labratori dentar

11.Cilet jane faktoret fizik qe do te donit te ndryshonit per te larguar friken?

☐ Tipologjia e klinikes

☐ Karakteristikat fizike te klinikes

☐ Lloji i ndricimit dominues

☐ Zhurmat dentare

12.A ka dicka qe ju qeteson apo ju ben te largoni friken ne klnike ?
Nese po jepni mendimin tuaj.

_____

_____

13.Sa i rendesishem eshte ambienti fizik ne perzgjedhjen e klinikes tuaj.

☐ shume pak   ☐ pak   ☐ mjaftueshem   ☐ shume

14.Sa e rendesishme eshte privatesia gjate sherbimit dentar. Pse?

☐ shume pak   ☐ pak   ☐ mjaftueshem   ☐ shume

Arsyeja _____

_____

15.Ne cilin prej opsioneve preferoni te jete vendodhja e klinikes dentare.

Pas zgjedhjes se vendodhjes, qarkoni arsyen qe ju pershtatet.

☐ Ne nje qender shendetsore

eshte me lehte e aksesueshme

arrin te kryesh shpejt cdo sherbim te nevojitur

ndodhet ne nje ambient perkatesisht per sherbime shendetsore

☐ Brenda nje rezidence private/pallat

te jep ndjesine e nje ambienti "si ne shtepi"

eshte me afer shtepise tuaj

nuk te jep stres/frike

☐ ne nje ambient privat, larg qendres urbane

te ofron ambient parkimi

eshte ambient larg zhurmave urbane

ka me shume elemente natyrore

16.Si preferoni te jete klinia ku ju shkoni per sherbimet dentare?

(klinike e hapur, gjysem e mbyllur apo e mbyllyr).
Poshte tyre, ju lutem shenoni me "X" atmosferen e deshiruar te klinikes.

klinike e hapur ☐	klinike gjysem e mbyllur ☐	klinike e mbyllur ☐
Ambient tradicional ☐	Ambient tradicional ☐	Ambient tradicional ☐
(rradhe me karrige plastike,i thjeshte, ngjyra e bardhe)	(rradhe me karrige plastike,i thjeshte, ngjyra e bardhe)	(rradhe me karrige plastike,i thjeshte, ngjyra e bardhe)
Ambient "si ne shtepi" ☐	Ambient "si ne shtepi" ☐	Ambient "si ne shtepi" ☐
(divan me ngjyre, korniza peisazhi, vazo lulesh)	(divan me ngjyre, korniza peisazhi, vazo lulesh)	(divan me ngjyre, korniza peisazhi, vazo lulesh)
Ambient modern ☐	Ambient modern ☐	Ambient modern ☐
(ngjyra monokrom, mobilje minimaliste, dritare te medha	(ngjyra monokrom, mobilje minimaliste, dritare te medha	(ngjyra monokrom, mobilje minimaliste, dritare te medha

17.Ku drejtohet shikimi juaj gjate sherbimit dentar?

☐ ne dizanjin e tavanit

☐ tek dritaret/hapjet per driten natyrale

☐ ngjyra e ambientit

☐ drita artificiale e pajisjeve dentare

18.Shprehni preferencat tuaja ne lidhje me frazat e meposhtme.

Frazat mbi elementet fizike te klinikes	Jam plotesisht dakord	Jam dakord	As dakord as kunder	Nuk jam dakord	Nuk jam aspak dakord	Nuk e di
Preferoj te shkoj ne nje klinike te madhe sesa ne nje klinike te vogel.						
Preferoj te shkoj ne nje klinike te vogel sesa ne nje klinike te madhe.						
Gjate sherbimit dentar preferoj driten artificiale.						
Preferoj te kete dritare te medha ne kliniken dentare.						
Preferoj qe ndricimi ne dhomen e sherbimit te jete nga tavani.						
Preferoj qe ambienti i klinikes qe zgjedh te jete nje ambient i ngrohte.						
Preferoj qe ambienti i klinikes qe zgjedh te jete nje ambient i fresket.						
Preferoj te degjoj muzike klasike ne vend te zhurmave te pajisjeve.						
Preferoj te degjoj tinguj te natyres ne vend te zhurmave te pajisjeve.						
Aroma karakteristike e klinikes me shkakton emocione negative.						
Preferoj qe muret brenda klinikes te jene me ngjyra.						
Preferoj qe muret brenda klinikes te jene te zbukuruara me postera/foto.						
Ne perzgjedhjen e klinikes ka shume rendesi pamja qe dritaret ofrojne.						

19. Cfare ngjyre do te donit qe klinika dentare te kete?

☐ ngjyrat e ngrohta

☐ ngjyrat e ftohta

☐ ngjyra neutrale

☐ ngjyra e bardhe

20. Shprehni mendimin tuaj ne lidhje me ndjesite qe hasni ne ambientet e klinikes.

_____

_____

_____

_____

- INTERVISTE

    PROFESIONISTET

    1.   A eshte e dukshme frika/ankthi nga pacientet gjate punes tuaj? Dhe a ju ndikon kjo gje procesi i punes ?

    2.   Ne rastin e pacienteve qe kane frike, a i lejOni te vijne vetem apo te shoqeruar ne klinike?

    3.   Cilat jane menyrat apo teknikat qe ju sugjer0ni per te shperqendruar friken?

    4.   Ne cilin kontekst urban preferoni te jete e vendosur klinika juaj dentare? Pse?

    5.   Sa i rendesishem eshte ambienti fizik ne perzgjedhjen e klinikes? Pse?

    6.   Sa e rendesishme eshte privatesia juaj gjate punes ne klinike?

    7.   Cfare tipologjie preferoni per kliniken tuaj? (e hapur , e mbyllur)

    8.   Cfare atmosfere preferoni per kliniken tuaj? (traditional, home, modern)

    9.   Cilet jane faktoret fizik qe ju ndihmojne ne performancen e punes tuaj?

    10.   Cilet jane faktoret fizik qe do te ndryshonit gjate performances tuaj ne klinike?

    11.   Cila lloj drite ju ndihmon ne performancen e punes ne klinike? Drita natyrale apo ajo artificiale?   Pse?

    12.   Si preferoni te jete menyra e aksesimit te drites ne klinike?

     (nga furniture, ceiling window)

    13.   Cfare do te preferonit ne vend te zhurmave ne klinike nga pajijet dentare?

    14.   Cfare ngjyre do te donit qe ambienti i klinikes tuaj te kete? (neutral,

e bardhe, warm, cold)

15.Cilat jane materialet qe iu preferoni per ambientin ne klinike?

Interview-Answers

Dentist 1 – The one at the residential-based dental clinic.

A1- During dental processes, being aware of patients' anxiety or nervousness is a crucial factor to take into consideration. Sometimes it impacts the work of the dentist.

A2- Giving patients who experience fear the choice to bring another person with them to the clinic can significantly increase their sense of security and lower their anxiety. That's why the clinic offers the waiting area open with a treatment area, so they can accommodate and enable them to offer those in need of emotional support.

A3- It's a little challenging, but if someone else is joining them for the therapy, or maybe the view out the window is naturally calming.

Relative Importance of Context/Location of Dental Clinic (Section B)

B1-It depends. To benefit from greater visibility, should choose a place where patients can access easily the clinic. But a location that is less stressful and more relaxing to go to work, should be away from the urban center.

Relative Importance of Physical Environment of Dental Clinic (Section C)

C1- It plays a significant role because this is the environment that many hours are experienced in.

C2- It is important because concentration, focus, and professionalism can be supported by this privacy and a quiet environment. (Rasti I bizneseve on the same floor, ka raste ku pengon discussions).

C3-For this small residential-based unit, the open layout is more considerable and looks more comfortable for the patients

C4- A welcoming or contemporary atmosphere that promotes comfort and familiarity, what this typology offers.

Relative Importance of Physical Features of Dental Clinic (Section D)

D1- The layout and organization of the workspace,

D2- For precise dental procedures, lighting needs to be optimized to ensure enough illumination and minimize shadows.

D3- Artificial Lighting or some hours of the day neutral light but with shading devices to regulate light levels

D4-From the dental furniture or openings with shades.

D5- Maybe a soft and quiet melody or nature sounds

D6-Neutral tones and white colors

D7- wood laminate and glass

Dentist 2 – The one at the hospital-based dental clinic.

A1- In general, the patients appear calm, but there are also cases, especially in the young age, where dental fear is evident. However, I try not to cause a problem in the work process.

A2- accompanied

A3- Explaining the procedures and for children, creating games according to the possibilities in the environment of the dental treatment room.

Relative Importance of Context/Location of Dental Clinic (Section B)

B1- In a place integrated with the hospital or in an area close to the urban center, it creates convenience for the doctor and also for the patients.

Relative Importance of Physical Environment of Dental Clinic (Section C)

C1- It is very important because the first impact is that of the environment regardless of other things

C2-It is very important during the work.

C3- Closed Layout, mostly for our working space.

C4-Modern Atmosphere

Relative Importance of Physical Features of Dental Clinic (Section D)

D1- The environment, the lights, the positioning of each device in the right place.

D2- I would also change the lights, as I think the lighting should be varied based on the respective environment, but also a more complete modernization of the reception environment.

D3- I think that a combination of natural and artificial light is ideal. But in some areas as dental sterilization environments, natural light helps me a lot to distinguish colors. But during the dental treatment process, I cannot do without artificial light.

D4- Wide openings.

D5- Music

D6- White with breaks of calming colors.

D7- Materials that show good hygiene.

Dentist 3 – The one at Biophilic stand-alone based dental clinic.

A1- A significant consideration is the patients' fear and nervousness during dental operations because they are the main "actors".

A2- They should come with a supporting person since they should be aware of the potential advantages of emotional support. Architects can create waiting areas with designated areas or inviting seating for patients and their companions. This helps patients feel secure and confident, during their waiting time, which helps them deal with their fears better. But not in the treatment room/dentist's office because of not comfort/ not privacy. (by her personal experience).

A3- Methods for reducing patient anxiety: Design components that capture the patient's interest and draw their attention away from anxiety-inducing stimuli include attractive artwork, nature-inspired design elements, and interactive screens.

Relative Importance of Context/Location of Dental Clinic (Section B)

B1- From her working experience: A dental office that fits perfectly into the quiet neighborhoods in the urban area and is located near supportive resources like

parks/ greenery may improve the overall patient experience.

Relative Importance of Physical Environment of Dental Clinic (Section C)

C1- Because it has a considerable impact on patients' perceptions, comfort, and overall satisfaction, the physical environment is crucial when choosing a dental facility.

C2- Designing treatment rooms with soundproofing features should be a top priority for architects to reduce noise disruptions and guarantee patient privacy. Also privacy is important in consultation areas or private offices where the dentist can have private conversations with patients.

C3- Open layouts, which have clearly visible treatment areas, promote transparency and patient involvement but not privacy for the dentist's work procedure. Better choosing closed or it depends on semi-closed areas.

C4-The preferred environment is a mix of modern and "home-like environment", but with a lot of "plants".

Relative Importance of Physical Features of Dental Clinic (Section D)

D1-Light / Nature elements

D2-Light and Sound

D3-During work is important soft lighting, a mix of them both (soft lighting)

D4- From ceiling

D5- Nature sounds

D6- A mix of white and warm colors

D7-Mostly glass