EXPLORING THE ARCHITECTURE FOR A COMMUNITY SHELTER FOR WOMEN IN THE KASHMIR VALLEY AFFECTED BY POST-TRAUMATIC STRESS DISORDER

A Thesis

by

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ABSTRACT

This study focuses on the Kashmir Insurgency that has strained the economic and political relations between India and Pakistan and terrorizing the civilians of the valley. This dispute has resulted in severe loss of security, an epidemic fear in the local people, emotional torture, several deaths and injuries resulting in chronic mental anxiety, depression, Post Traumatic Stress Disorder (PTSD) and other mental ailments. The purpose of this study is to support the claim that architecture can have an impact on the built environment that accelerates healing in its residents, while developing their mental health.

An initial review of related literature was completed to arrive at a map of architectural qualities that would create an environment better suited not only to heal, but also provide a dignified lifestyle to the women victims of armed conflict. The literature covered various aspects of design, culture, and model of care as important branches to yield the therapeutic milieu in the shelter design. Previous studies that focus on PTSD in women civilians are rare, but to understand design protocol in developing countries, two precedents were analyzed on facilities that catered to a population with similar issues and symptoms. The final step included studying two shelters were picked that had environmental qualities that previous literature had supported as healing qualities, with the additional community participation from the general public and health professionals on their perception of their immediate surrounding and the common problems associated with typical rehabilitation institutions.

All the phases of the study were compared at the end to positively assert that the architecture does have an impact on the wellbeing of human lives. The primary emphasis of the shelter design was to promote empowerment, independence, freedom and control, and the confidence to reintegrate into the society.

With the set of goals, and elements for a therapeutic environment, the precedents and the case studies, the results extract cultural design trends and spatial characteristics that are apt for a design of this nature that do not follow the typical American standards. The results can be used as a tool to architects, health professionals, administrators and other professionals to achieve an awareness to work together to birth an environment that can accelerate the healing of mental trauma.

DEDICATION

I dedicate this study to all the victims of the Indo-Kashmir-Pakistan conflict in the past, present and future, to all the women at the long-term care center at the University of Kashmir, and all the women at the Banyan and The BALM, Chennai who have made this study a success, and the architects and healthcare professionals who used their knowledge to aid architecture in its development.

As a thank you, I would like to dedicate this thesis for its topic to all my friends in College Station, who motivated me to continue with this topic despite hitting hard walls in the journey, who helped in understanding the precarious situations in the concerned regions when I underestimated the depth of it.

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I must express my gratitude to a various number of people who helped me through the evolution of ideas and the path to the study. First, Dr. Stephen Caffey for spending his time talking about research ideas related to the health of high-risk population, thereby helping me arrive at this question. I would like to thank Prof. George Mann, and Dr. Ray Pentecost for the inspiration they have provided from the first day to study health topics and architecture's intervention for developing it. I would like to thank Dr. Xuemei Zhu for her class and her ideas about the behavioral effects of architecture that helped me to culture my idea and formulate a plan for the study, and Dr. Mary Meagher, whose expertise on behavioral psychology has helped me understand the mental plight of the women in question.

There are people outside of the Texas A&M University system who allotted their time to meet/talk and discuss the current trends in the study and provide a clearer vision. Matthew Finn, from Perkins + Will, Lindsey Thiele, from HKS architects, Dr. Mardelle Shepley and Dr. Naomi Sachs from Cornell, and Dr. Valerie Greer from Washington University at St. Louis, all of whom supported my topic and were happy to help me. I would like to thank all the NGO social and administrative staff at The Banyan and The BALM who have dedicated their lives to women at risk, who go beyond caretaking duties and help empower the women at their shelters, motivate them to gain the confidence required to reintegrate into the society.

I also thank my colleagues and friends, especially Ms. Shweta Menon who helped acquire the floor plans, and the data required for the study in India without which this study would not have reached fruition.

Finally, I would like to thank the professionals working for Doctors without Borders, New Delhi, and the professors/doctors at the University of Kashmir for opening their doors and answering all my questions and giving their opinions without reservations.

CONTRIBUTORS AND FUNDING SOURCES

This thesis was supervised by thesis committee that was chaired by Prof. George J Mann and Dr. Xuemei Zhu from the Department of Architecture, and Dr. Mary Meagher from the Department of Psychology. The study was also guided by other professionals who work in fields of healthcare architecture.

All the work displayed for the study were conducted and analyzed by the student independently.

There are no outside funding contributions to acknowledge related to the research and compilation of this document.

NOMENCLATURE

PRISMA	Preferred Reported Items for Systematic Meta – Analysis
JK	Jammu and Kashmir
PTSD	Post-Traumatic Stress Disorder
DV	Domestic Violence
SPH	Srinagar Psychiatric Hospital
KMHS	Kashmir Mental Health Survey Report of 2015
WHO	World Health Organization
IJK	Indian Administered Jammu and Kashmir
PJK	Pakistan Administered Jammu and Kashmir
QUORUM	Quality of Reporting of Meta Analyses
EMDR	Eye Movement Desensitization Reprocessing
UCL	University College London
CHD	Center for Health Design
POE	Post Occupancy Evaluation

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1. INTRODUCTION

1.1. Background

In 1947, when both India and Pakistan got their independence, the sovereignty of the state of Jammu & Kashmir (hereafter referred to as J&K) was left ambiguous. Because of its position, both the countries wanted the governance over the state (Figure 1.1 and Figure 1.2). After the partition, the two countries fought three other wars in 1965, 1971 and 1989, over the State's administrative powers (Shukla, Rabasa, Warner, Chalk, & Khilko, 2007). The conflict became aggressive in the 1980s, when both the armies started employing physical violence on the civilians of the Valley to force loyalty. In 1998, both countries acquired nuclear weapons and openly tasted their use, raising significant concerns among the International Community about the addition of nuclear weapons in a region that was already unstable in many other aspects. The Line of Control that separates the boundaries of Indian Jammu Kashmir (IJK) and Azad Kashmir (Pakistan Jammu Kashmir or PJK) have been occupied by Pakistani troops since the advent of the nineties (Sehgal, 2011).

Apart from organized wars by the two countries, there have been attempts at terrorism by Pakistani militant groups at different times in the last two decades in the country of India. The two consecutive terrorist attacks in 2001 furthered the political tensions between the two countries. As a method of retaliation, the Indian troops were redeployed to the border, which was once again responded by another terrorist attack in 2002 (Sehgal, 2011). The report taken in 2011 puts the death toll of people during the past two decades of Kashmir as overwhelming as 89,000 and the number of enforced

disappearances at 10,000 (Sehgal, 2011). Even in 2019, there are reports of military related clashes that put the lives of the citizens at risk.

The result of this constant state of armed conflict has left the community in a desolate, helpless and traumatized plight. This study brings light on a significant part of the Indian political history, and at the end of it hopes to establish a space that the women can live in, away from the site of direct conflict to recuperate and heal in relative peace. In June of 2019, The Indian Government revoked the Article 370 (Appendix A) that gave the people of the state of Jammu and Kashmir the equal rights as the rest of the country, with the local system finally following the central administration, relaxing the tensions a little in the IJK, while the revocation angered the administration in PJK.

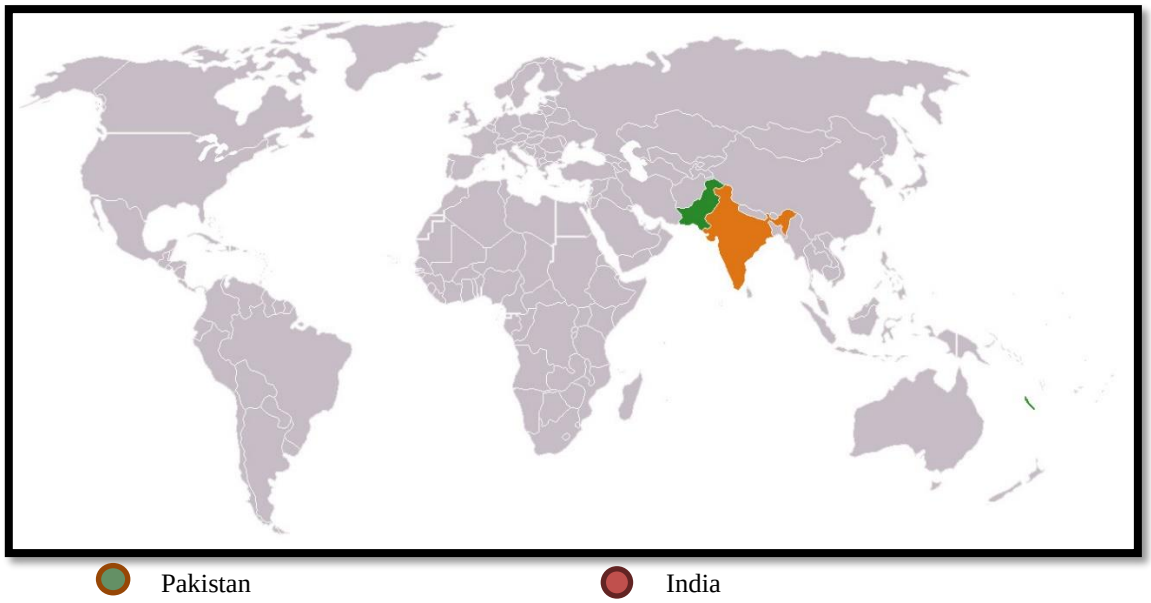

Figure 1.1: Map of the World with India and Pakistan (Kazi, 2014)

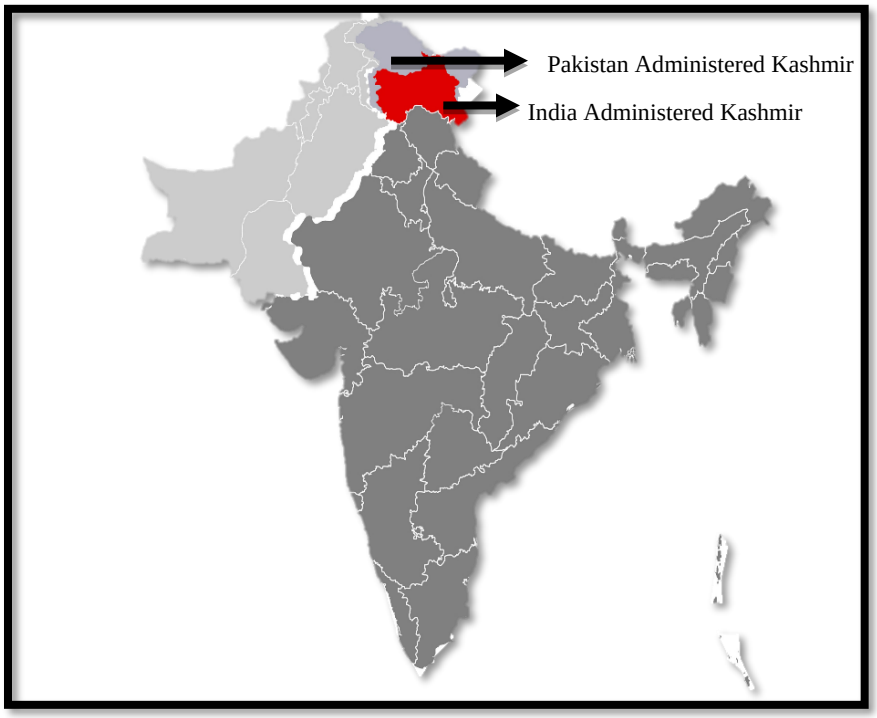

Figure 1.2: Map of the India, Kashmir and Pakistan (Kazi, 2014).

1.2. Significance

The everlasting conflict between India and Pakistan has been constant and unfading for 72 years ever since the independence of the two countries from the British. The significance of the issue is primarily political in nature, but also socio-cultural, economic and psychological. The issue lies in the location of the state of J&K as figure 1.3 shows. J&K is uniquely positioned in a great economically (strategically) valuable area, in-between India, Pakistan, and China. In situations like this, what prevails is a sense of terror and it executions of it to exert social control, if necessary by disrupting the very fabric of the socio, cultural and economic relations (Amin & Khan, 2009).

Figure 1.3: Map of the Line of Control between India and Pakistan (BBC, 2019).

1.2.1. Political and Economic Significance of the Problem

India holds Kashmir as a tactic, and if Pakistan hands its share over, it will make their agriculturally dependent nation seek "India's" water sources.

The northern territories hold a significant asset for India especially places like Siachen Glacier. If Pakistan and China were permitted to connect their militaries at Siachen, India's national security over the whole Northern frontier would be in peril (Hashmi & Sajid, 2017).

The armed conflict in the Kashmir valley has resulted in drastic reductions in capital and income, physical destruction of agricultural resources, reduced investment added with severe loss of security, an epidemic fear in the local people living in the valley,

emotional torture, several deaths and injuries (Rather, 2013). The Kargil war in 1989 led the path to an insurgency resulting in the last 30 years of militant and military activity.

Since 2008, the Kashmiris have launched their own form of retaliation, using civil disobedience in the streets, a non-violent stone-pelting method rather than guns that has been named the "Second-Revolution" for self-determination (Anjum & Varma, 2010).

As of August 2019, the Indian government revoked Article 370/35A that enabled the state of Jammu and Kashmir have a separate constitution, and exercise autonomy over the internal administration of the state.

1.2.2. Social and Cultural Impacts of the Problem

The last 10 years have been an ordeal for the civilians in Kashmir (Kashmiri population). Even now, the city is hindered by checkpoints, cordon-and-search operations, and beatings. It is important to note this to avoid any bias; that the grave human rights abuse to the women in the Valley are being executed not just by the Pakistani army, but also the Indian Army that wishes to convey a message about forced allegiance. Apart from this, humiliation, verbal abuse, summary executions, rapes and custodial torture have transformed Kashmir into one of the most oppressive places on earth (Kazi, 2014). Since the war has killed more men than women, and the women are still being tortured, and raped, this study will focus more on the mentally and psychologically scarred women in the Valley.

The disturbing point is that rape in Kashmir is not due to a few undisciplined soldiers, but it was a strategy to demoralize the spirit of the civilians in rebel, as most of them were raped in front of their children and other family members (Gossman, 1993).

Women of the valley have lost their self-respect, their friends and family, and finally their will to live alone. In addition to this, this population group has retreated into hiding from professional help, or seeking therapy, in fear of their psychological stigma and a complete ignorance and awareness about even such a path.

1.2.3. Psychological Issues

Trauma is a mental issue and the built and physical environment is not the cure to it. By understanding how a person's brain perceives the environment around them, the most, architects can do is to employing techniques and concepts that would provide a space conducive to healing(Hildebrand, 1999). The Kashmir Valley is a rural village in the northern most part of India, too far away from the Metropolitan centers of the country. Though the entire state can be classified as "Sub-urban", the people of the valley are mostly still not educated or exposed to the modern world that we are aware of. Added to this, the community is largely dominated by a patriarchal and backward belief that is supported by the complete breakdown of socio-cultural support system. This society makes it almost impossible for women to seek any kind of help for mental health without being ostracized from the society. The conflict has resulted in 19% of the Kashmiri population showing strong symptoms of PTSD, and 17%, 16% and 14% having a combination of PTSD, depression, depression and anxiety and anxiety respectively. Baramulla and Bagdam (areas of Kashmir) have around 50% of its population showing

chronic PTSD symptoms, though Srinagar accumulates many patients being the only place with a hospital ((MSF), 2015).

Figure 1.4: Women and Children in Conflict, Kashmir (Muslim Mirror, 2018; Saha, 2017)

1.3. Purpose of the Thesis

This research is based on the theme that a healthy design can establish a stronger relationship between the space and physical and mental health of the users in it. Though the topic of the research is primarily a political issue, this research is that of an architectural nature that aims at providing a dignified rehabilitation experience in a nurturing space for the battered women. The pivotal aim of this study is to understand how we, as architects and research professionals can contribute towards creating a community shelter for the traumatized women to call “home” to develop their emotional,

physical and mental health, and help them regain confidence, and foster the process of reintegrating into the society, enabling them to live life to their fullest potential.

To achieve this, the study looks to create a framework that can be used as a foundation to help design a shelter that displays the qualities of a therapeutic environment aimed at supporting its residents recover by acting as the healing environment, at the same time serving as the reference for how architecture can help at closing the bridge among social care, healthcare and designing.

1.4. Research Question

To what extent can **architecture along with its varied concepts and elements** help in creating a **therapeutic community shelter** for the women suffering **from Post-Traumatic Stress Disorder** as a result of the **ongoing conflict in the Valley of Kashmir, India?**

2. STUDY DESIGN

2.1. Overview of the Methodology

This second chapter of the thesis will explain the phases the author studied as a journey to deepen the understanding and build a mental bridge between the health outcomes and the built environment as a healing capsule. The purpose of literature reviewing is to categorize architectural themes that play a major part in creating spaces that not only simply house victims of trauma, but also plays a cognizant role in healing them. The study begins with exploring what the existing literature on architecture for health explains, and diving deeper into specific aspects gradually probe into how every individual element contribute to the whole environment, and previous cases where the amalgamation of such theories have positively influenced the health outcomes and quality of lifestyles for its users. The following sections will explain briefly about the phases of the study, which will be elaborated in the following chapters.

2.1.1. Phase I: Literature Review

Chapter 3 of this document is titled “Literature Review” and consists of overviewing and synthesizing a variety of scholarly pieces of literature, which helps in defining the focus of this study. Identifying those articles that match the interests of the topic, and those that correlate with it, and eliminating the rest that seem like relevant but may deter the course of study are part of analyzing the obtained literature. An amalgamation of the literature describes common themes that the research will take forward into the subsequent phases of the study. The importance of literature review is that it will be an ongoing process as the document is written, to keep the data updated and current.

2.1.2. Phase II: Precedents Analysis

A Precedent can be defined as something done or said that can serve as an example, more so a model from which a moral can be derived. Colloquially, precedents analysis is referred to as an internet-based case study, meaning that the research on a similar field of interest to the study in hand has previously been conducted, and finalized, which can now be used as a model or a framework upon which conclusive evidence can be drawn. In architecture and related fields of design, precedents are widely used to aid the design process from conception to final outcomes. Precedents are not models that should be copied but rather used as an inspiration to solve problems that have been handled or considered in previous designs. The precedents can be used to understand materials, or construction techniques, or design concepts. In this study the precedents help to understand aspects of architecture in third world countries, among other things, that are not exposed to the current trends of research in architectural innovations to avoid the disconnect between the physical and the cultural environment. The author obtained four such studies, with the help of professional connections, rather than browsing through the internet. Each of these studies explained material choices, design techniques, and site and context for community shelters for victims of different traumatic injuries in different developing nations. The selections were narrowed down to two of the four which concentrated on women and a community for refugees due to more grounds in common to this research.

2.1.3. Phase III: Case Studies

Case studies were the final phase of data collection for the study. This phase involved the researcher choosing shelters in India to investigate if the literature review and precedents had common point of interests with the built environment in the country in question. It is important to note, however that the State of Jammu and Kashmir, specifically the Kashmir Valley is exposed to aggressive precautions (refer section 1.2.1; subsection "Political and Economic Significance of the Problem") and will not cooperate with the context of this study nor do they have suitable shelters that would aid the research efficiently. The study included two facilities from Chennai, India to understand cultural design trends and economic significance of such shelters. The case studies had three phases each one aimed at developing tools to determine the design guidelines for a trauma shelter that accelerates healing and improves the quality of lives.

1. Spatial Morphology and Layout of the Shelters: The study uses a depth chart for the facilities that analyzes the levels of privacy, and the space typology.
2. Archived Data from freelancers in Chennai, India who have created a manual for shelter design and renovations (2018) using community participations and resident surveys.
3. The built environment of shelter homes: This study evaluates the built environment (design) of shelter homes using content analysis with themes derived from the literature review using an assessment toolkit.

2.2. Site Selection

After the qualitative data derived from a literature analysis, the researcher chose five facilities that housed women who were subject to different types of trauma (domestic abuse, poverty, homelessness, victims of stigma, mental disorders, etc.,). Out of the five shelters, two were chosen. Both shelters were founded by the same team of women who were educated and trained from different parts of the world in issues of psychology, healthcare, and sociology. The selection criteria for these shelters were the design parameters that put quality of life and sense of community as the prime factors. Though the shelters are not located in the same region as the study's area of concern, understanding similar cultures in shelter architecture, with an awareness of the region's culture can be used to derive at design considerations for a trauma shelter in Kashmir. The shelter design was carried out with the aid of women who were residents in their other shelters, who enabled the understanding of the environmental stressors prevalent in their environments. The answers were available at request from the shelters and the architects.

With the archived data about perspectives and perceptions, the researcher made an activity map of the shelters of a typical daily life. The mapping was done on multiple times based on the data that was collected by three teams over a month to correct any instability. Despite best efforts, it is important to notice that the study was conducted during one month in a whole year and based on resident and staff answers, it was obvious that as the seasons got cold, the activity in some open spaces would increase/improve as the weather became friendly.

3. LITERATURE REVIEW

3.1. Overview of the Literature Analysis

Initial literature search included descriptors that would relate to Indo-Pakistan history, Kashmir Insurgency, Pakistani militancy, human rights, trauma, war, women, psychology of war on women, emergency, crisis, transitional, domestic violence shelters, women abuse, bad designing, healthy and healthcare architecture, PTSD, mental illness, cultural stigma, architectural psychology, women and architecture, cultural architecture, theories of embodiments, and healthcare professionals. The author started with a large body of scholarly publications, and methodically excluded and narrowed down their records based on the eligibility criteria to summarize the study selection process which is elaborated in Appendix B of this document. Preliminary sources included published literature, articles and scholarly publications taken from various databases like Google Scholar, EBSCO, PubMed, Medline, and JSTOR. Other databases included CINAHL, Avery Index to Architectural Periodicals and PsycInfo. Some of the articles that were obtained during the initial search were found to completely stray off topic and were rejected immediately.

The rest of the articles were screened over two times to filter, and reject the duplicates, or those with irrelevant data to the study. All the articles were read thoroughly to extract all important data that would enable reach consensus. It is important to note that some of the studies in the literature may not have strong support to their hypothesis, and those studies are screened once more to attempt to find secondary evidence to support such claims. Based on all the articles analyzed, the literature review was classified into

detailed and hierarchical aspects. Table 3.1 shows all the databases and the number of articles from each of them for preliminary review. Table 3.2 narrows all the combinations of terms used to arrive at desired articles or publications.

The literature was studied and investigated using the PRISMA (Preferred Reported Items for Systematic reviews and Meta-Analysis). The flowchart is explained in Appendix B, and the data extracted from the literature is elaborately explained in the following sections. The following table 3.1 gives an overview of all the electronic databases that was used throughout the study and the number of articles they yielded.

Databases	**No. of. Articles**
Academic Search Ultimate (EBSCO)	33
Avery Index to Architectural Periodicals	5
CINAHL Complete	9
Google Scholar	54
JSTOR	20
Medline	2
ProQuest Dissertation and Theses	9
PsycINFO	12
PubMed	23
Web of Sciences	14
Psychology and Behavioral Sciences Collection	2
Total (Including Duplicates, before Initial Screening)	**183**
Total (After Rejections due to all Exclusion Criteria)	**104**

Table 3.1: Electronic databases and Number of articles (S. Chandramouli, 2019)

Note: Some databases were used but are not listed because all the articles that was accessed through them were deleted, for they did not match the keyword criteria.

DAAI: Design and Applied Arts Index: 5

Medline (Total Combined): 12

There were published chapters from books that was also used for the literature reviews that are included in the table as articles.

Mental Illness	**Dimensions of Health**	**Built environment**	**Evidence based design**	**Healthcare facility/design**	**Healing Architecture**
Stigma	Women, war & Health	Human rights abuse	Theories of embodiment	Cultural designs	Significance of Home
Psychology	Therapeutic environments	Biophilia	Healing Gardens	Community/public health	Cognitive Architecture

Table 3.2: List of Keywords Used for the Literature Review

3.2. Prevalence of Mental Illness in Kashmir Valley

The issue in Kashmir was ignored by governmental bodies owing to the conflict of interest which is political in nature. But in the last decade, the organization called “The Doctors without Borders” (Médecins Sans Frontiers) based out of the capital city of New Delhi have launched various counselling sessions in the valley under the Initiative Kashmir Mental Health Survey with help from the Institute of Mental Health and Neurosciences at Kashmir and Kashmir University. After establishing contact with the Doctors without Borders, they agreed to share their mental health report from 2015 on

all districts of Kashmir Valley, especially those with predominant rates of depression, anxiety, and PTSD. Prior to the insurgency, the prevalence of mental health issues in Kashmir was insignificant. The records from the Srinagar Psychiatric Hospital indicates that the number of patients registering at the Outpatient Department rising from 10-20 a day in the 1980-90s to almost 200 a day in 2002. More recently, SPH recorded the highest of approximately 63,000 patients in 2006 (Yashwi & Haque, 2008).

The KMHS (Mental Health Survey Report of 2015) recorded a shockingly high rate of mental illness in the Valley. In their report, they observed about 1.8 million people (45%) adults living in the Valley showed significant symptoms of overall mental illness, with 1.6 million (41%) adults characterized with depression, 415,000 (10%) with chronic clinical severe depression. An estimated 1,000,000 (26%) are living with undiagnosed significant symptoms of anxiety disorder. Nearly 1 in 5 adults (19% i.e., 771,000) displayed significant PTSD symptoms, with 248,000 (6%) meeting diagnostic criteria for PTSD. Furthermore, almost everyone displaying symptoms of Depression, and Anxiety also showed varying degrees of symptoms of PTSD. The districts of Baramulla and Badgam (located nearest to the Line of Border) had the highest rates of symptoms for all three mental disorders. The Figures 3.1 -3.7 are a representation of the rates of different mental illness in the Valley, from the Survey Report. Figure 3.5 shows the most common coping strategies adapted by adults, and figure 3.6 and 3.7, the different traumatic events and the average rates of those exposed through a life cycle by civilians in Bagdam, the worst affected site, and the total average in the Valley.

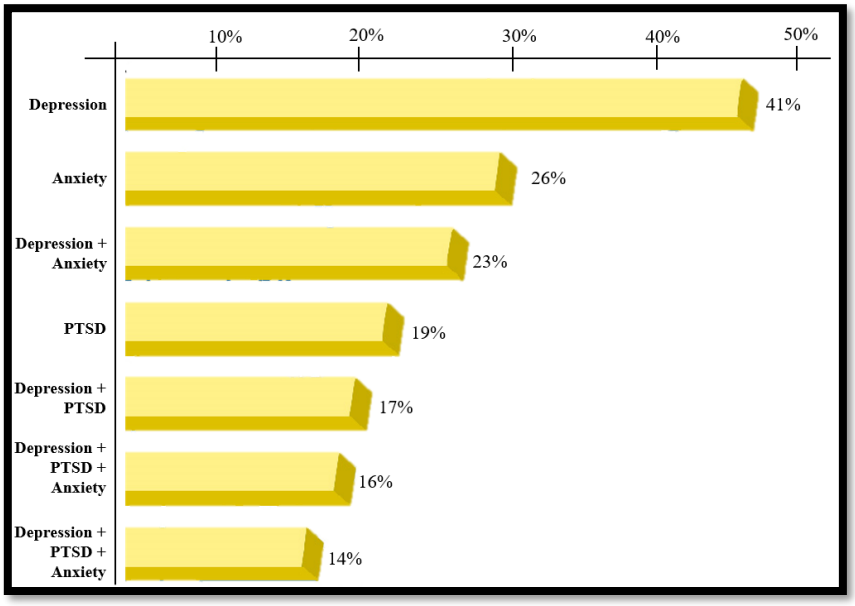

Figure 3.1: Prevalence of Mental Illness in Women in the Valley (MSF, 2015)

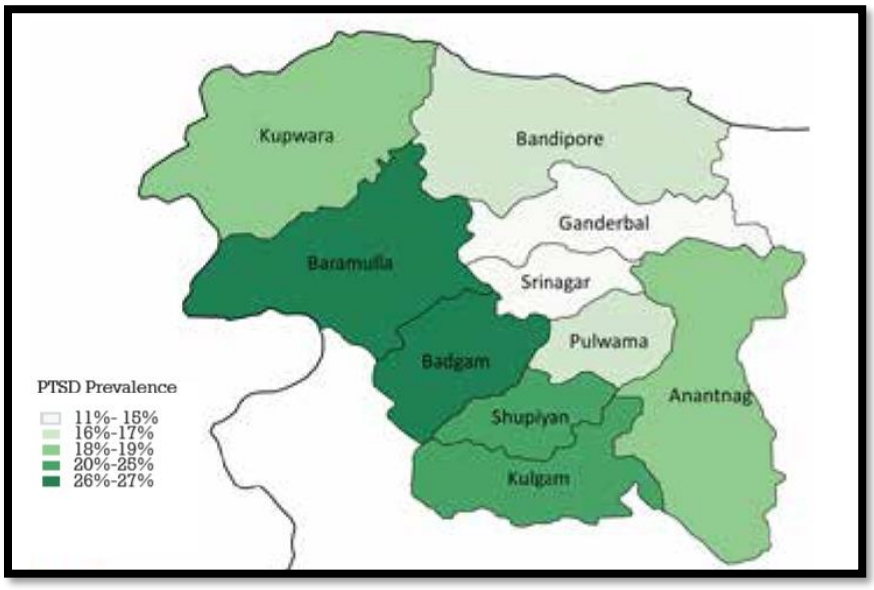

Figure 3.2: Prevalence of PTSD in the Valley (MSF, 2015)

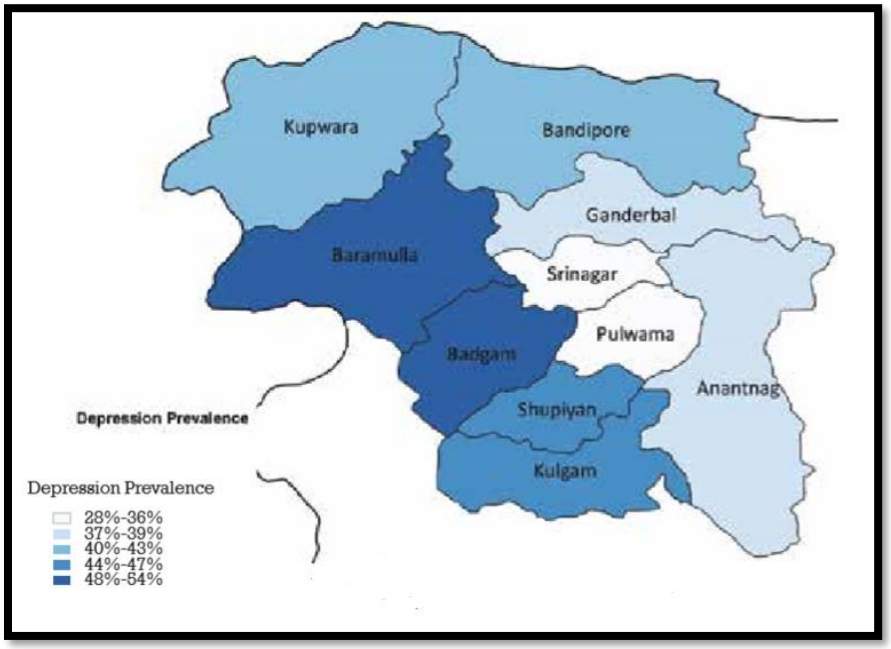

Figure 3.3: Prevalence of Depression in the Valley (MSF, 2015)

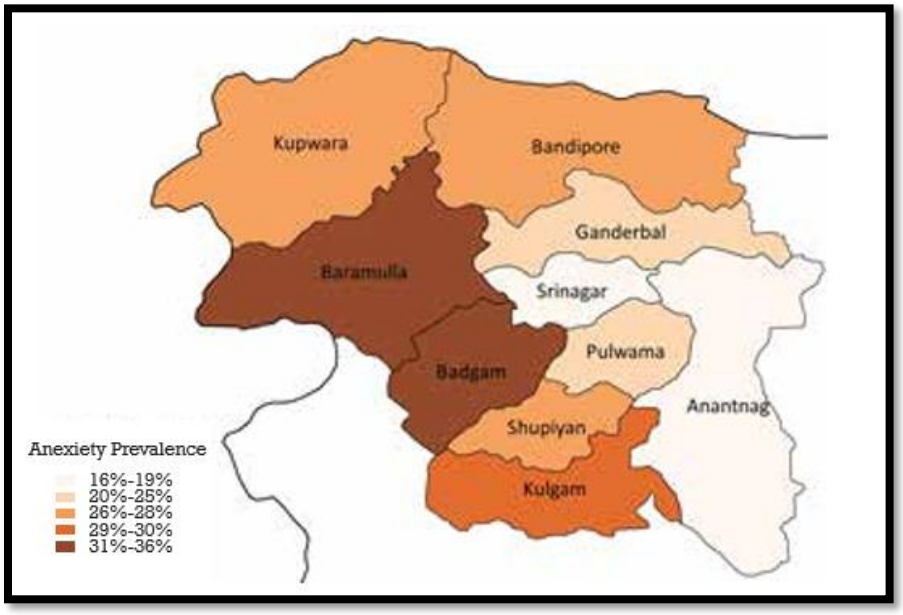

Figure 3.4: Prevalence of Anxiety in the Valley (MSF, 2015)

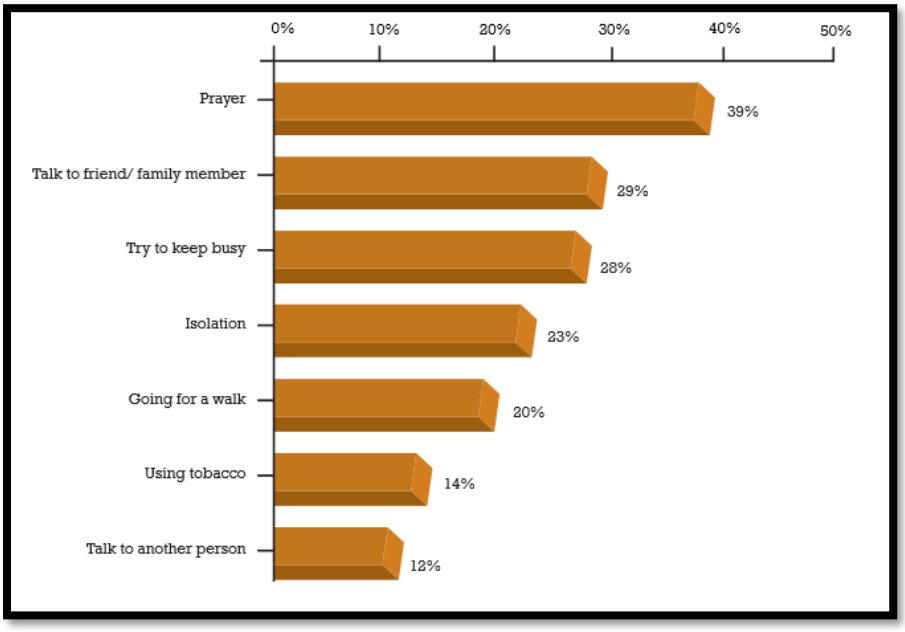

Figure 3.5: Coping Strategies identified (MSF, 2015)

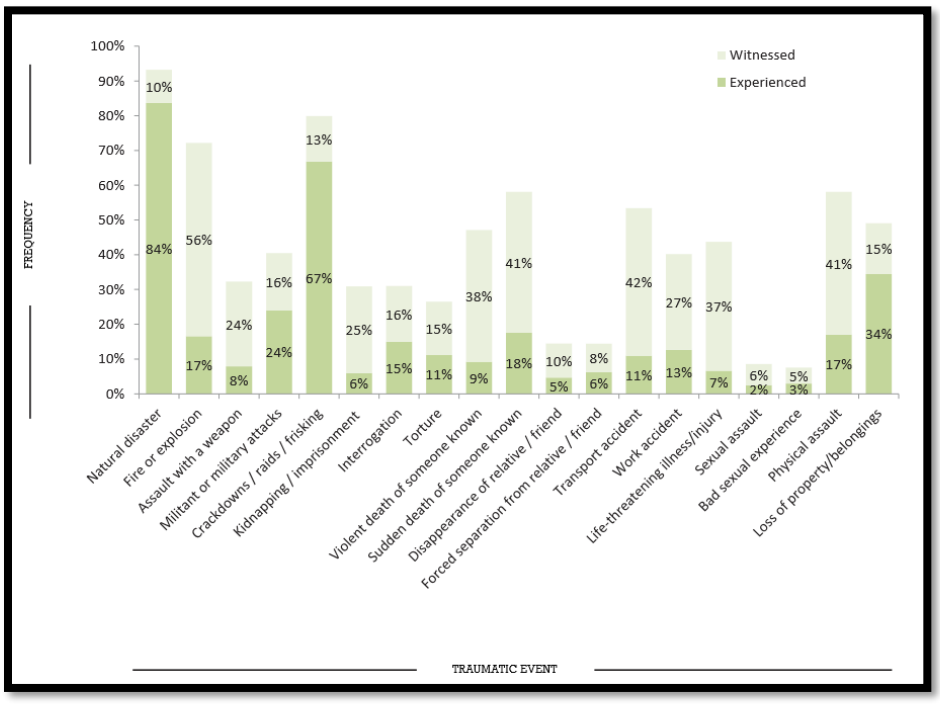

Figure 3.6: Traumatic events experienced or witnessed by adults over a lifetime (MSF, 2015)

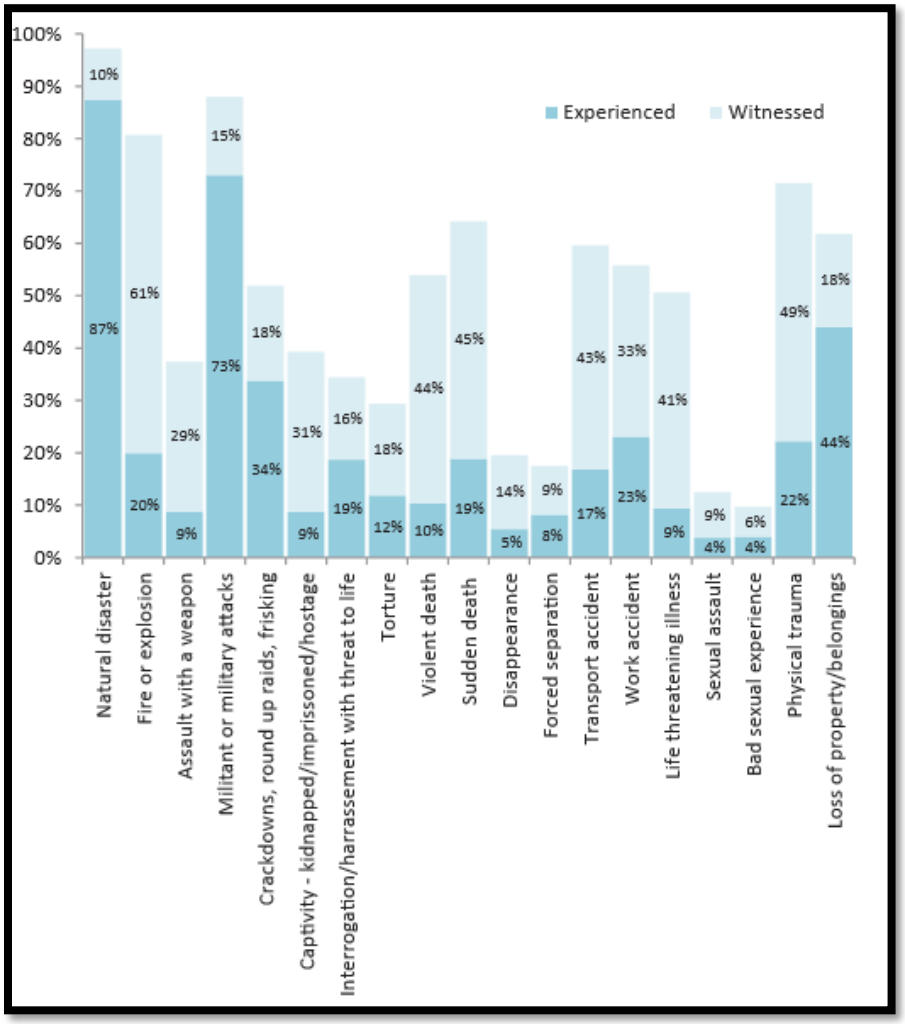

Figure 3.7: Traumatic events experienced or witnessed by adults in Bagdam (MSF, 2015)

3.3. Understanding Post Traumatic Stress Disorder

Post-Traumatic Stress Disorder (PTSD) is a severe and psychological disorder that can be acute or chronic and is the result of exposure to any traumatic event. Every individual goes through a traumatic event during their life, but most of them do not develop PTSD. Under normal circumstances, the symptoms associated with PTS goes away with time, but in extreme situations, the exposure is continuous thereby not allowing any time for

individuals to recuperate. Traditionally, PTSD is associated with veterans after deployment, on the battlefield. But the lesser known fact is that PTSD is not contained to war veterans. PTSD comes from any type of traumatic event of any severity. It can include things like war, car accidents, rape, physical assault, or even verbal and emotional abuse, says Dr. Coleen Cira, a psychologist specializing in women and trauma. People who are exposed to such events are at increased risk for PTSD as well as for major depression, panic disorder, generalized anxiety disorder, and substance abuse, as compared with those who have not experienced traumatic events (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). War adversely affects combatants and non-combatants alike, both physically and emotionally. Death, injury, sexual violence, malnutrition, illness, and disability are some of the most threatening physical consequences of war, while post-traumatic stress disorder (PTSD), depression, and anxiety are some of the emotional effects (Kazi, 2008). The Mayo Clinic categorizes the symptoms of PTSD into four themes: intrusive memories, avoidance, negative mood changes, and changes in physical and emotional reactions. Symptoms can vary over time or vary from person to person.

1. Intrusive Memories: Flashbacks, reliving the trauma, nightmares or associating regular aspects of daily lives to an element that brings back the trauma.
2. Avoidance: Avoiding people, places or activities that remind them of the event.
3. Negative mood changes: Hopelessness about the future, detachment from friends and family, lack of interest in any activities, having no positive emotions and numbness.

4. Changes in Physical and Emotional Reactions: Easily frightened, being on guard, Insomnia, substance/alcohol abuse, overwhelming shame or guilt and aggression.

3.4. PTSD in Women Victims of Armed Conflicts

The US Department of Veteran Affairs explain that though both men and women who experience PTSD may develop physical health problems, women tend to get jumpy, have more trouble feeling emotions, and avoid things that remind them of the trauma than men. Men usually turn aggressive, irritable and are more likely to feel angry and to have trouble controlling their anger than women. Women with PTSD are more likely to feel depressed and anxious, while men turn to alcohol or drugs.

A large body of research has been dedicated to the male race victims of PTSD, especially returning veterans. But in recent years, the outcome of a prolonged armed conflict has turned to be destructive for the civilians, especially women who are found to develop PTSD more quickly than men (Christiansen & Hansen, 2015). In areas of armed conflict, studies have shown that women develop similar symptoms as active soldiers but in addition to all of those, women may also be made to endure to a wide range of specific gender-based violent acts, such as forced pregnancy, abduction, rape, sexual slavery, and forced prostitution during wars, and other forms of torture (Hynes, 2004). All the data collected by the military on wartime morbidity factors mostly document the direct effects of combat related exposures on the combatants and lesser on the civilians, not to mention issues related to human rights (Garfield & Neugut, 1997). The injuries inflicted to women are invisible, and beyond what men experience. In rural Kashmir, the disappearances and death of men in the community has resulted in an alarming number

of widows, presumed to be close to 20,000 (Kazi, 2008). But apart from the widows, the conflict has given rise to the phenomenon ‘Half-Widows’ (Qutab, 2012). This is the population of those women whose husbands are marked “missing” presumed to be dead, without any proof. These half-widows experience the same trauma as a widow, but with additional unique aspects. They do not get recognition of their status due to missing proof, and they do not have the opportunity to get closure as they don’t get to mourn the loss of their loved ones, or hold a funeral (Qutab, 2012).

Where it concerns the women population and trauma, there are distinct directions one can take while attempting to create a healing space for them.

3.4.1. Significance of Home:

Home is often a significant space for women as their psychology dictates their need to connect to things, especially those things within their immediate grasp. Through architectural design, we can build bridges that extend beyond the existing barriers and place the designer on the human level in concert with an analytical design approach (Prestwood, 2010).

3.4.2. Women and Architecture:

For women of armed conflicts, their home is the site of attack. Their shell of safety has been massacred with violence, and weapons. A shelter would serve as a new “home” as they would project their ideas of a home into the shelter seeking healing, and recuperate, and reintegrate back into the society, therefore retake their lives back to order.

Understanding concepts of home and incorporating them in a shelter design relate to security, shelter, and identity, informs architectural design and research (Prestwood,

2010). Figure 3.8 is a chart to understand symptoms and approaches relating to PTSD in women. The therapy includes Prolonged exposure which is a form of behavioral therapy formulated to help with PTSD, Cognitive Behavior Therapy which focuses on moving forwards by targeting present and future events. **Eye Movement Desensitization (EMDR)** is an interactive module of psychotherapy technique used to relieve psychological stress where you relive traumatic memories while the therapists work on the patients' eye movements.

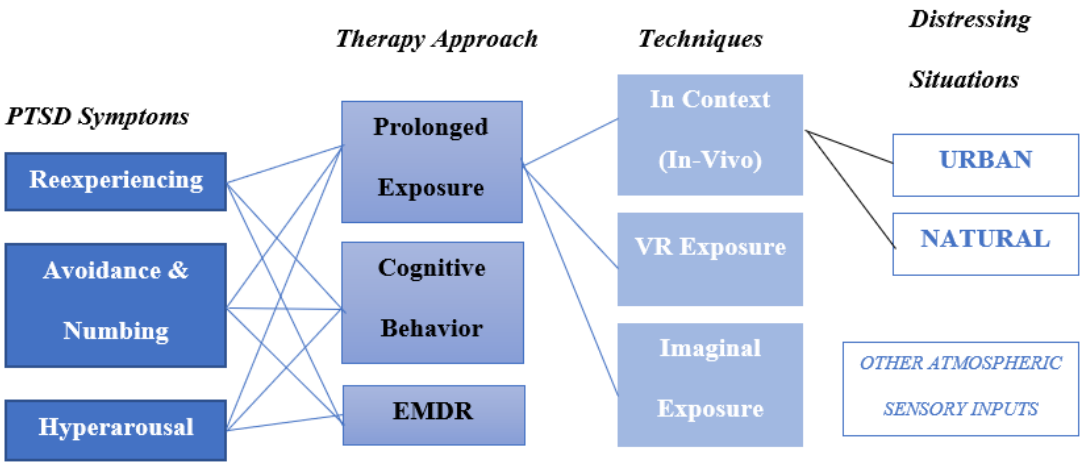

Figure 3.8: PTSD Design Flow Chart (Hartman, 2012).

3.5. Journey of a PTSD Victim

Each one experiences PTSD in a different way, but the journey has five common stages (US Department of Veteran Affairs, 2018, January 9):

1. The Emergent Stage: The immediate stage where the person feels agitated by everything around them, their anxiety levels are unhealthily high, and this is the stage where their instinctive fight or flight mode kicks into gear.

2. The Numbing Stage: The second stage also called Denial; the individual starts to avoid anything that makes them feel remorse or mental agony, and they deny the emotions they feel as a shield from the reality. With proper diagnosis, and care, the afflicted can move forward, but in most cases, people that are neglected or those without closure do not move past the numbing stage.
3. The Intrusive Repetitive Stage: The third and possibly the most hurting/destructive one of all, as the individuals start to relive the trauma, have nightmares and flashbacks despite best efforts to push them behind. But this is also the stage where they can start wholly accepting the damages, confront the trauma and start to regain a purpose to their own and their loved ones' lives.
4. The Transition Stage: The first stage of "Recovery" and "Healing". This is the acceptance phase, where the individual understands all that has happened, and tries and achieves to have a positive outlook on life.
5. The Integration Stage: The final stages of successfully reintegrating coping mechanisms into the daily life, as the individuals get treated medically, and socially. Getting to this stage takes hard work and a lot of time and in the process may temporarily regress into one of the previous stages.

3.6. Health risks of Poor Architecture and Consequences

Any place, whether architecturally constructed (built environment) or naturally available (nature) provides human beings with a strong connection to place, and this sense of embodiment is how we come to understand and relate to the world (Prestwood, 2010). Building design has the potential to induce stress and affect human health. A monotony

in the visuals of buildings and repetition may cause a unique form of sensory deprivation. Buildings designed like these may impose nothing more than a massive shadow over the users, taking away any humanity, making it cold and unwelcome. Public Health has been one of the most important concerns as back as 1926, when public and community health was declared a fundamental right to the people. The World Health Organization (WHO) later added disease control to improve physical and mental health (Ricci, 2018). When this directly implicates on city planning, architecture becomes a part of the action to be taken. Studies have proven that desolate neighborhoods with dilapidated buildings and unused outdoor spaces make for an unsafe community, evoking anxiety and fear in people. There have been many terms that define this specialty that brings architectural design into the health of human beings. The most used or popular terms are Cognitive Architecture or Environmental Psychology, both that have gained popularity in the recent times. In the current age, people tend to spend about 90% of their time inside a building (Paletta, 2018). The role of Architecture in improving mental health and psychology of the human brain and the possible negative impacts of poor design are explained in the section titled "*Architecture's role in Mental Health and Psychology"* in the book "*Cognitive Architecture: Designing for How We Respond to the Built Environment* by Sussman and Hollander. They say that people are generally healthier in an environment that is supportive, aesthetic, and has a mixed land-use with minimal repetition. They also explore the benefits of Biophilia, and how its design qualities can create a soothing environment that inculcates a healthier lifestyle. Jane Jacobs in her book "*The Death and Life of Great American Cities"* explores safety

in the metropolitan neighborhoods of Greenwich in New York City. Many other authors and environmental professionals have been interested in exploring the positive effects of design on the health.

In the context of my study, the risk factors were by large due to ignorance and unawareness, and a few by negligence. The Kashmir region has been neglected in literally all aspects due to its constant hostile relations with Pakistan. The area is underdeveloped, with no proper healthcare facilities in general. The “hospitals” in the proximity are those handled by the state government and are not staffed satisfactorily to heal anyone. Moreover, the buildings are old, with no aesthetic appeal. The outdoor environments are plain and dusty sand covered paths, with no proper planning. Architectural concepts, or an evidence-based design approach are too advanced, when the facilities lack basic needs and structure.

So, “poor architectural design” plus “improper manpower” have resulted in an environment where even health (or absence of sickness) can deteriorate. A few “mental health centers” are institutions with prison-looking rooms, where patients are “housed” for eternity without any space for them to heal or recuperate. The patients have no place of respite, and no opportunity for healthy interactions with other patients, or with doctors, and have no sense of support or security.

Poorly maintained buildings make us nervous and fearful by activating our Sympathetic nervous system which is detrimental to our health (Finn, 2013). A wide variety of unique buildings and shops stimulate our mind, while dull repetitive buildings bore us which has been clinically proven to induce stress. The field of environmental psychology

focuses on environmental stressors and the gate into the consequent effects that can have on people (Evans & McCoy, 1998). Furthermore, constant exposure to such negative building characteristics can be detrimental to health since they can be a source of chronic stress. Fortunately, this is both avoidable and correctable considering all the cognitive research and building technology at our disposal.

3.7. Facets of "Healthy Architecture"

Buildings as refuge serve as examples of planned sanctuaries for the protection of man from the hostile natural environment to which he would otherwise be exposed (Hildebrand, 1999).

The WHO defines **Health** as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. The Hippocratic Oath of medicine says that the function of protecting and developing the health must rank above restoring it when it is impaired. As healthcare designers, every space that is being created must have qualities that not only restore health, as in a hospital but also act as a space that protects and develops their health while restoring it. This study puts "protecting" and "developing" the health of the patients over restoring their health as these are victims of Post-Traumatic Stress Disorders.

An armed conflict affects everyone in general, but since the advent of the 21st century, the nature of such conflicts has turned internal, long drawn, and complex with civilians increasingly becoming the targets (Bennett *et* al., 1995). In rural Kashmir, women are not as educated or strong enough to lead a stable life at the face of the deaths of their husbands or other family members. Women of the Valley have a severe impact both

directly and indirectly. The afflicted in Kashmir have gone through war, rape, physical and psychological, mental and emotional torture. They have faced harassment from both the armed forces and the militants as punishment. Along with attacks on their life and safety, they were specifically targeted for rape and abuse. Kashmir is a very conservative society where honor is directly associated with the women. At the point in their lives, where women need more support from their peers and society, they were shunned, neglected and victimized by their own people (Qutab, 2012). After this severe human rights abuse, the victims feel demoralized with no purpose to their lives and are looking at an uncertain future. They go through an ordeal of an identity crisis, homelessness, loss of security, torn down mentally, with undiagnosed depression and PTSD. The design of the shelter must accommodate for the state of the residents' state of mind at the time of entry. When they are brought into the shelter, the ambience must make them feel important, inculcate a sense of trust, and comfort. Treatment can begin only when the residents start to open and interact with one another. This aspect of the healing journey falls under protecting their health, which leads caretakers to help develop the health. Many health and wellness organizations categorize health into different dimensions when it comes to developing an individual's health. There are four to five aspects that all these organizations and departments can agree on:

The wellbeing of an individual can be seen from four distinctive angles:

1. **Physical** (usually involves exercise, and a healthy diet)

2. **Mental** (The ability to focus, pay attention to detail, stay coherent and productive).

   Psychological/emotional (A sense of control over emotions, which reflects actions, attitude, appetite, etc., Issues here can be detrimental to all the other facets).

3. **Intellectual** (The ability of learn, be creative, and apply knowledge to tasks).

4. **Spiritual** (Guiding sense of life's values, and purpose, a belief (faith) in a unifying force that gives one the motivation to carry on).

   There is one other dimension that is highly significant to this thesis: The Environmental Dimension which is understanding the impact the social, natural and built environment affect your health and well-being (Stoewen, 2017).

   This thesis will explore the qualities of architecture that will play a role in helping not only the residents develop their health, but also how design can accommodate staff's preference, spaces that will help them also develop their health, while caring for their residents. By taking this route into setting guidelines, the design will be user-centered rather than a patient-centered module.

   The final facet of designing for health is restoring their health, which typically means re-integrating them back into the society, by treating them as best as we can so that they can live their lives as normally as possible. There have been numerous researches about the restorative qualities of design, typically in hospital rooms, and layout that help achieve this. The concept of restorative architecture can be traced back to Florence Nightingale's theories of lighting, ventilation and air-conditioning in hospital wards that

could greatly impact healing and survival rates. Current hospitals have started to focus more on modern technological treatment methods but have resulted in a noisy, cluttered environment leaving patients and families confused and lost. The large scale of the hospitals often come with multiple entrances, unclear signages, long hallways and the institutional modules that affects the patients' ability to heal comfortably (Schweitzer, Gilpin, & Frampton, 2004). There are qualities in a healthcare facility that accentuate healing, and those that hinder it. Prof. Alan Dilani, the founder of International Academy of Health and Design talks about a Salutogenic Approach in his paper "Psychosocially Supportive Design: A Salutogenic Approach to the Design of the Physical Environment" in 2008 to designing health facilities which includes control, temperature, daylighting, aesthetic views, and flexible design. There are other similar facilities that share qualities that a trauma shelter of this type needs, like those that house victims of domestic abuse, human trafficking, or homelessness. All these victims share symptoms that are common with depression and PTSD, and relevant literature can be used to some extent in understanding design methods for the current topic.

3.8. Architecture's Role in Mental Health and Psychology

People spend almost 90% of their time inside buildings or surrounded by them (Evans & McCoy, 1998). Recent years have seen a remarkable upward growth on general awareness on the interaction between human beings and the environment, which is sometimes termed architectural psychology (Canter, 1972). Elements of the built environment can create a positive or negative influence on the social determinants of health (Satcher, Okafor, & Dill, 2012). The Impact of the Built Environment on Health

is an emerging field. As designers, we have an ethical responsibility to create spaces that influence and improve human health. Over the last 20 years, there has been a visible transition in the construction industry from building buildings to designing them. The trend started with hospitals that are dedicated spaces to cure patients. The first quality of a restorative environment was its access to nature and daylight (Shepley et al., 2013). Another factor was to improve a sense of control for the patients, by providing flexibility that was patient-centered allowing a supportive space proved to reduce length of stay, and better health outcomes once they had been discharged. The trend began with the question "*if buildings can impact health, then can city planning too?".* Jay Appleton's concepts of "Prospect and Refuge" explains how certain spaces that let its users observe and assess their surroundings without being seen provides a sense of innate security and safety in people as opposed to others. Grant Hildebrand in 1991 worked with this theory on interior qualities like window sizes, heights of ceilings, and the spatial complexity of the design (Dosen & Ostwald, 2013). One of the phenomenal researches in this aspect includes that of Roger S Ulrich and his theoretical framework to remove the environmental stressors from a space that will accelerate healing in patients in hospitals (Figure 3.9).

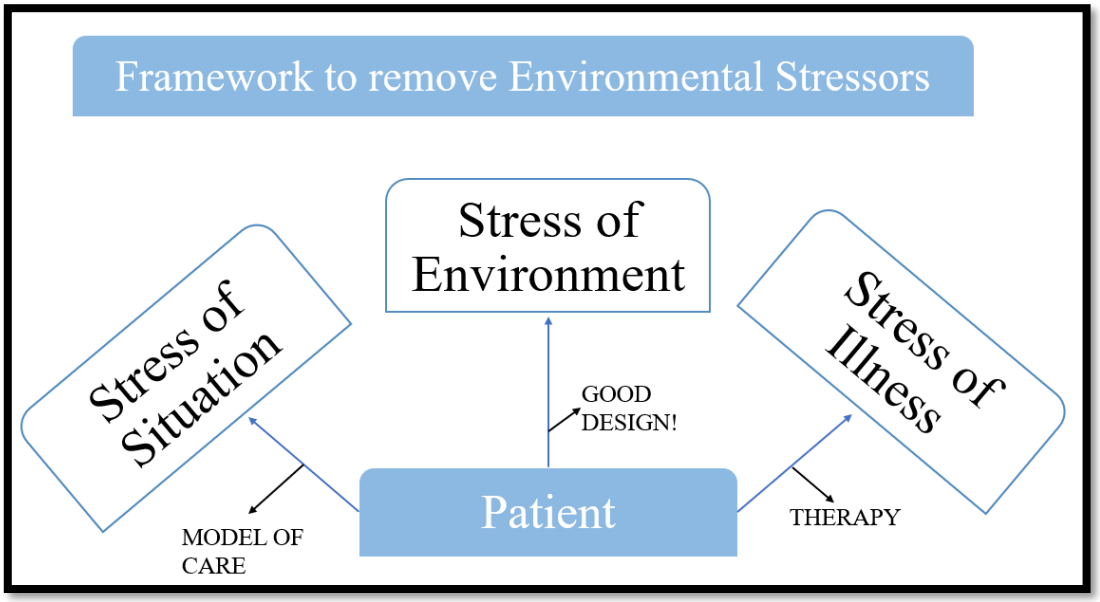

Figure 3.9: Roger Ulrich's framework to remove environmental stressors in healthcare settings

3.9. Creating a framework for Architecture for Trauma Shelters

Among the articles that were collected and reviewed, there were definitive themes that were repetitive in most of them that had proven to have a positive impact on the health of residents in healthcare facilities. The literature was chosen for anything wide related to health of users to specific traumas, women, and shelters of different categorizations. Since studies that focus on shelters for women war victims are rare, the study concentrated on understanding PTSD with symptoms of Depression, correlated them with symptoms of those studies on other trauma in women, to broaden understanding of shelter design ideologies. After the literature were summarized into different charts and table, a handful of specific literature that studied shelter designs in different regions were also chosen to further understand the culture impacts of architecture. Table 3.3 reviews

different traumas that the literature explored, with Table 3.4 deriving at the common symptoms shared among the victims of different ailments.

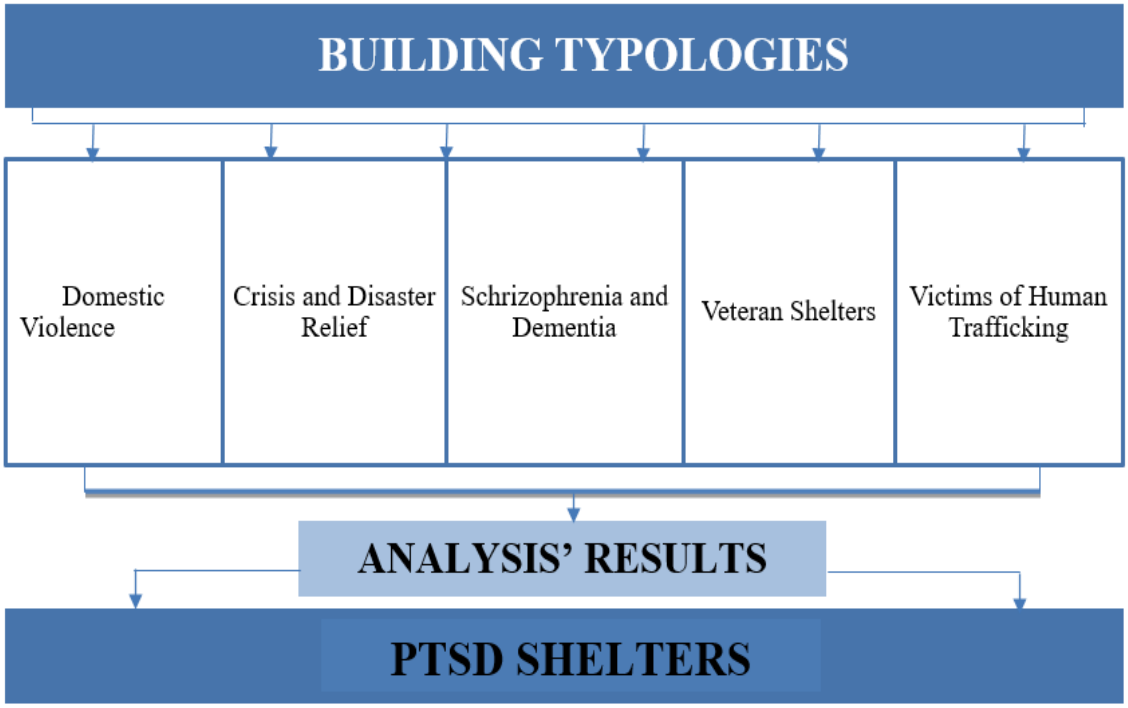

Table 3.3: Review of Different Building Typologies Found in Literature Studies (S. Chandramouli, 2019).

Apart from these, there are other forms of shelters and even safe houses, that may fall under being temporary or emergency crisis shelters that house victims of similar mental issues.

Shelter Typologies	Signs of Ailments	Impacts of the Trauma
Domestic Violence	Physical Bruises, Fractures, Concussions, PTSD, Substance abuse, Depression, Anxiety, Loss/Imbalance of Appetite, Insomnia, Tension, Headaches, and Emotional turmoil	Grief, Isolation, Injustice, Shock, Disbelief, Confusion, Anxiety and Crying, Embarrassment, self-blame, Humiliation, Mood swings etc.,
Crisis and Disaster Relief Shelters		
Schizophrenia & Dementia	Irritability, Restlessness, Lack of Restraint, Physical Disorientation, Anxiety, Loneliness, Mood Swings, Nervousness, Lack of Expressions, Social Withdrawal.	
Veteran Shelters	PTSD, Mental Exhaustion, Numbness, Insomnia, Hypervigilance, Substance Abuse, Suicide/Death.	Sudden outburst of anger, Foreshortened sense in lifespan (career, marriage, children).
Victims of Human Trafficking	Physical Abuse, PTSD, Cognitive Impairment, memory loss, depression, Suicide, Drug Abuse.	Fear & Constant state of Vigilance, Insecurity, Embarrassment, Feelings of severe guilt.
***Common Symptoms**: Physical Bruises, Depression/Anxiety, Social Withdrawal, Numbing, Insomnia, Drug and Substance Abuse, Hypervigilance, Suicide/Death.*		

Table 3.4: Symptoms Chart of Different Shelter Typologies (S. Chandramouli, 2019)

Table 3.5 details the primary goals that the literature mentioned were pivotal aspects that can be used as a shelter design toolkit, with figure 3.10 lists all the elements of architecture that the articles explored, or mentioned as a tool that can be integrated into the design program of a shelter, that would accelerate all the facets of healthcare design.

Goals		***No. of Articles (Total: 53)***
1	Reducing Environmental Stressors	25
2	Sense of Control and Independence	17
3	Positive Distractions	28
4	Biophilic Concepts	32
5	A Human-Centered Design: A Therapeutic Milieu	***35***

Table 3.5: Key Goals to be achieved as found in the literature (S. Chandramouli, 2019)

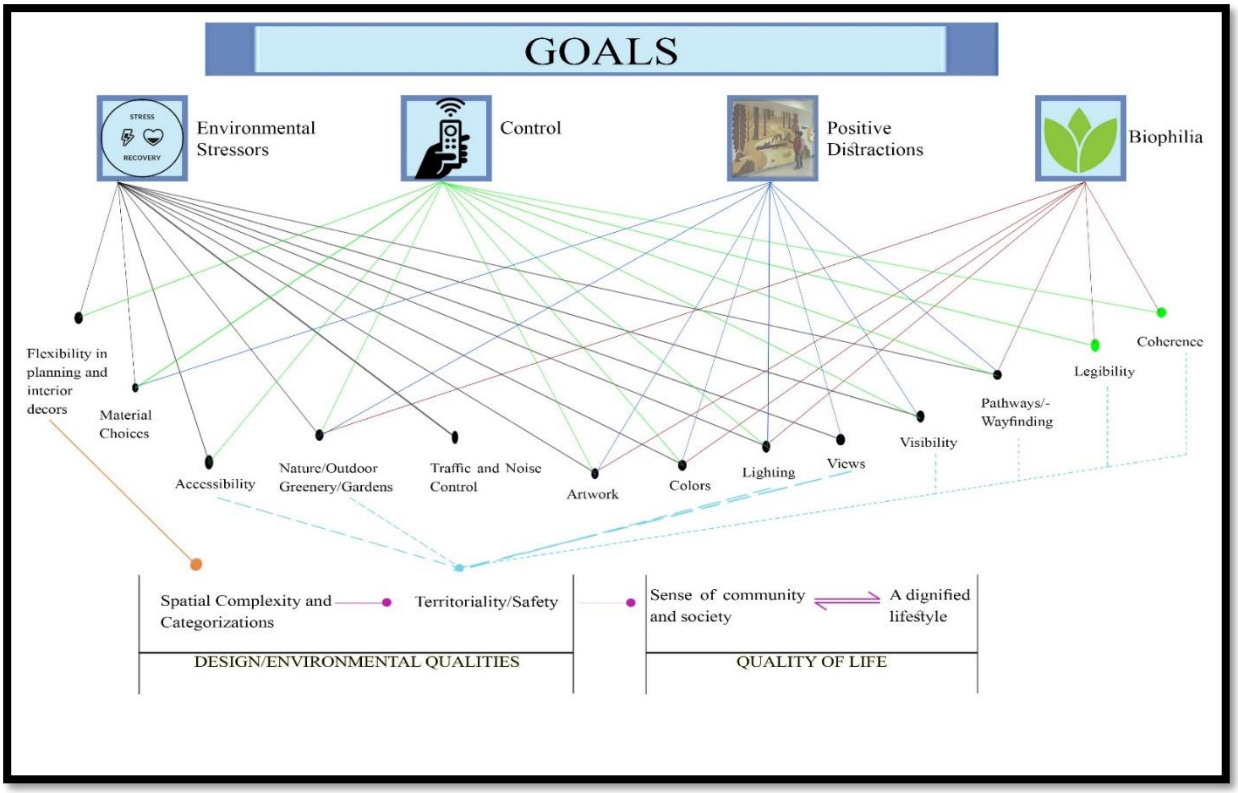

Figure 3.10: A literature map of goals, themes, and end results of expected shelter design (S. Chandramouli, 2019)

The four primary goals as per the literature reviewed are:

1. Reducing Environmental Stressors
2. Incorporating the Sense of Control
3. Providing Positive Distractions
4. Inculcating Biophilic Design

The above four can result in what the design of healthcare design now calls “Patient Centered Module” where the facility is designed from its residents’ perspective. But for a shelter to achieve its full potential, it becomes necessary to also address staff needs, especially those who live their lives inside the facility, and dedicate the better part providing support and care to their residents. This module that caters to both the patients,

and its staff, and every other user can be termed as a “Human-Centric” Design.

Emerging trends in the evidence-based design field of research for healthcare facilities also mention most of these qualities as being a crucial aspect that accelerates all the facets of health, and design. Each of the literature that was assessed and reviewed in detail have architectural or environmental qualities or elements that can be placed under at least one of the goals above.

These elements that are listed in the chart are:

1. Flexibility in Planning and Interior Décor (Furniture etc.,)
2. Material Choices
3. Accessibility
4. Nature, Gardens, and Outdoor Greenery
5. Traffic, Circulation and Noise Control
6. Artwork
7. Colors
8. Lighting/Daylighting
9. Views/Visibility (Includes Prospect/Refuge theories)
10. Wayfinding, and Pathways
11. Legibility
12. Coherence

3.9.1. Flexibility in Planning and Interior Décor

Flexibility is the first theme that was emphasized as an emerging awareness among designers and engineers. Being able to move around with ease, either around the facilities or just desks and couches give rise to a sense of control among the residents. Physical constraints that threaten the user to effectively interact with their environment reduce choice or behavioral options that can produce or exacerbate stress (Evans & McCoy, 1998). In this context, "Control" is just the ability to design one's surroundings as per their wish and alter their physical environment. A space that produces a maze-like movement, with uncontrollable conditions can be associated with learned helplessness especially with prolonged exposure.

Achieving flexibility is very easy, and it can be incorporated into the building even after it has been constructed. Furniture arrangements or design even can directly affect social interaction potential (Sommer, 1969). For example, chairs in the lounge that face each other around a tea table encourages conversation by provision of comfortable interpersonal distances, ease of eye contact, and physical comfort during conversation than rows and rows of chairs, that allow for seating, but promote a dissociative and passive environment (Evans, 2003). Spaces that support participation in treatment are those that provide environments that are sufficiently flexible in configuration as to allow for a variety of activities (Shepley et al., 2013).

Some studies explain that a circular design would be the best at achieving not just flexibility, but also bring out a society mimicking institution, since it was symmetrical, and would naturally radiate all the focused interaction towards the center, while private

space would be on the periphery. This layout allows for communication, aesthetic views, and variety of activities drawn away from the patient's core of stay (their rooms) (Edginton, 2010).

Figure 3.11: Flexibility in typical Healthcare Settings (S. Chandramouli, 2020)

3.9.2. Material Choices

After the Second World War, there was a radical transformation in the construction industry due to the massive influx of demands towards the rise of new residential buildings, especially those that were proposed for defense. It was clear that architects from the other parts of the world needed to adapt newer, efficient technologies mostly from that of the United states that initialized the usage of prefabricated materials, and locally available materials that reduced construction and labor costs with increased output, like adobe or plaster (Anderson, 2009).

The choice of material also asserted a level of control in the users provided there was history, or even a path of bond between them. This was also a reason for adopting local materials that the residents have a familiarity with, with which they could develop a sense of home, or culture (Evans & McCoy, 1998).

3.9.3. Accessibility

Accessibility is the broad term that can be explained in terms of the layout allowing for smooth transitions and proximal distances between different zones of the facility. Mental Health facilities face the challenge of providing the necessary spaces, for both the patients and the staff with reasonable distances, which would make traveling easier, and avoid confusions. Physical accessibility was often mentioned as a crucial requirement for all mental healthcare projects (Chrysikou, 2014). Consideration for physical disability, in the sense of accessibility, has been integrated in the design of public architecture in the United Kingdom since the implementation of Part 3 of the Disability Discrimination Act in the mid-1990s (Figure 3.12).

Patients' movement in healthcare facilities, hospitals or otherwise and even as a community has been compromised to allow for technological innovations in the construction and design industry removing the openness in planning that dominated in the past. A study at University College London (UCL), Barlett investigated the relationship of the physical environments of accommodation for acute mentally ill people. The results found a vast discordance between them that jeopardized physical and organizational milieu, and accessibility, even though the vast majority of the patients were physically able (Chrysikou, 2014).

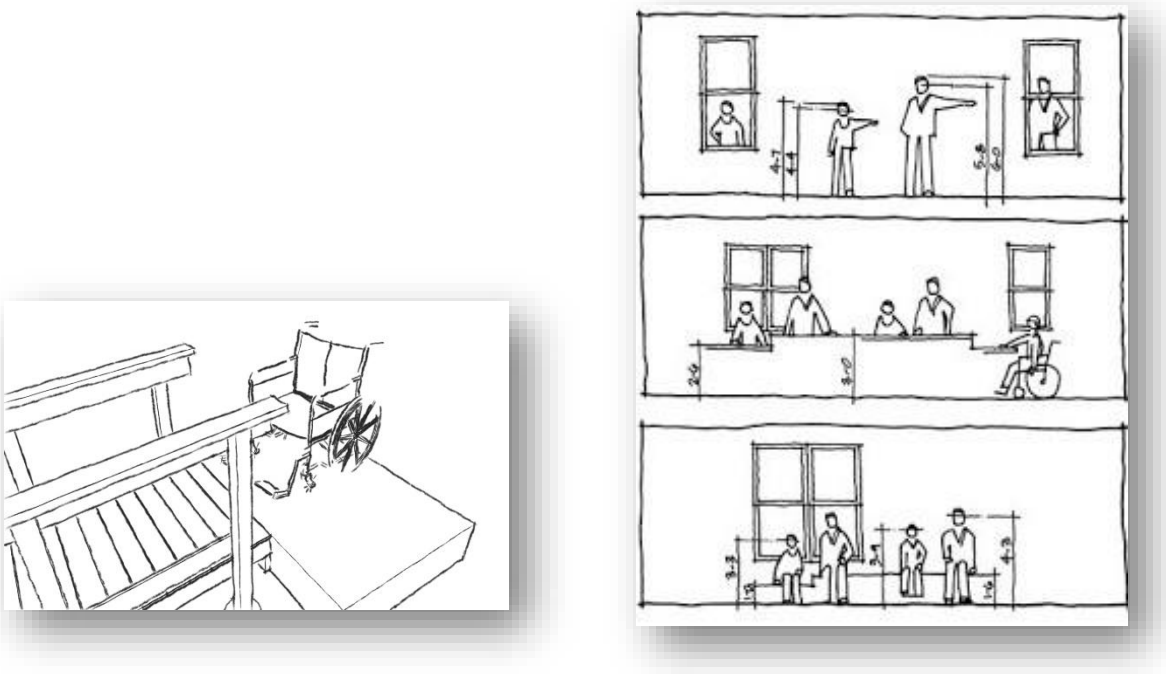

Figure 3.12: Accessibility and Universal Design
(Image 1: S. Chandramouli, 2020; Image 2: Universal Design, Source: McMonigal Architects, Minneapolis)

3.9.4. Nature, Gardens, And Outdoor Greenery

Nature is a subject that has been widely researched and explored to say the least. Roger Ulrich (1989, 1991, 1999, and 2002) studies about different aspects of the positive benefits of nature. Based on this work other scholars have published studies that explore the advantages of having a healing garden inside mental health facilities that soothes patients with dementia or Alzheimer's. In fact, several studies that focused on nonpatient groups (as well as patients) have consistently shown that simply looking at environments dominated by greenery, flowers, or water -- as compared to built scenes lacking nature (rooms, buildings, towns) has significantly helped in promoting recovery

or restoration from stress (Ulrich, 1999). This was only the initial study that paved the way for studies along similar lines. Currently, there is mounting evidence that gardens are especially effective and beneficial as a restoration for stressed patients, family members, and staff (Ulrich, 1999). Cooper-Marcus and Barnes (1995) found that restoration from stress, including improved mood, was by far the most important category of benefits derived by nearly all users of the gardens -- patients, family, and employees (Figure 3.13).

To be brief, healing gardens became a trend and were designed to achieve five major goals:

1. To provide a safe outdoor environment.
2. To provide a place for reflection.
3. To provide a place for relaxation.
4. To provide a place for socialization; and
5. To provide a place for people to maintain the hobby of gardening (Connellan et al., 2013).

Wagenfeld, Roy-Fisher, & Mitchell (2013) in their study for a veteran center connected positive health outcomes in veterans with PTSD to access to healing nature. They maintained that the presence of gardens inside the veteran center gives soldiers a sense of calm, and defensible home contributing towards a salutogenic model of design (Wagenfeld, 2013).

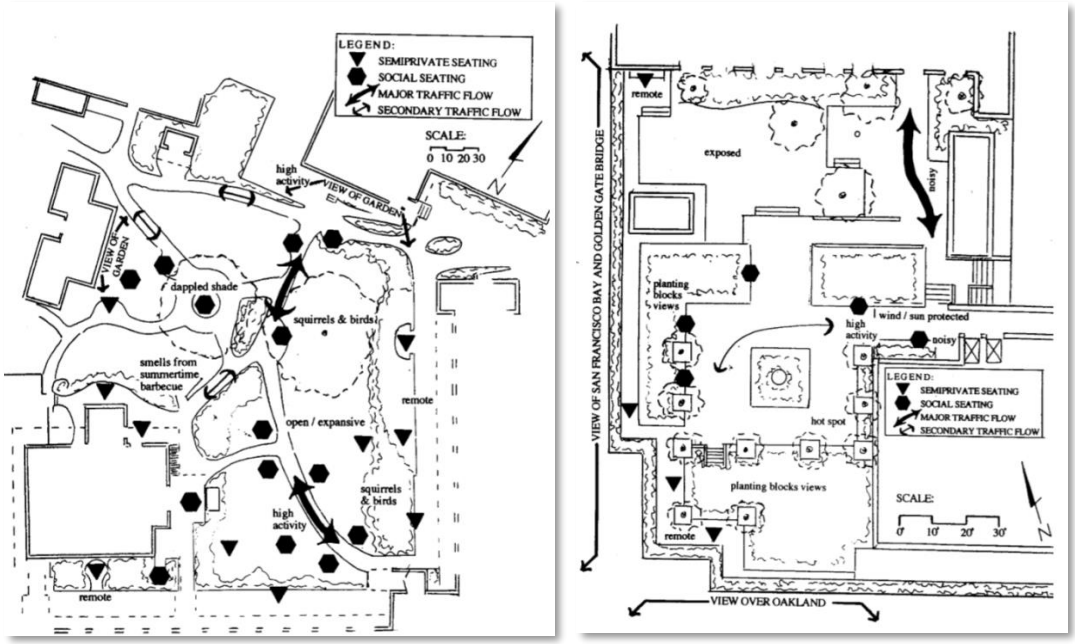

Figure 3.13: Gardens in Healthcare Settings: Medical Center, Berkeley, and Walnut Creek, California (Marcus & Barnes, 1995)

3.9.5. Traffic, Circulation and Noise Control

Traffic and Circulation refers to the haphazard movement inside and around any building that causes confusion and crowding. In a healthcare facility, they can be major environmental stressors that hinders with the feeling of calmness, peace, coherence, and security. This unnecessary complexity can be solved with wider, and open spaces that are not hidden from mainframe views.

Adjacently, noise is a tangential attribute that arises partly due to the uncontrollable traffic and can be both interior and outdoor. Noise inside healthcare settings is widely recognized as a highly negative environmental characteristic that increases patients' perception of pain, increases the use of pain medications, contributes to sleep deprivation, and may cause patient confusion and disorientation in addition to disrupting

serenity. Some studies even go far enough to suggest that noise can decelerate healing in patients, increasing the length of stays (Schweitzer et al., 2004). Noise can also be caused by neighbors in a shared room that has showed to decrease the sense of control, and comfort in patients who tend to feel victimized once again.

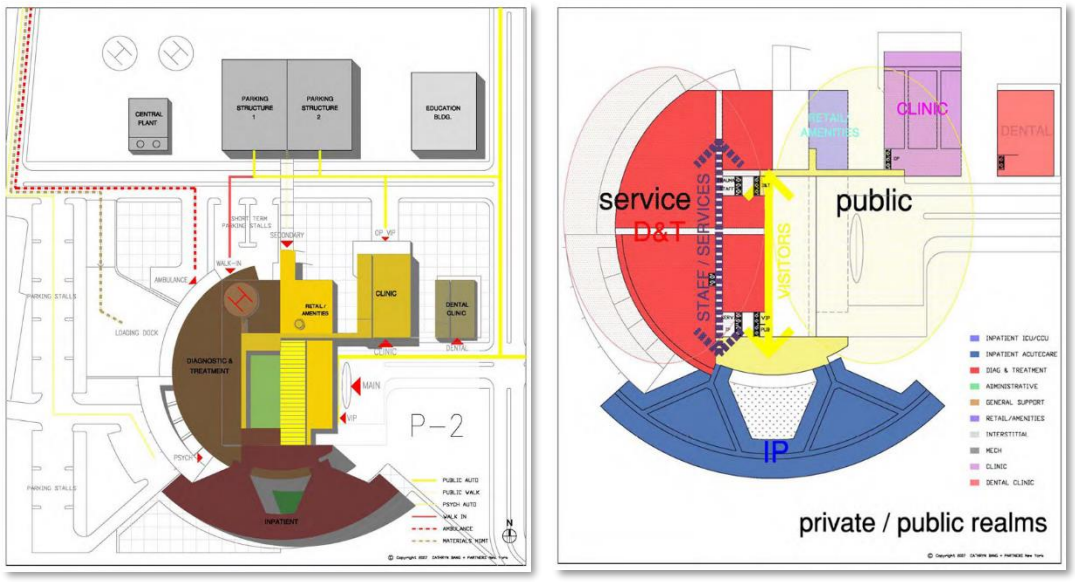

Figure 3.14: Traffic and Circulation, New Zayed Military Hospital, Abu Dhabi (Cathryn Bang + Partners, 2007)

3.9.6. Artwork

Norma Daykin, Elle Byrne, Tony Soterlou and Susan O'Connor from UWE, Bristol conducted a systematic literature review on the impact of art, design and the environment on mental health care. Daykin et al. reviewed over 500 papers, as well as 19 reports of quantitative and qualitative studies. One of the key finding was that "depression and anxiety were respectively 34% and 20% lower where intervention had taken place than with groups not exposed to arts" (Daykin, Byrne, Soteriou, & O'Connor, 2008).

A survey of patients, visitors and staff found that over 95% of respondents positively perceived the presence of artwork, and felt they were enhancing the well-being and diminishing stress levels, improving mood and distracting from worries (Connellan et al., 2013). Patients with dementia used artwork for wayfinding too and expressed as them being easier landmarks for decision making rather than memory or planning based derivations.

3.9.7. Colors

Colors form a separate theme on its own and are an integral aspect in healthcare research trends. The choice of colors can possibly affect brain's activity and create a sense of wellbeing and originality within architecture. Colors have a symbolic value and in that way contribute to the building's identity and/or cultural meaning. The so-called warm colors (red, yellow and orange) are considered to have an activating affect, while the so-called cold colors (blue, purple and green) are considered to have a calming effect (Dilani, 2008). Holahan and Saegert (1973) found patients socialized more in a newly remodeled ward with bright colors compared to a ward with old and worn furniture and dark and dull color scheme. Monochromatic schemes of colors tend to give a boring vibe and may improve stress, while bright colors, particularly at the red end of the spectrum all appear to increase stimulation (Dilani, 2008).Colors can also have a cultural affiliation, according to a study by Abel in 2009. People from each country showed tendencies for unique color preferences, with significant differences in frequency of colors and hues (Chauhan, 2014).

3.9.8. Lighting/Daylighting

The impact of lighting mostly that of natural daylighting has been researched over and over, both in Healthcare facilities and non-healthcare institutions. Schweitzer, Gilpin, and Frampton (2004) noted the different effects of natural versus artificial lighting on patients, specifically in the areas of illuminance, uniformity, diffusion, color, and UV radiation. Artificial lighting that reflect a glaring yellow ray can cause chronic tendencies of harmful/aggressive behavior especially in the mental health behavioral facilities (Shepley et al., 2013). A major subtheme concerning light is that of natural light or daylight, which is linked to the following issues in the literature: eating disorders, depression, circadian rhythm, Alzheimer's disease, sensory stimulation, therapeutic design, and therapeutic patient rooms. Once again, the access to daylight is directly linked with the length of stay and healing rates in patients (Ulrich et al., 2008).

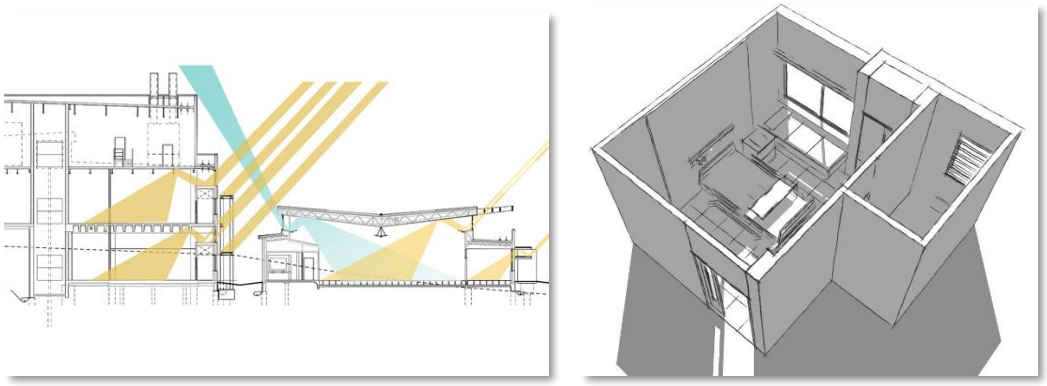

Figure 3.15: Lighting and Daylighting Design (Jensen, 2013; S. Chandramouli, 2020)

3.9.9. Views/Visibility

While Visibility and Views can refer to having a large window that looks out to something picturesque, they also widely mean the categorization of spaces. Direct contact with natural elements as well as views of nature provide restoration (Evans & McCoy, 1998).

Visibility is very crucial for the residents as they enter the shelter. Kaplan (1983) maintains that an enclosed space will evoke a feeling of safety or relaxation while a view from that space can add levels of stimulation and excitement. Women of the context need to be able to assess the immediate environment around them for danger and at the same time does not feel targeted by it. Jay Appleton's "to see without being seen" also famously called "Prospect and Refuge theory" identifies elements in an environment which satisfy the biological need for survival by offering an opportunity to observe or to hide (Dosen & Ostwald, 2013).

Figure 3.16: Prospect and Refuge Design (S. Chandramouli, 2020)

3.9.10. Wayfinding, and Pathways

Wayfinding is a separate aspect in the textbook of biophilic design. Building layout and wayfinding are also fundamental to autonomy supportive design. Artwork and signage are typical wayfinding design elements (Chanmugam & Grieder, 2013). A space that does not have any interior landmarks where it is easy to get lost causes a sense of fear, and disorientation. This also has a hand in ***Coherence, and Legibility*** the last two themes prevalent in the literature. Coherence refers to simplicity in form and layout of the building, clarity or fluid transitions among different spaces. Some architects plan grandiosely thereby forgetting in the process the fluidity which increases stress, and an unsafe living environment. Rapid changes in visual access produced by movement across a sharp vertical or horizontal barrier can cause marked disorientation. Corners, entryways, and stairs are sometimes designed so that little is discernable about impending space until one has crossed the barrier. Many accidents in buildings are attributable to this quality (Archea, 1985).

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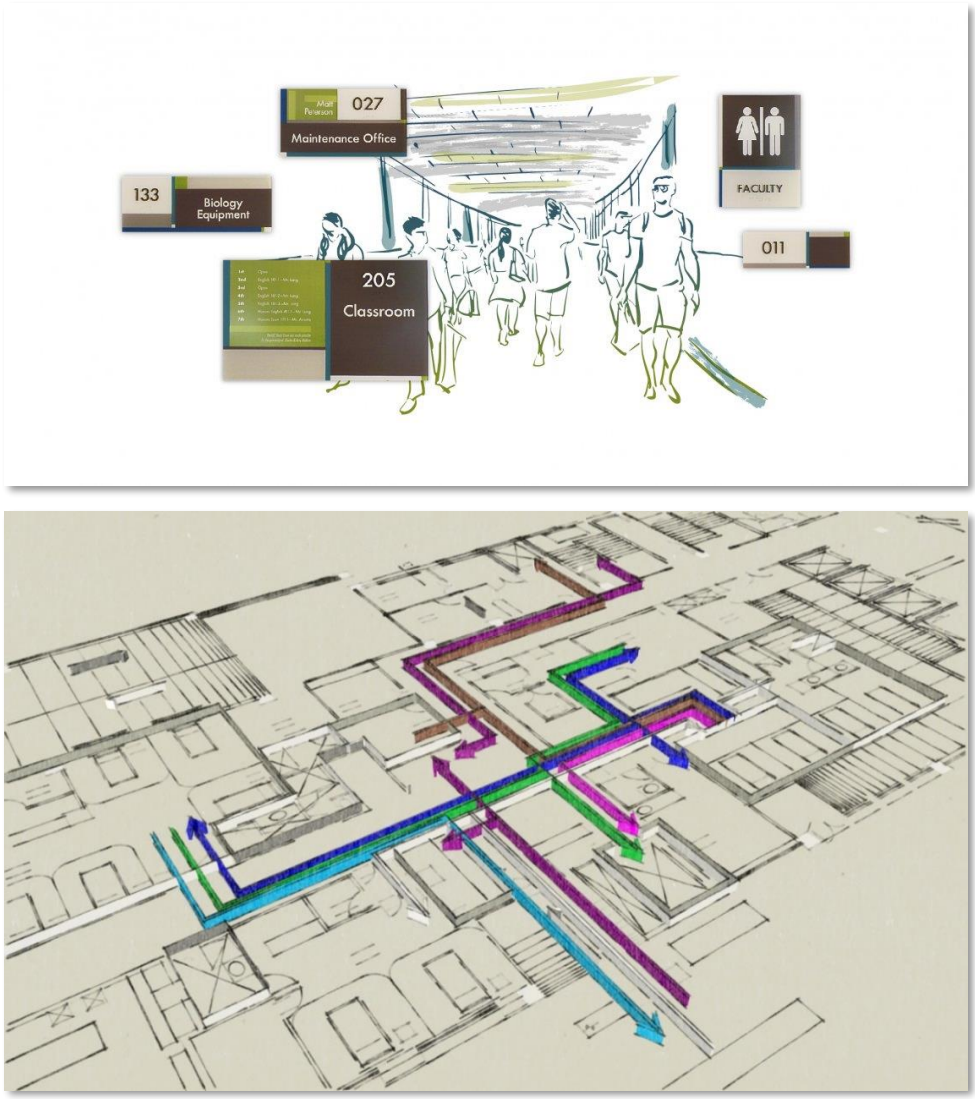


Figure 3.17: Wayfinding and Coherence(Take Form, 2017; S. Chandramouli, 2020)

3.10. Understanding the Culture

Architecture has always had a place in cultural identity and can be traced back to ancient styles of Roman and Byzantine era. Architecture enriches the cultural identity through specific styles, and elements of any settlement. They can be correlated with region, or religion, time and place, geography and climate, and of course availability and ease of construction (Danish, 2015).

The rural Kashmir experiences humid and short seasons of summer, and raw and prolonged winter. The region adapts a vernacular style of architecture that is traditional to their culture and religious heritage at the same time support the city's susceptibility to earthquakes.

Their buildings are mostly constructed from the local materials with local labor and skills, to reflect the unity of the community without any external influence. In the history of the region, the buildings have been dependent on stone, mud, bricks and woods for both roofing and walls. Their walls are thick built of brick and stone to resist their cold winters, and roofs made of mud-timber.

3.11. Conclusions

Several aspects from several pieces of research work on several shelter typologies have been studied, assessed and reviewed. Each of the goals, architectural qualities, and concepts, and the abstract aim that the design aims at providing play a role in PTSD shelters. The literature that was studied, and the case studies that are being chosen to focus on certain thumb rules that the residents need to feel in order to regain their

confidence and dignity in life. The analysis that was reviewed in detail can be categorized into the following goals:

1. Safety and Security
2. Sense of Freedom and Independence
3. An interactive community
4. Creating a home-like environment

These four aims will be broken down in reference to the literature map to investigate and summarize how each of the elements and qualities that was studied have been incorporated in existing shelter design and the model of care to achieve the bigger goals.

4. PRECEDENCE ANALYSES

4.1. Overview of the Precedence Analysis

To better incorporate the issues relating to the design of crisis and trauma shelters, it is prudent to understand the current issues in the design of shelters, and the redemptive measure that are being taken to remedy that. The literature review contained vital information that was inherent in developing the framework in tables 6.1-6.3 in the final chapter. The next phase of the study is to investigate the framework established by the literature closer to the context of the study population. For this purpose, two communities of vulnerable population, seeking a refuge from issues of isolation and human right abuse were chosen outside United States in regions that were still plagued with similar social and cultural skyline, to understand the parameters explored by the general literature. All the themes found so far, and their corresponding qualities were all taken into consideration to judge their influence on the health outcome of the residents. This study takes a deep look at both the sites to evaluate the design features that have been used to mitigate mental trauma.

4.2. Study Design and Site Selection Criteria

The first precedent is from Burundi, near Rwanda where a student from Texas A&M University's healthcare architecture student Lindsay Thiele (Nee Dusek), designed a community camp for the refugees of the civil war, who sought for a community to heal, and develop the quality of their lives in peace.

In a time where the world is conflicted with armed conflicts, it gets difficult for the civilians housed in the targeted region to lead a healthy life and are forced to flee to

other regions in search of the most basic needs for survival. This design for community nodes enriches roots of home, hope, and of healing. This project was based on the exact ideology of this study that architects are responsible for creating environments that allows its users to flourish. The final design by Ms. Thiele was based on three case studies on Surgical Clinic and Health Center, The Library of Muyinga and Makoko Amphibious Community Center that discusses aspects of design, which Thiele uses to fabricate her personalized program for the outcome. Thiele focuses on easy modules, with vernacular themes, with culturally appropriate spatial organization that the people of the region would feel attached to that enables develop their mental, physical, and spiritual health of the community.

The next case in the report was a design program for a shelter for Human Trafficking Victims by Laurie Karsten, from University of Cincinnati who conducted her precedent analysis at the Oasis Center in India, to arrive at the proposed shelter. Karsten conducted her study with Indian community to understand Indian Perspectives on refuge shelters that differs from the western world patterns. In her study, she integrates Indian architectural elements from her history into the building like open courtyards, vernacular building techniques and materials, open planning with an abundant presence of vegetation, all of which contribute to communal living.

With the help of both of these studies, the research gets closer to understanding designing for a suburban and rural Indian population, with elements that have proved to aid the sense of familiarity and home, rather than incorporate foreign qualities to a space that might reject the incorporation.

4.2.1. A Community for Refugees – Burundi

The program for the community center accommodated a clinic that focused on malnutrition, HIV, Malaria and Women's health, and space for education to create awareness for the residents in the colony. This was to stop the chain of typical refugee camps where people lived without basic amenities or care. The building type was a mixed-use community center that would incorporate healthcare, wellness, nutrition, gardens, and safety. The use of local materials enabled community participation as a way of providing employment to the refugees in addition to its availability and ease of construction.

Figure 4.1: Open Planning of the existing community planning for refugees (Dusek, 2016)

Figure 4.2: Open Planning layout of the proposal for community planning for refugees (Dusek, 2016)

The final goals of the proposed shelter are five in total:

1. Create a community for the refugees to regain an above average quality of life.
2. Take advantage of the locally available materials while avoiding materials in shortage.
3. Respect, and incorporate local culture using traditional Burundian values to create meaningful spaces.
4. Create shades to allow the people to spend their time, for recreation, while focusing to reduce the load and stress on waterlines.
5. Create an overall space that concentrates on nourishing the health of the community.

4.2.2. Center for Human Trafficking – Ahmedabad

Laurie Karsten from the University of Cincinnati proposes a shelter for trafficked women, in the North Western Indian State of Ahmedabad, based on similar framework and literature that recovery from PTSD involves the victim feeling a sense of safety, and belonging, that motivates reintegration and participation in the society. The shelter she aimed at consisted of family rooms, residential units, counseling rooms (for mourning and reflection), classrooms, and a craft market connected to the street level. Through her research, she arrived at a design that connected to the culture of her site (which is India) with the critical points of her principles involved using urban agriculture to abet therapy and self-sufficiency, a safety threshold, and a lightwell to open up the dense mass of the building and provide aesthetic lighting for views. Each unit was corresponded with garden spaces and porch swings if a mother wants to feel relaxed. Figure 4.2. – 4.3 shows the planning levels that Laurie Karsten followed in her study (Karsten, 2012).

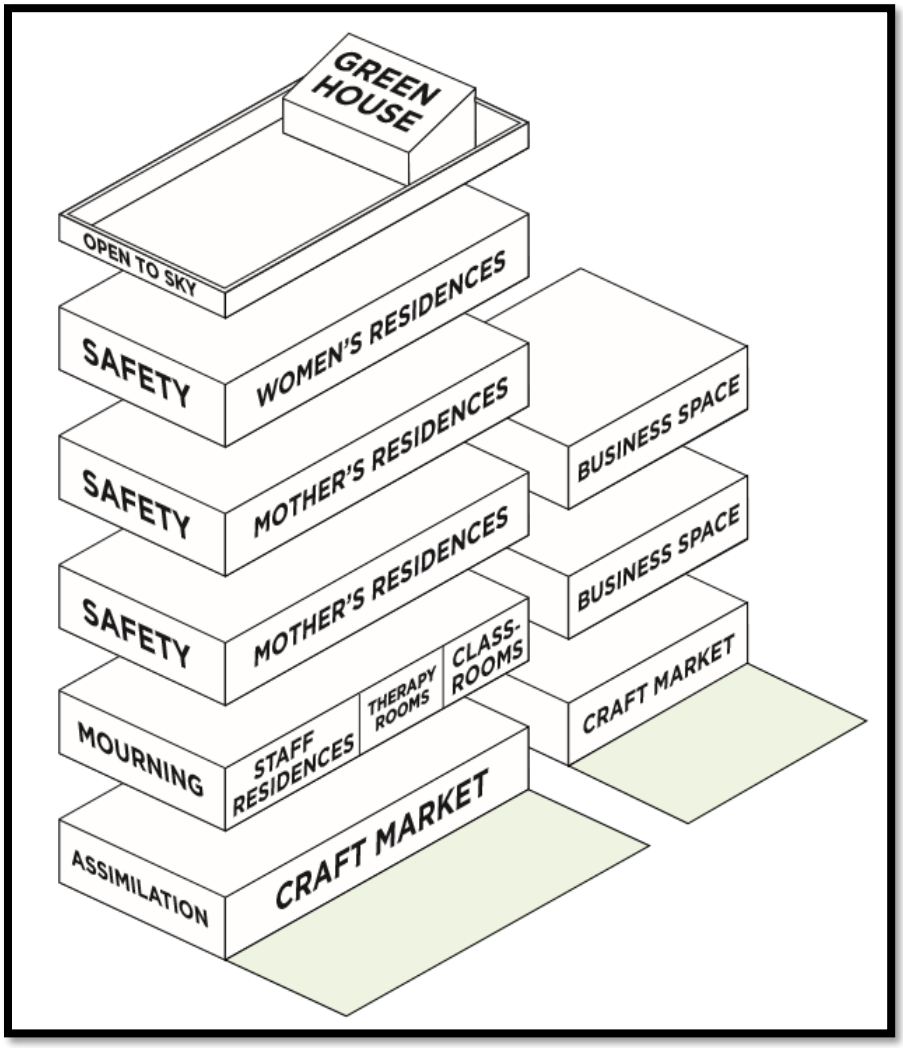


Figure 4.3: Leveling of the Women's Shelter in Ahmedabad (Karsten,2012)

Figure 4.4: Rendered Sectional of the Women's Shelter in Ahmedabad (Karsten,2012)

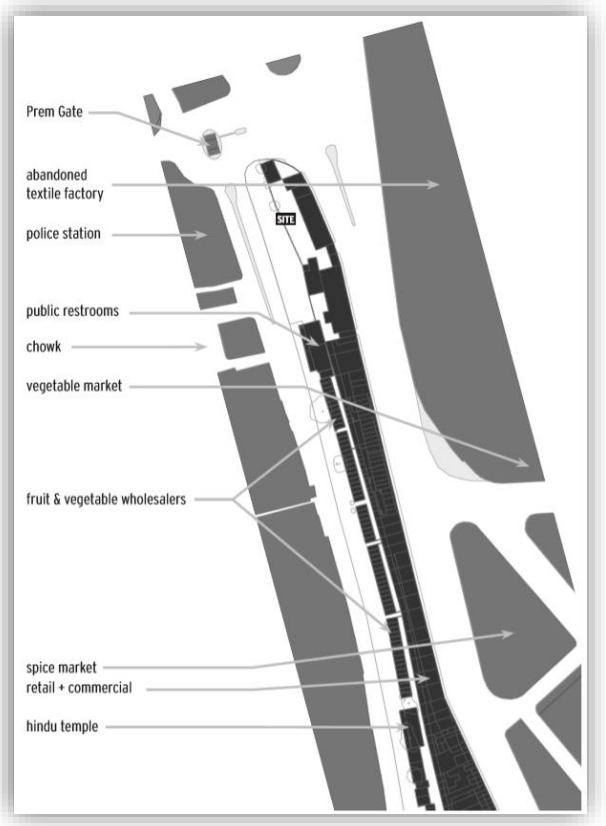


Figure 4.5: Site and Neighborhood, Ahmedabad Shelter (Karsten,2012)

Figure 4.6: Panoramic View of Ahmedabad Site (Karsten, 2012)

4.3. Results

The precedents both have a lot of characteristics of design in common, and some that vary for its respective culture. Both Burundi and Kashmir have a tropical climatic profile with an annual average temperature of 25-30 degrees Celsius, while Burundi and Ahmedabad experience a hot summer, with Kashmir experiencing a mild heat during 1/3rd of the year. All the three regions studied have a need to use local resources, which are cheap and can be utilized to its maximum potential with minimal labor costs. The biggest asset in both these studies are that the context of them is focused on developing nations of Burundi and India, meaning that the typical design aspects that is predominant in the current USA or the western culture are not replicated in these designs, as they would not be completely beneficial but rather those that would be suitable for their respective culture and geography. Since both the cases focus on safety and privacy, and majority of the literature on trauma and recovery reviewed similar aspects of lifestyle, the following lists the aspects pertaining to these issues in the built environment:

- Spatial Hierarchy and Depth: The layout of the building must lead the user from lesser private spaces to more private areas, with a coherent transformation among each point, while encouraging interactive and personal spaces for the women inside.
- Stimulus Shelters: Providing spaces that foster the sense of refuge like alcoves or recessions, that allow for private reflection and sense of calm (Stewart-Pollack & Menconi, 2005).

- Light and Colors: Allowing maximum natural light into the building, while keeping in mind the degree of brightness required for different spaces inside the building. Warm colors for interior décor and cool colors that promote activity and peace respectfully.

5. CASE STUDIES

5.1. Overview of Case Studies

Chapter 3 on this thesis discusses systematically all the concepts used in the literature reviews on designing shelters for vulnerable women. From the help of a dignity framework for women who had undergone physical and emotional torture and violence, the researcher derived three goals that the architecture of the space must convey. The previous chapter was on precedents that were studied to understand architectural innovations in developing nations as opposed to the western world. The case studies chosen helped in investigating the spaces and design layout with the use of the built environment assessment toolkit (a content analysis using the 4 themes derived from literature) with the help of archived surveys and the brief visit the researcher had during her visit to Chennai, India (Home City of the researcher) in Summer of 2019. The study does not involve any kind of direct or indirect interactions or communications with the residents or staff that would require an Ethics Approval (Institutional Review Board, IRB). The data obtained were strictly either those that were already in possession of the architectural firm/team that designed and renovated the shelters, or other designers that are involved with the project. The research did have communications with the architects and social workers for any questions that arose during data analysis, which was welcomed by the professionals.

5.1.1. Site 1: Goals of the Shelter

The Banyan is a Non-Governmental Organization located in Chennai, India. The shelter was founded by a group of women in 1993 with an agenda to help fellow women who

have been at the receiving end of the cultural stigma very prevalent in the country. The shelter started an initiative called “emergency and recovery center” that offers to pick up women who are homeless, and/or have been abandoned, and/or with mental illness. Their program includes reconnecting people together when possible. After they treat their residents, and they regain their abilities to live a normal life, they try to find the families that abandoned them, offer counselling services and do their best to patch up families.

In 2007, they opened another long-term teaching shelter called “The Banyan Academy of Leadership in Mental Health” that educates students to intern at the site and spread awareness about stigma and mental illness (Case Study II). In 2017, they opened another chapter in Kerala, India to spread helping hands wider and farther. In addition to this, they also have yet another initiative called “NALAM” (Wellbeing) that approaches mental illness from a wellness perspective. Their shelters can be found all over the country, in Chennai, Kerala, Maharashtra, and Trichy. These clinics are established to work along with the Department of Health, Panchayat, Corporation, Colleges, and the State Training and Resource Center.

5.1.1.1. Client Information

With the help of the lead designer of the shelter, the research was introduced to the team of social workers and the members of the management. At the beginning of the study, Ms. Anjali Sinha, the head of senior management team along with Ms. Mrinalini Ravi who helped the author understand the goals of the shelter. She put the researcher in contact with Ms. Swapna Krishnakumar, and Ms. Sowmya Kamal Nath, both of whom

assisted the researcher with voluntary guidance (via email) and cleared any hindrances along the study.

5.1.1.1.1. Design objectives

The goals of the organization are to tackle mental illness salutogenically: wellness, developing the state of trauma to **improve in the overall quality of life**. The shelter aids women regain their confidence, ability to give them a chance for a normal healthy life, through giving **them a sense of home through a community-oriented framework that focuses on safety, comfort, freedom, and honesty. Another goal of the shelter is fostering empowerment through providing variety of activities and employment** that they get paid for. To **motivate independence**, they are taken out for excursions to the beach or the movies, or just a stroll down the road. The final state objective was to establish a culture that makes the women feel safe, comfortable, and empowered. Each of these aspects are described below:

1. Safety and Security
2. Sense of Freedom and Independence
3. An interactive community
4. Creating a home-like environment

1. Safety and Security

Most residents in the shelter felt safe, and secure with the guards at the gates 24/7 and the constant vigilance provided by the location of the wards (S. Menon, Personal Communication, 2019). They also felt nurtured and cared for by the nurses and the staff. The primary reason for any negative feeling was during the active treatment stages.

Women with trauma that included domestic abuse on their lives felt threatened when they were being fed medications. The doctors were aware of this issue and explained that it was a trust issue that takes some time for those residents who were new. (M. Ravi, Personal Communication, 2019). The fellow residents are very helpful and caring, and at most times can pacify the other women. Design features include barbed wires above the parapets that are aesthetically constructed to inculcate a sense of privacy. The big windows in almost room and ward make for a safe, well-lit ambience as the residents feel trapped in. The colors scheme was very basic and allowed for no flexibility, but also did not emanate any feelings of hostility. Unfortunately, the facility does not have any protocol to prevent conflicts that arise between/among the residents and tackle it manually. This may affect the emotional safety a little.

Figure 5.1: Photographs of the Banyan by S. Chandramouli and S. Menon, 2019

2. Sense of Freedom and Independence

The shelter aims at feeding a sense of freedom and independence to the residents. This is done by allowing them to have a flexible daily life. They are not imprisoned to their rooms, or to anything they don't wish to do. The only aspect of their lives that is fixed is the food times. During the study, the author observed how some of them like walking around the facility, or knitting clothes, helping the staff with odd jobs, or simply staying in the wards. The shelter has spaces that allows for creative activities such as sewing,

tailoring, and other handicrafts. They can exit the shelter provided they have a member of the staff to assist them. One of the most appealing features of the shelter is their terrace which also uses exposed bricks, that the residents paint and color (Random bricks are painted a different color that stands out). When the outside weather is not all that humid and dry, the staff takes the residents who love spending their evening time sitting and playing on the terrace. The facility had various classes of artwork and painting on walls that the residents observed and even replicated with their own tinge of creativity.

Figure 5.2: Photographs of the Banyan by S. Chandramouli and S. Menon, 2019

3. An interactive community

Most residents expressed their agreement of having to live together, having faced abandonment or loss in the lives. The rooms are usually wards which is the common patient protocol in the country unlike the United States, but they also have private and semi-private rooms for patients who may prefer to live alone. The residents liked to talk to others who they consider as their family. They also engage in activities to accompany their friends, and maybe watch movies together. They also form groups to sit together in

the evening and chat, even with the nurses and social workers. The facility tried to avoid any alien attachment to the place, so employed exposed brickworks for the façade, and the rest of the exterior. Unfortunately, the interiors resembled a metropolitan shack with dull tiles, and mosaic for the most part. It was mostly because of these monotonous views of the rooms that the residents walked out every now and then to get a whiff of the brickwork. This choice of material added to their daily lives at the shelter gave them a feeling of belonging in a community.

Figure 5.3: Photographs of residents at the Banyan, by S. Menon, 2020

4. Home like environment

The very module of the shelter's design opposes a typical institutional setting. The residents can decorate their rooms, or any part of the outdoor areas with the items they choose. They engage with the environment, and the people around seamlessly. All the factors like the material choices, the organization of the wards, décor flexibilities and the different activities produce a homely ambience.

There are also policy level decisions (outside of architecture) that keep the shelter protocol within check like trust, transparency and collaborations, peer and administrative support all of which adds to a truly empowering society within the facility.

Figure 5.4: Photographs of the Banyan, by S. Chandramouli and S. Menon, 2020

5.1.2. Site 2: Goals of the Shelter

The Banyan Academy of Leadership in Mental Health (BALM) is also a Non-Governmental Organization, also operated by the same founders as the first site. This site is in Chennai, India along the coast far away from the metropolis. The facility is located near the Banyan Hospital which is a primary healthcare center. The shelter

houses women victims of chronic lasting brain injury, and subsequent abandonment. The residents here have a life of their own inside the center, and they sometimes shuffle the residents between the BALM and The Banyan, depending on health conditions. Once again, the shelter provides treatment, housing, employment, leisure, and constant care to the residents. This facility is also a school for sociology and mental health, and has strength of 50 students, who attend classes here at the shelter, and interact and train nursing the residents who live there.

5.1.2.1. Client Information

Since the facility operated under the same management as Site 1, a member of the senior management, Ms. Vijayalakshmi and the head of Nursing, Ms. Punita Sambath, who assisted with the whole study via email and telephone conversations. One prominent advantage with data related to this shelter was that since the facility was an educational setting, the library inside it contained information on the initiative, background information of the founders, and the objectives desired by the treatment models.

5.1.2.1.1. Design objectives

The researcher spent some time to investigate the floor plans of the setting and the spatial organization, design parameters, and understanding the philosophy of design. As a part of the Banyan Leadership Initiative, this facility also takes a salutogenic view on mental illness. The goals of the institution to naturally incorporate the feeling of stability, confidence, trust, and collaborations that helps to develop the health of the residents physically and cognitively. The women are taught to engage in a society, work and read (if needed), and improve their body language. The shelter is laid out in a way to

attract their residents to stay out all day and only use their wards to sleep, encourage a sense of community, independent thinking, and decision making. The facility is an epitome of shelter design and needs to reach farther as an example to other such institutes. The community, the design, and the supportive staff have strengthened the feeling of culture, safety, and empowerment. Just like case study I, the following attributes of the shelter typology is discussed below:

1. Safety and Security
2. Sense of Freedom and Independence
3. An interactive community
4. Creating a home-like environment

1. Safety and Security

The facility is located half a mile away from the coast's mainline road, and is away from prying eyes, with tall walls around it like a moat. The residents' area is on the lower level, that is accessed with the main staircase and ramp at the entry which is hidden from view. This planning structure provides the highest levels of security. The facility is 2 stories high and has a horizontal layout with most of the ground level being used for the garden area and a gazebo. The entire indoor quarters are planned around and overlooking this huge garden. This location is ideal in providing a safe and secure environment that feels guarded. The nursing staff are equally divided to each ward, who take care of the residents after curfew. The fellow residents are very helpful and caring, and at most times can pacify the other women. The wards are placed on the periphery

with big fixed windows that overlook the grounds. Just like the Banyan, the color and interior lighting were basic and functional, but the facility didn't really need it as the large open gardens reflected the daylight everywhere. Unfortunately, the facility does not have any protocol to prevent conflicts that arise between/among the residents and tackle it manually. This may affect the emotional safety a little.

Figure 5.5: Photographs of the BALM, by Sarayu Chandramouli, 2019

2. Sense of Freedom and Independence

The mission statement for the shelter aims at offering a sense of freedom, and independence to the residents through a program that is flexible. The wards are designed around a beautiful healing garden, that is completely shaded by trees, pergolas and a gazebo to sit and relax. The study was divided to understand activities at different times of a day, and astonishingly, very few residents even stepped into the wards/rooms and stayed in there during the day (even during direct sunlight). Just like in case study I, the residents are encouraged to take part in different activities like sewing and handicrafts, gardening, cleaning and organizing that helps the staff. The facility also has a big library

with computers and indoor lounge space that ensures minimal isolation. Since the coast is very near, and the facility only houses 30 women, the nurses take them to the beach twice a week (at least once). Since the center also serves as a school, the residents along with the students involve in photography and artwork. The corridors may be construed as narrow, but they are directly on the garden's path of light, so always well lit.

Figure 5.6: Photographs of the BALM, by S. Chandramouli and S. Menon, 2019

3. An interactive community

The residents could live with their friends and liked the arrangement of 5 women a ward module. The nurses have stayed there along with the residents for so long that they're

now family. The facility uses local bricks for the exteriors, terracotta for the gazebo, and the dining room's roof. Though there weren't exclusive spaces allocated for social gathering, both the sites, along with precedents had areas dedicated towards community activities like sewing, or weaving, or simply even recycling materials in the case of Burundi's community center. A "market-place" was mentioned in the Center for Trafficked Women that connected the interior of the shelter with the neighborhood markets to allow for outsourcing business.

More importantly, an interactive community means an environment that supports healthy social interaction and needed privacy. The BALM had a strong sense of indoor crafting spaces that fostered communication and interaction. More importantly, the woven products were turned into a business module to foster empowerment.

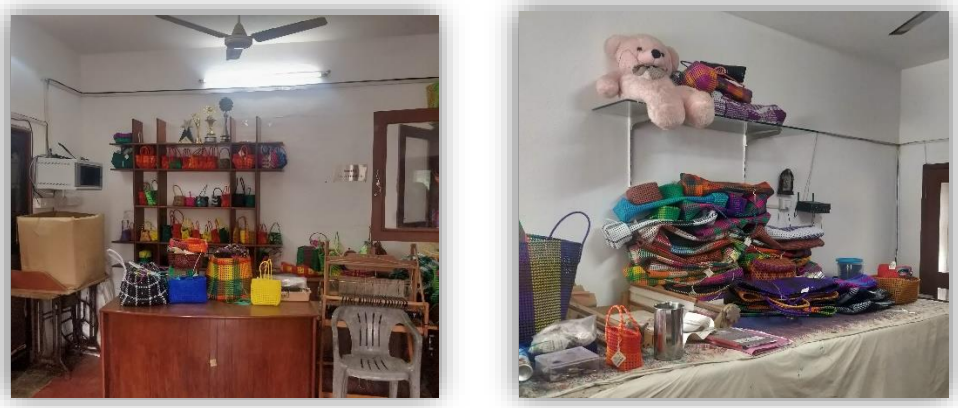


Figure 5.7: Photographs of the BALM, by S. Chandramouli and S. Menon, 2019

4. Home like environment

Since the setting was a secondary effort by the women who started The Banyan, the BALM also focuses on a home like ambience as opposed to a hospital. The first words

out of most resident's lips were that this was not a hospital. The residents can decorate their rooms, or any part of the outdoor areas with the items they choose. They even plant seeds that they prefer, which they nurture. The dining space and the activities room are placed on the other side of the gardens, with the former being on the first floor, with the ground floor being a pathway that connects to the rest of the facility. There is an auditorium that is typically used for the educational lectures, but when there's no school, the residents watch a movie or two on the big screen. They engage with the environment and the people around seamlessly. All the factors like the material choices, the organization of the wards, décor flexibilities and the different activities produce a homely ambience.

Just like the Banyan's motives, the BALM's policies keep the shelter running effectively and provide the fundamental framework of trust, transparency and collaborations, peer and administrative support all in check.

Figure 5.8: Photographs of the BALM, by S. Chandramouli, 2019

5.2. Study Design and Data Collection

5.2.1. Built Environment Assessment Toolkit

The built environment assessment toolkit was created after carefully reviewing the literature to understand the features in the facilities that support these. It was based on the structure of the **Clinic Design Post Occupancy Evaluation Toolkit** created by The Center for Health Design (CHD) (2015) to examine the exteriors, interiors and all the spaces within a facility. The CHD Clinic Design Post Occupancy Evaluation (POE) toolkit offers components to audit the physical environment with a set of fourteen design principles. This study follows the principles laid out for this checklist and evaluates the exterior and interior spatial qualities on 10-14 aspects in each of the shelter.

5.2.2. Themes for Content Analysis

A shelter would serve as a "home" as they would **project their ideas of a home into the shelter because they're seeking healing and getting their lives back in order.** Understanding concepts of home and incorporating them in a shelter **design relate to security, shelter, and identity**, informs architectural design and research. The environment should be created in a manner to minimize a hostile ambience, eliminate feelings of danger or threat to the resident (both from outsiders as well as other fellow residents) and maximize security of residents and staff. Strategies to strengthen safety from the outside and organize a life adhering to social norms among strangers within the shelter can result in a space where residents live under surveillance, but without feelings of invasion.

The shelter can create an empowering yet comfortable and home-like environment where women can slowly reclaim their identities away from the trauma field and personalize their environment to feel like their own self.

The reason behind choosing a shelter as opposed to a hospital is that a shelter can emanate the ambience of a home through exterior and interior designing. This may include gardens, art, material choices, personalized comfortable furniture that does not look institutional, and emanate homeliness. Several environment/behavior researchers have suggested that, one way to achieve a more social and homelike environment is to demarcate spaces from private, semipublic and public, with transitional spaces that connects every category of space. Similarly, comfort is divided into several branches consisting of all the aspects mentioned above that add to the visual comfort, acoustic comfort, and orientation. Facilities of treatment that are designed with familiar residential qualities translates to healing, comfort, and a smooth transition to reintegration into society.

The selection criteria for the themes are explained at the end of this document in the appendices.

Based on the above three themes, the physical and built environment will be assessed:

1. From the exterior
2. From the Interior spaces based on function:

a. Lobby/Lounge

b. Dining/Kitchen

c. Wards/Private rooms/Other resting rooms

d. Sewing or Handicrafts room

e. Terrace

f. Patio/Outdoor spaces/Café

Built Environment Assessment Toolkit

General Information

Name of the center: The Banyan

Location and Physical Address: 6th Main Rd, Mogappair West, Mogappair Eri Scheme, Mogappair, Chennai - 37

Area/Total number of floors: 5 floors

Total number of patients: 100-110

Table 5.1: Exterior Design Qualities for Content Analysis - Banyan

Design Evaluation – Exterior:

		DESIGN EVALUATION – EXTERIORS		
THEME 1	Safety and Security	Access to nearby transportation ports/ and major landmarks	1	72.7%
		Proximity to schools/colleges or any other educational facilities	1	
		Proximity to hospitals/ or any other major hospitals	1	
		Availability of ramps	1	
		Daylight in wards, and rooms, and well-lit corridors/outdoors	1	
		Security at the entry/exit to the facility, and the building (Locks/Guards/etc)	1	
		Presence of barbs/fences/ or moats to mark boundary	0	
		Easy access to alarms in case of crisis	0	
		Presence of shades/pergolas in the outdoors	1	
		Visibility to the outside and Vice Versa	1	
		Use of plants or trees to visual and aesthetic soothing	0	

		DESIGN EVALUATION – EXTERIORS		
THEME 2	Sense of freedom/ control/privacy	Spaces that offer privacy and meditation	1	66.66%
		Interactive spaces/or socializing spaces	1	
		Any Green screens at the boundary	0	
		Healing Gardens/Greenery/landscaping	0	
		Pathways around the facility	1	
		Spaces for all ages and activity	1	

		DESIGN EVALUATION – EXTERIORS		
THEME 3	Sense of community and comfort	Use of local materials	1	100%
		Community oriented activities	1	
		Accommodating spaces that allow community engagement	1	
		Home like outdoor design	1	
		Flexibility in outdoor arrangements/ and design	1	

Table 5.2: Interior Design Qualities for Content Analysis - Banyan

Design Evaluation – Interior:

		DESIGN EVALUATION – INTERIORS		
THEME 1	Safety and Security	Presence of ramps or lifts to access upper levels	1	66.7%
		Surveillance cameras with the control unit placed at strategic positions	0	
		Separation of public and private spaces	1	
		Separation of treatment and living spaces	0	
		Presence of artwork/painting or sculptures	1	
		Presence of ligature resistant furniture	0	
		Ideal ceiling heights	1	
		Provisions of wards, family rooms and private bedrooms	1	
		Provisions of individual storage lockers in wards	1	

		DESIGN EVALUATION – INTERIORS		
THEME 2	Sense of freedom/ control/privacy	Clear segregation of spaces ranging from public to semi-public to private	0	82%
		Absence of long dim lit corridors	1	
		Provision of a variety of group rooms	1	
		Use of color within the shelter	1	
		Provision of attached bathrooms/toilet	1	
		Presence of locking system for each of the bedrooms	0	
		Flexibility with furniture; control over positions of bed	1	
		Permission to get personal items like furniture or photographs, artwork	1	
		Provision of locked storage for personal belongings	1	
		Provision of windows/blinds to allow/control natural light, ventilation and view	1	
		Provision of sufficient/adjustable night-lighting	1	

		DESIGN EVALUATION – INTERIORS		
THEME 3	Sense of community & comfort	Use of local materials	1	100%
		Variety of spaces that allow different indoor activity	1	
		Personalized bedroom/ward designs	1	
		Flexibility in arrangements/ and design	1	

General Information

Name of the center: The BALM

Location and Physical Address: No. 45, Sannadhi St, Thiruvidanthai Panchayat, Kanchipuram - 603112

Area/Total number of floors: 2 floors

Total number of patients: 30

Table 5.3: Exterior Design Qualities for Content Analysis - BALM

Design Evaluation – Exterior:

		DESIGN EVALUATION – EXTERIORS		
THEME 1	Safety and Security	Access to nearby transportation ports/ and major landmarks	1	
		Proximity to schools/colleges or any other educational facilities	1	
		Proximity to hospitals/ or any other major hospitals	1	
		Availability of ramps	0	
		Daylight in wards, and rooms, and well-lit corridors/outdoors	1	
		Security at the entry/exit to the facility, and the building (Locks/Guards/etc)	1	
		Presence of barbs/fences/ or moats to mark boundary	0	
		Easy access to alarms in case of crisis	0	
		Presence of shades/pergolas in the outdoors	1	
		Visibility to the outside and Vice Versa	1	72.7%
		Use of plants or trees to visual and aesthetic soothing	1	

		DESIGN EVALUATION – EXTERIORS		
THEME 2	Sense of freedom/ control/privacy	Spaces that offer privacy and meditation	0	
		Interactive spaces/or socializing spaces	1	
		Any Green screens at the boundary	1	
		Healing Gardens/Greenery/landscaping	1	
		Pathways around the facility	1	
		Spaces for all ages and activity	1	83.4%

THEME 3	Sense of community and comfort	DESIGN EVALUATION – EXTERIORS		
		Use of local materials	1	
		Community oriented activities	1	
		Accommodating spaces that allow community engagement	1	
		Home like outdoor design	1	
		Flexibility in outdoor arrangements/ and design	1	100%

Table 5.4: Interior Design Qualities for Content Analysis - BALM

Design Evaluation – Indoor spaces

THEME 1	Safety and Security	DESIGN EVALUATION – INTERIORS		
		Presence of ramps or lifts to access upper levels	1	
		Surveillance cameras with the control unit placed at strategic positions	0	
		Separation of public and private spaces	1	
		Separation of treatment and living spaces	0	
		Presence of artwork/painting or sculptures	1	
		Presence of ligature resistant furniture	0	
		Ideal ceiling heights	1	
		Provisions of wards, family rooms and private bedrooms	1	
		Provisions of individual storage lockers in wards	1	66.7%

THEME 2		DESIGN EVALUATION – INTERIORS		
	Sense of freedom/ control/privacy	Clear segregation of spaces ranging from public to semi-public to private	1	72.7%
		Absence of long dim lit corridors	1	
		Provision of a variety of group rooms	1	
		Use of color within the shelter	0	
		Provision of attached bathrooms/toilet	0	
		Presence of locking system for each of the bedrooms	0	
		Flexibility with furniture; control over positions of bed	1	
		Permission to get personal items like furniture or photographs, artwork	1	
		Provision of locked storage for personal belongings	1	
		Provision of windows/blinds to allow/control natural light, ventilation and view	1	
		Provision of sufficient/adjustable night-lighting	1	

THEME 3		DESIGN EVALUATION – INTERIORS		
	Sense of community & comfort	Use of local materials	1	100%
		Variety of spaces that allow different indoor activity	1	
		Personalized bedroom/ward designs	1	
		Flexibility in arrangements/ and design	1	

5.2.3. Assumptions and Limitations to the Case Study

It is assumed that the answers given to the freelancers, and students were sincere, precise and honest. It is also assumed that the answers were recorded into the archives without elimination or modifications. The study only tackled the architectural aspects of the

facility and did not target the policies, functioning, care modules and funding of the shelters.

The activity maps of the shelters are not to be perceived as accurate as they were graphed with the data from the archives and the general impressions of the professionals.

The research did not apply for an IRB application as the time of the study was met with a global pandemic (COVID-19) and international travel was not recommended.

The graphical representation of the activity prevalence among the residents may be irregular, and some observational inaccuracies were bound to occur seeing as the researcher did not personally conduct this study individually but only depended on the data already available.

5.3. Results of the Case Studies

5.3.1. Site 1 – The Banyan

5.3.1.1. Spatial Morphology and Depth Analysis

The Banyan is a five-floor facility (figure 5.9 – 5.12), designed to house women running away from social and emotional issues. The building looks like a home from the outside and is one of the most prominent of such shelters in the whole city. The facility is in the quiet inside of a busy metropolitan national highway. Since the road is shut off on one side (external factor), the end of the street is used for visitor parking, along with street parking on the quiet street, to avoid a crowd inside the facility. For this spatial analysis, each floor has a point of focus, from which each area of interest is measured for proximity, privacy, and connectivity. This analysis is done in the form of a chart. The spaces are categorized as:

Outdoors – The spaces in direct contact with the porch, and the entry gate, and are an open space with no boundary.

Communal – Or Public spaces that house a specific number of residents together with an activity other than resting/sleeping being the purpose of the room and are measured in reference to the location of the staircase and elevator.

Intimate Spaces – The spaces that are private or are designed for one specific activity: sleeping, or resting, the adjoining lavatories, and their laundry cabinets.

Public Spaces: Office areas, administrative support spaces, or staff lounges that aren't spaces designed for the residents.

So, based on the above categorizations, the shallowest to deepest spaces can be arranged as:

Outdoors >>> Communal >>> Intimate >>> Public >>> Intimate

Figure 5.9: Ground Floor, Site I: Banyan (Architectural Management Services, 2017)

Ground Floor: The floorplan of the facility has a corridor that leads to the facility's core from the wide porch, with the administrative spaces located for ease of access to the public. The exteriors have a salon, a café, a small provisional store, and a textile room all of which have their own residents working in it, with supervision. The interior of the ground floor has an open room with looms that the residents use to weave, every day.

First Floor: The first floor followed by the above floors has the vertical shafts as the root point from which all the spaces were measured. The first floor has the facility's office areas on the left of the staircase and is not privy to the residents from 9-5 on weekdays. The spaces resemble a typical corporate bullpen, with about 6 cubicles. Around the bullpen, we have the founder's office, HR spaces, or PR spaces. Towards the end of the wing, they have an auditorium that they use in times of group video viewing. The dining space to the right of the stairs can be a major node for activities, as the kitchen has some residents helping the contractors with the food preparations. The back of the kitchen connects to the back of the facility on the ground floor.

Figure 5.10: First Floor, Site I: Banyan (Architectural Management Services, 2017)

Figure 5.11: Second Floor, Site I: Banyan (Architectural Management Services, 2017)

Figure 5.12: Third Floor, Site I: Banyan (Architectural Management Services, 2017)

Second Floor/Third Floor: The second and third floors of the facility accommodate the major four wards, one of which is donated for the geriatric residents. Both the floors have a sewing room, handicrafts area and a storage unit to store them in, before every exhibition.

Terrace Floor: The terrace floor is a fully open area fenced with grills that views into a roof garden, and the entire city. The walls of the terrace have exposed brickwork, which is used as a creative canvas for the residents who paint on it. Sometimes, the faculty uses it to have some lunch. This area is also a major point of activity through about 7 months in a year, except during summer.

Spatial Hierarchy Analysis

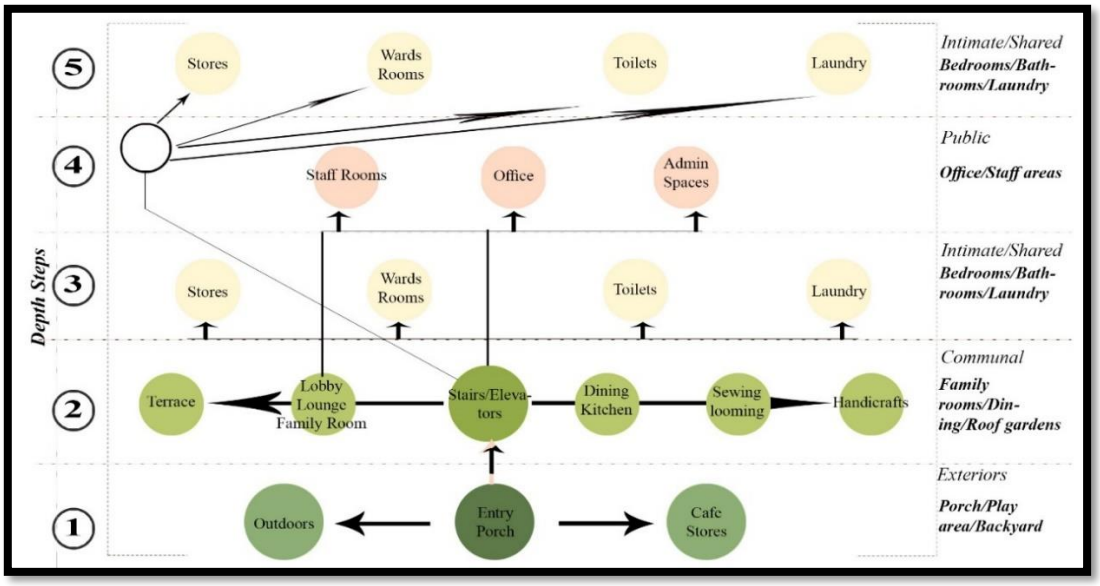


Figure 5.13: Spatial Hierarchical Analysis, Site I: Banyan

5.3.1.2. Activity Mapping

An inter-disciplinary approach by the Architects and a group of freelance designers (formerly architecture students) was established in mid-2017 (as a part of their case study), to understand the spaces in which residents like to spend their leisure time. The manner of the study was by choosing different ranges of time with 60-90 minutes of intervals, starting at 8am and ending at 20:30, when the residents hit the pillow. The staff would go home starting at 18:00, and return around 8:00 the next day, leaving the nurses for the night. The residents are never left without the supervision of at least one senior nurse (floor rotation basis). With the data provided to the researcher, the table below was made tentatively to estimate the percentage of activities in different spaces in different times.

Time	Outdoors %	Reception %	Handicrafts %	Wards %	Dining %	Terrace %	Misc %
8-9:00	13.64	0.00	13.64	36.36	27.27	0.00	9.09
9-10:00	16.36	4.55	9.09	31.82	18.18	0.00	20.00
10-11:00	13.64	0.00	31.82	27.27	6.36	4.55	16.36
11-12:30	13.64	4.55	25.45	24.55	13.64	3.64	14.55
12:30-14:00	4.55	9.09	13.64	27.27	40.91	0.00	4.55
14-16:00	22.73	13.6	13.64	27.27	4.55	0.00	18.18
16-17:30	22.73	9.09	31.82	9.09	0.00	9.09	18.18
17:30-18:30	39.09	10.91	13.64	18.18	0.00	4.55	13.64
18:30-20:00	9.09	0.00	9.09	31.82	45.45	0.00	4.55
20– 20:30	0	4.55	0.00	77.27	4.55	0.00	13.64

Table 5.5: Time and Space based User Activity - The Banyan

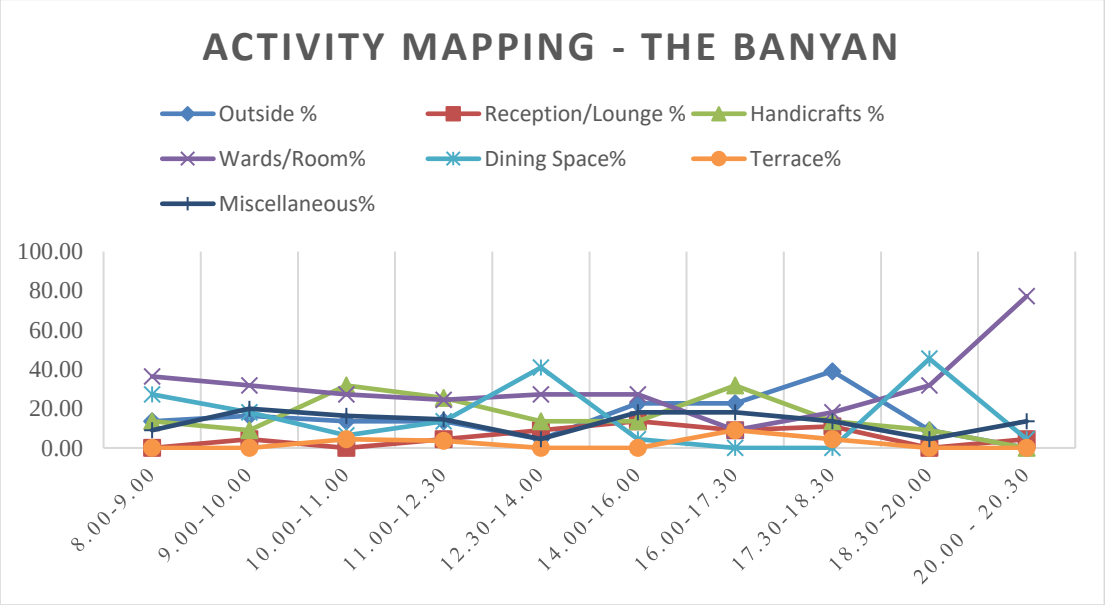


Table 5.6: Spatial Preference and Activity Mapping by users at Site 1

5.3.1.3. Responses to Surveys and Interviews

The study was conducted with a sample of 25 women (n=25) with five residents within the age group of 21 – 30, ten residents between 30-50 and ten patients above 50 years of age. Table 5.5 was derived with the sample of 25. Most women had been staying there for more than 10 years and still do, but there were three who were brought in a month ago, and around eight had been staying for 2-3 months. Most residents preferred either the outdoors or staying inside their wards. The residents that liked to sew or tailor said that they would prefer a wider area maybe even outside where they spend their free time in. The terrace seemed to be a space of activity. The openness of the space provided the aesthetics, and the freedom we're trying to achieve, but at the same time seemed to the least favorable place during summers. The initial floorplan of the facility had a garden on its perimeter, but since the facility had some insect issues in the past, the garden areas

were removed to avoid such problems, but the residents did not seem to like the garden – less backyard. The idea of a closed garden seemed to be a popular idea among the residents, who seemed to have projected their own ideas onto the shelter.

5.3.1.4. Conclusions

The shelter was designed to protect dignity and foster independence, while enriching all the facets of healthcare architecture too. There were aspects that could improve like the missing healing gardens, and the restricted access to an open, and aesthetically beautiful terrace. The material choice for the exterior was of high-quality vernacular, but the interiors resembled a typical modern-day institution. The furniture choices were also basic, and were functional rather than comfortable, though the residents made good use of them. Overall, the design of the shelter was satisfactory in terms of all the themes listed on this study's content analysis based on the Built Environment Assessment Toolkit.

5.3.2. Site 2 – The BALM

5.3.2.1. Spatial Morphology and Depth Analysis

The BALM is a 2-floor facility (figure 5.14-5.15) that houses women suffering from various kinds of mental health problems and/or social shunning. The facility also donates some of its spaces for educational lecture halls that have students majoring in social studies that have classes in the center twice or thrice every week. The students engage with the residents as a part of their program to aid distressed women. The facility is hidden inside a node of bungalows, and away from the coastline (a 2 min drive to ECR,

Chennai). The center is oriented to receive the sea breeze and with the whole building being an open layout, the breeze gets circulated graciously.

The spatial analysis has one nodal point: The Banyan Tree Podium in the middle of the Garden on the ground floor. Since the facility is both educational and residential in nature, the analysis will discuss proximity levels and privacy issues between the two functions of the shelter, and connectivity. The spaces are categorized as:

Outdoors: The Garden, The Pathway, The Gazebo, and the open hallway in front of the rooms. Since this qualifies for more than half of the shelter, parts of these spaces will also be categorized as:

Communal - Or Public spaces that house a specific number of residents together with an activity other than resting/sleeping being the purpose of the room.

Intimate Spaces – The spaces that are private or are designed for one specific activity: sleeping, or resting, the adjoining lavatories, and their laundry cabinets.

Public Spaces: Office areas, administrative support spaces, or staff lounges that aren't spaces designed for the residents.

So, based on the above categorizations, the shallowest to deepest spaces can be arranged as: Outdoors >>> Communal >>> Intimate >>> Public >>> Intimate

Figure 5.14: Ground Floor, Site 2: The BALM (Architectural Management Services, 2017)

Ground Floor: The entrance to the center leads us down to the ground floor, which is technically below the road level. We step into a lobby/reception, that divides into two wings on its either side. These wings are armed with shared bedrooms each with 5 beds

and one nurse bed. The left wing is armed with administration units and a couple of small lecture halls. The ground floor has an auditorium that is typically used for student presentations, but also for residents every week during movie times. Behind the auditorium is the handicrafts room, that has handmade baskets, bags, purses, and sarees. The center has 3 sets of stairs that are strategically placed around the garden to avoid unnecessary long routes.

Figure 5.15: First Floor, The BALM (Architectural Management Services, 2017)

First Floor: The first floor is typical, with one housing wing, the other wing with a library, a computer room, and lecture halls. At the end of the corridor is an open to the Garden Dining space that has direct access to its kitchen and utilities on the ground floor. One of the major issues with this design module was the fact that it didn't allow for attached Bathrooms, and residents had to come out of the room to use one of them.

Spatial Hierarchy Analysis

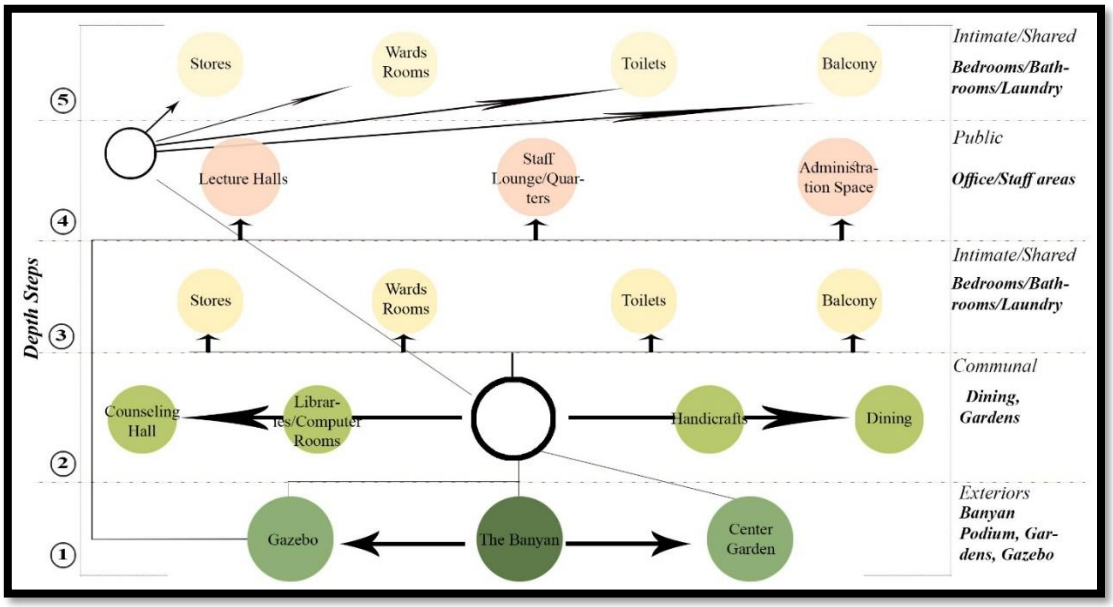


Figure 5.16: Spatial Hierarchical Analysis, Site 2: BALM

5.3.2.2. Activity Mapping

Following similar module used for case I, the researcher decided to categorize a typical day in the shelter into 6-time ranges. The original data had 9-time ranges, which was developed further. The reason for this cumulation was that the eliminated time ranges had data that was negligible and had no random variations. The basis for doing so was

majorly was dependent on the open grounds of the shelter and was easy to understand the activity nodes in the center. To accommodate most activities, the time zones were chosen with 60-90 minutes of intervals, starting at 8 in the morning and ending at 20:30, when the residents hit the pillow. The staff were all permanent who had their own bedrooms where they lived. Every 2-3 months they would go visit their homes. They had administration staff that would spend every day from 8 – 6pm to help the permanent staff here. In addition to this, the doctors were only a phone call away at the hospital on the same road. After analysis of observing activities referenced on a time-spatial orbit, the table below was made that would close on the pivotal goal of the study.

Time	**Garden%**	**Handicrafts%**	**Wards/Room%**	**Dining Space%**
8:00-9:00	10	6.66	33.33	50
9:00-11:00	26.66	40	33.33	0
11:00-12:30	40	33.33	26.66	0
12:30-14:00	0	33.33	16.66	50
14:00-16:00	50	16.66	33.33	0
16:00-17:30	66.66	16.67	16.66	0
17:30-18:30	43.33	16.66	40	0
18:30-20:00	33.33	0	33.33	33.33
20:00 – 20:30	0	0	100	0

Table 5.7: Spatial Preference and Activity Mapping by users at Site 2: The BALM

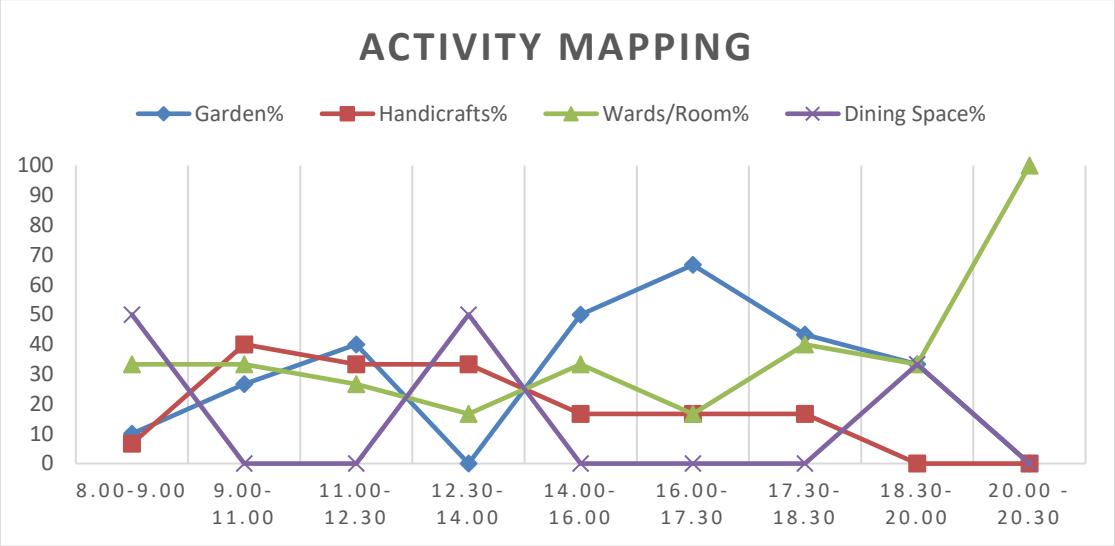


Table 5.8: Spatial Preference and Activity Mapping by users at Site 2

5.3.2.3. Responses to Surveys and Interviews

The collaboration of the same team of Architects and Freelancers that were mentioned in Site 1 (Refer to Section 5.3.1.3) conducted a similar study on the BALM but this time with the help of students at the shelter. The shelter housed 30 women (35 women in 2019) at the time of the study, whose length of stays differed from a few months to 4 – 5 years. The survey was conducted with 20 (n=20) women with seven residents within the age group of 21 – 30, eleven between 30-50 and the last couple between 50 - 55 years of age. Out of these participants**,** 4 had just moved in a few months back, 7 of them have been living for a year (10 – 15 months), and the rest for more than 2 years. The calculations for age and length of stays were available in the study report, and was completely anonymous. 100% of the respondents seemed to spend most of their daily life outdoors. On a really hot day, some of the residents spend their time in the activities

room, or the lounge, and a very few remain indoors in the ward. They liked their dining area because it was on the first floor and was held together will pillars rather than walls, thus boosting the sense of openness.

5.3.2.4. Conclusions

The planning of the shelter was so strategically executed with a simple concept of placing the wards or any room along the periphery and donating the core of the layout to a vast healing garden. The shelter enriched a strong desire to promote confidence, protect dignity and foster independence, thus satisfying the three branches of healthy design. The material choice for the exterior was of high-quality vernacular, but parts of the interiors could use improvement at establishing same concepts. The furniture choices were also basic, and were functional rather than comfortable, though the residents made good use of them. Overall, the design of the shelter was satisfactory in terms of all the themes listed on this study's content analysis based on the Built Environment Assessment Toolkit.

5.4. Comparative Case Study

In this section, a summary of the case studies is presented side by side in different aspects to analyze the different elements that influence the design efficiency. Both facilities are analyzed morphologically, and in respect to the themes used in the content analysis. An average percentage of theme satisfaction is calculated for both the sites. Unlike calculating the average of two numbers, the method for calculating average percentage does not yield an accurate result if we add the numbers and divide it by 2.

The decimal percentages are multiplied by the sample, then divided by the total sample sizes. The arriving number is multiplied by 100 to get an average percent.

The comparison also includes the missing concepts used in the literature that the facilities could have added.

5.4.1. Morphological Comparison

CRITERIA	Site 1	Site 2
Overall Shape	Linear	Clustered
Area Details	Site: 15,500 Sq.ft; Built up: 18,600 Sq. Ft	Site: 30,000 Sq. Ft; Built up: 39,500 Sq. Ft
Type of Rooms	Shared	Shared
Circulation Type	Central Landing	Inside – Out Corridors
Problem Areas	Lobby, Counseling rooms	Toilets for Bedroom, Activity Lounge

Table 5.9: Morphological Comparison of Case Studies

5.4.2. Design Objectives based on Content Analysis

Table 5.10: Design Objectives based on Content Analysis of Case Studies

	SITE 1	SITE 2
T H E M E 1	+Access to nearby transportation ports/ and major landmarks. + Proximity to hospitals/ or any other major hospitals +Availability of ramps +Daylight in wards, and rooms, and well-lit corridors/outdoors +Security at the entry/exit to the facility, and the building (Locks/Guards/etc.,) +Presence of shades/pergolas in the outdoors +Visibility to the outside and Vice Versa + Presence of ramps or lifts to access upper levels + Separation of treatment and living spaces + Presence of artwork/painting or sculptures	+Access to nearby transportation ports/ and major landmarks +Proximity to schools/colleges or any other educational facilities +Proximity to hospitals/ or any other major hospitals +Daylight in wards, and rooms, and well-lit corridors/outdoors +Security at the entry/exit to the facility, and the building (Locks/Guards/etc) +Presence of shades/pergolas in the outdoors +Visibility to the outside and Vice Versa +Use of plants or trees to visual and aesthetic soothing. +Presence of ramps or lifts to access upper levels

Table 5.10 Design Objectives based on Content Analysis - Continued

	SITE 1	**SITE 2**
THEME 1 CONTINUED	+ Provisions of wards, family rooms and private bedrooms + Provisions of individual storage locker in wards. (-) Presence of barbs/fences/ or moats to mark boundary. (-) Easy access to alarms in case of crisis (-) Use of plants or trees to visual and aesthetic soothing (-) Surveillance cameras with the contro unit placed at strategic positions (-) Separation of public and private spaces (-) Presence of ligature resistant furniture (+) Ideal ceiling heights	+Separation of public and private spaces +Presence of artwork/painting or Sculptures +Ideal ceiling heights +Provisions of wards, family rooms and private bedrooms +Provisions of individual storage lockers in wards (-) Surveillance cameras with the control unit placed at strategic positions (-) Separation of treatment and living spaces (-) Presence of ligature resistant furniture (-) Availability of ramps (-) Presence of barbs/fences/ or moats to mark boundary (-) Easy access to alarms in case of crisis
(%)	69.5%	69%

Table 5.10 Design Objectives based on Content Analysis - Continued

	SITE 1	SITE 2
THEME 2	+Spaces that offer privacy and meditation +Interactive spaces/or socializing spaces +Pathways around the facility +Spaces for all ages and activity +Absence of long dim lit corridors +Provision of a variety of group rooms +Use of color within the shelter +Provision of attached bathrooms/toilet +Flexibility with furniture; control over positions of bed +Permission to get personal items like furniture or photographs, artwork +Provision of locked storage for personal belongings	+ Interactive spaces/or socializing spaces + Any Green screens at the boundary + Healing Gardens/Greenery/landscaping + Pathways around the facility + Spaces for all ages and activity + Clear segregation of spaces ranging from public to semi-public to private +Absence of long dim lit corridors + Provision of a variety of group rooms + Flexibility with furniture; control over positions of bed + Permission to get personal items like furniture or photographs, artwork + Provision of locked storage for personal belongings

Table 5.10 Design Objectives based on Content Analysis - Continued

	SITE 1	**SITE 2**
THEME 2 CONTENT D	+Provision of windows/blinds to allow/control natural light, ventilation and view +Provision of sufficient/adjustable night-lighting (-) Any Green screens at the boundary (-) Healing Gardens/Greenery/landscaping (-) Clear segregation of spaces ranging from public to semi-public to private (-) Presence of locking system for each of the bedrooms	+ Provision of windows/blinds to allow/control natural light, ventilation and view + Provision of sufficient/adjustable night-lighting (-) Use of color within the shelter (-) Provision of attached bathrooms/toilet (-) Presence of locking system for each of the bedrooms (-) Spaces that offer privacy and meditation
(%)	74%	77.5%

Table 5.10 Design Objectives based on Content Analysis - Continued

	SITE 1	SITE 2
THEME 3	+ Use of local materials + Community oriented activities + Accommodating spaces that allow community engagement + Home like outdoor design + Flexibility in outdoor arrangements/ and design	+ Use of local materials + Community oriented activities + Accommodating spaces that allow community engagement + Home like outdoor design + Flexibility in outdoor arrangements/ and design
(%)	**100%**	**100%**

5.4.3. Comparisons of Resident Perceptions Based on Surveys

Table 5.11: Design Objectives based on Resident Perceptions

Survey Response based on Themes	**Site 1**	**Site 2**
What % of the respondents feel safe?	58.5%	78.8%
Where do they feel safe?	Wards, and Activity Rooms	Gardens, Bedrooms
What features make them feel safe?	Walls, Backyard, Security.	Refuge from outdoors, Gazebo, Staff

Table 5.11: Design Objectives based on Resident Perceptions - Continued

Survey Response based on Themes	**Site 1**	**Site 2**
Where do they feel unsafe?	Lobby, Treatment Areas	Classrooms, Backyard, Porch
Room preference (%)	Wards (preferred lesser roommates)	Wards (Wanted no more than 3 in their proximity)
What % of respondents feel in control of the environment?	63.8%	72.7%
What % of the respondents feel comfortable?	58%	49.5%
What spaces make them comfortable?	Gardens, Wards, Terrace, Activity Spaces	Healing Gardens, Dining Spaces, and Gazebo

Both sites are perceived by their residents as a safe capsule to an extent. But the residents at Site 2: The BALM adapt an entry at an upper level gradually descending towards an open layout at the lower level, with enough seclusion from the main road, and prying eyes emanates more safety for the women inside. Both the sites feel the safest when in their wards/bedrooms, for the residents consider this as their personal shell. Most of the residents at both sites preferred wards with roommates rather than private rooms owing to the nature of their stay. They felt safer around others who had been in

similar circumstances as them. The depth analysis that was conducted in chapter 5 also correlated with the theory that the wards were at the most private and deeper nodes of the planning. It is evident from the table that the residents did not feel at ease in lobby areas and preferred to use the walkways around the buildings.

The idea of Control was perceived by maximum residents as the freedom to modify and alter their space/territory as desired, but some also felt uncomfortable at the fixed furniture, and expressed ideas of couches, and easy-rest chairs that would suit better to their needs. They were happy with their locker and laundry space that was next to their respective beds. Another aspect of control was the temperature inside. Due to the open nature of wards, the shelter did not utilize air conditioning, but used personal fans for their residents. Some expressed that having a thermostat and an AC unit would be appreciated when fans did not help the heat.

However, in matters of comfort, the surveys' results show a lower rate than expected. Some reasons for this was the treatment that felt a little forced by some of the residents. But at site 2, the sense of comfort is even lower owing to the absence of a closure immediately around the residents because of the spacious layout.

Some of the major factors that was noted at the end of the comparative case study was that all the themes that were studied tied up to the sense of space providing the residents with the utmost sense of being home that provided the sense of both physical and emotional safety, which was closely associated with freedom, independence, and being in control thereby making their stay comfortable.

One important aspect of design that both sites failed to achieve was to corroborate the outdoor architecture with justifiable indoor design and décor, however site 2 attempted to do so by using soothing colors. The next chapter will encompass all that the author has understood in the previous section of the thesis on how to redefine what we know of the design parameters for shelters for Post-Traumatic Stress Disorder based on the design parameters for DV, Veterans, and other mental ailments.

6. CONCLUSIONS: REDEFINING THE DESIGN FRAMEWORK

After the course of the study, the last two chapters look at redefining the framework for design for mental health based on the findings from the literature review, precedents analysis, and case studies. The total understanding of design parameters, the characteristics of spatial alignment and impact of each architectural element that goes into creating such a therapeutic environment, will have an adverse effect on the quality of life the residents would be experiencing.

In chapter 3, section 3.9, a set of tools were overviewed, and were further narrowed down into specific goals they were meant to help achieve. At the end of investigating how these elements weaved into the environmental matrix, it is time to re-evaluate, re-assess and re-define them to fit the design of PTSD shelter for war victims.

Based on the common symptoms experienced by different communities of trauma-affected population (table 3.2), and common design qualities that all contribute to soothing specific expressions of the ailment, with the help from resident surveys, spatial and depth maps from the case studies, each of the goals are once again explained in reference to the target population of the study. The summation of the study will be illustrated with a table explaining the micro-level zoning and proximity levels of each of the space in the shelter to achieve their maximum benefits through its planning. The themes for the content analysis are re-designed with the elements that are utmost necessary for the shelter, at the end of analyzing each category.

6.1. Safety and Security

Victims who are in need of the refuge, especially those who lose their family and place of residence as a result of the armed conflict are primarily looking for a place where they can feel safe. Due to the high risk of the armed conflict, civilians have lost their safety net, and with no healing space in their immediate vicinity are forced to live out the rest of their lives right in the middle of the battlefield. A very few of them with family outside of Kashmir are helped and moved to other neighboring states. Even with those who do, the probability of them being treated is minimum, given the stigma. The pressing issue with shelters in Kashmir is that there is none. Hospitals are in remote areas that are not accessible to every civilian, nor are the facilities sufficiently equipped to care for them. Most of the hospitals are more of small clinic setting in the rural fabric of the state. Secondly, they were renovated almost a decade ago, and are now dilapidated. Last but not the least, the rural areas of Kashmir are not evolved to understand design parameters and their influence on the users' state of mind. At the end of observation of the studies, and this thesis, certain aspects of the environment became prominently visible as being integral parts to healing a traumatized brain. Safety and Security were ranked as top priorities both in the literature review and in case studies. The reason behind this is that victims of armed conflict need to safe from actual and perceived risks of invaders (which can be the caregivers, or fellow residents in the context of this study), and from jarring elements present passively in the surrounding environment. The shelter design must have exterior and interior components that do not remind them of their trauma, alleviate the need of constant vigilance, and take the

healing process from there. The elements that were listed in the content analysis can once again be referred to categorize the elements used or overlooked in the shelters in the previous sections.

The table 6.1 has categorized elements as necessary for designing a facility from both outside and inside, in order of increasing importance for the nature of this study.

Table 6.1: A framework for Design Elements for Shelter for Women with PTSD for Safety and Security

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
1	Surveillance Cameras, Locks, Guards, Other Security Measures	Exteriors and Interiors	Safety for residents from the outside world, and fellow residents.
2	Marked Perimeter/Boundary/Moats, Barbs, etc.,	Exteriors	Feeling of a home like environment, a set property line to demarcate the "house" and "outside world".

Table 6.1: A framework for Design Elements for Shelter for Women with PTSD for Safety and Security – Continued

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
3	Prospect and Refuge (Visibility to Outside, and Privacy from the Outside).	Exteriors	Safety, Privacy and Comfort for residents, Sense of vigilance and transparency for newer users. Those spaces that can also be used as surveillance points for the care takers, to maintain an eye on the activities and a pleasant co-existence.
4	Elements of Biophilia (Trees, Greenery, Water Features for outside; Use of artworks, interior landmarks, or other visually appealing indoors) as aesthetic features, and wayfinding.	Exteriors and Interiors	Feeling/Sense of embodiment, mental sooth, Feelings of Relaxation and Calmness. Visual Aesthetics, Screens, Positive Distractions from the interior walls, or the medical-like facility.

Table 6.1: A framework for Design Elements for Shelter for Women with PTSD for Safety and Security – Continued

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
5	Sense of shaded and open areas (Pergolas, Seating Areas…etc.,). - Daylight and Well-Lit Corridors	Exteriors and Interiors	Areas of Well lit, but pleasant outdoor spaces, Promoting openness and spaces for interaction.
6	Separation of spaces based on Living, Treatment, Public and Private usage/needs.	Interiors	Sense of ease, specific areas based on function, to maintain dignity, confidentiality and a substantial quality of lives.
7	Provisions of personal storage for each bed.	Interiors	Safety of residents' assets, and personal items.

Table 6.1: A framework for Design Elements for Shelter for Women with PTSD for Safety and Security – Continued

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
8	Availability of Ramps/Elevators	Exteriors and Interiors	Ease for all users of all age, especially disabled.
9	Meditation, Family and Support Rooms, Options of Private and Shared Ward spaces - Placement of rooms to monitor indoor activity without invading privacy.	Interiors	Confidentiality for family/friends, residents, and space to pause, and reflect.
10	Ligature Resistance	Interiors	Physical Safety of residents with fresh trauma.

Design of the shelter should not be just to promote physical safety, and shelter security, but also to instigate psychological and emotional wellbeing that increases in a safe environment. Some of the design aspects may even provide multiple goals in improving quality of lives for the users.

6.2. Sense of Freedom and Independence

A sense of freedom and independence encompasses the sense of control and flexibility all of which become important in fostering the victims' quality of lives. Both the shelters that were studied and the precedence that was analyzed were attractive as a refuge spaces for a vulnerable population because of their modules of care and treatment. The spaces allowed for more flexibility to the residents than a typical institution. The residents could go about learning to conduct their lives in a more unhindered manner, with the treatment being just a part of their daily lives. The shelter design must accommodate for the wishes and wills of the users, with spaces that are so designed that their placement offers privacy or attracts social interaction. The shelters that were studied focuses on social interaction even in wards, and based on the responses from interviews and surveys, residents also preferred to live with fellow mates rather than alone for fear of numerous factors. Based on its function, the planning should allow for a gradual increase in depth at its core, following the depth analysis that was done in Chapter 5. Providing the most able spaces relates to not just healing a trauma, but also with accentuating stress reduction, social reintegration, and closure. Neither one of the case studies, nor the precedence puts a huge emphasis on meditation, reflection, or activity spaces but both the sites in the case study does offer indoor options for handicrafts and sewing. Therapeutic spaces also include garden spaces which the BALM, and the community camp in Burundi offers, but the other two do not, though they do have a little space allotted for elements of nature.

Freedom and independence do not strictly mean just that but with freedom and independence comes a sense of control, comfort that has proven to accelerate the rate of healing the trauma. Some important aspects of privacy are the rooms/wards in the shelter. From the case studies, we have concluded on design attributes that promotes health through freedom, flexibility, control and independence. Like the table on safety measures, the table below arranges design features important to achieve different aspects of the second theme.

Table 6.2: A framework for Design Elements for Shelter for Women with PTSD for Control, Comfort and Freedom

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
1	Segregation of Spaces: For privacy and meditation; Interaction and socializing; Public, Semi Public/Private to Private.	Interiors	Function based areas enabling control and comfort over usage of different spaces through the day, Variety of living spaces according to interaction level preference – Minimize reliving the trauma and aids recovery.

Table 6.2: A framework for Design Elements for Shelter for Women with PTSD for Control, Comfort and Freedom – Continued

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
2	Provision of windows/blinds to allow/control natural light, ventilation and view; Absence of long dim lit corridors; Provision of sufficient/ adjustable night-lighting.	Exteriors and Interiors	Providing and promoting independence, comfort and control.
3	Any Green screens at the boundary; Healing Gardens/Greenery/landscaping	Exteriors	Promotes control over their immediate surrounding; freedom of movement due to an increased sense of awareness.
4	Use of color within the shelter	Exteriors and Interiors	Visual Aesthetics to promote improve moods and mental comfort with appropriate colors for different spaces.

Table 6.2: A framework for Design Elements for Shelter for Women with PTSD for Control, Comfort and Freedom – Continued

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
5	Flexibility with furniture; control over positions of bed; Permission to get personal items like furniture or photographs, artwork.	Interiors	Control over their living spaces; helps create a home inside the shelter; creates comfortable living ambience.
6	Pathways around the facility	Exteriors	Increases freedom and independence helping in mental relaxation.
7	Provision of attached bathrooms/toilet	Interiors	Sense of control to both the residents, and their family (if applicable).
8	Presence of locking system for each of the bedrooms	Interiors	Control and comfort over their private life, helps in faster recovery.

Table 6.2: A framework for Design Elements for Shelter for Women with PTSD for Control, Comfort and Freedom – Continued

	Design Quality/Element	**Placement/Level in Planning**	**Goals achieved by the Quality**
9	Provision of locked storage for personal belongings	Interiors	Offers Privacy, Comfort and Freedom
10	Access to Hubs, Hospitals, Schools, or Markets, etc.,	Site Planning	Regaining independence on a macro level; outside the parameters of the shelter.

6.3. An interactive community

"An institution mimicking society" is the term that was mentioned more than a few times during the literature review which was once again paraphrased by residents and staff members at the shelter during questioning. At both Banyan and the BALM, the residents were given wards rather than rooms, for fear for safety. But this is also due to the cultural design implications that is prevalent in healthcare design around major parts of India; of providing wards for patients more than individual rooms owing to serve those can't afford private rooms. But this idea of grouping them proved to have more

benefits than anticipated in this case. The provision of wards allowed for a dormitory – like environment promoting more conversation and socializing and gradually thicker friendships among residents. More importantly, an environment that emanates the sense of community accelerates healing than an institutional environment, while also promoting a dignified quality in lifestyle.

6.4. Creating a home-like environment

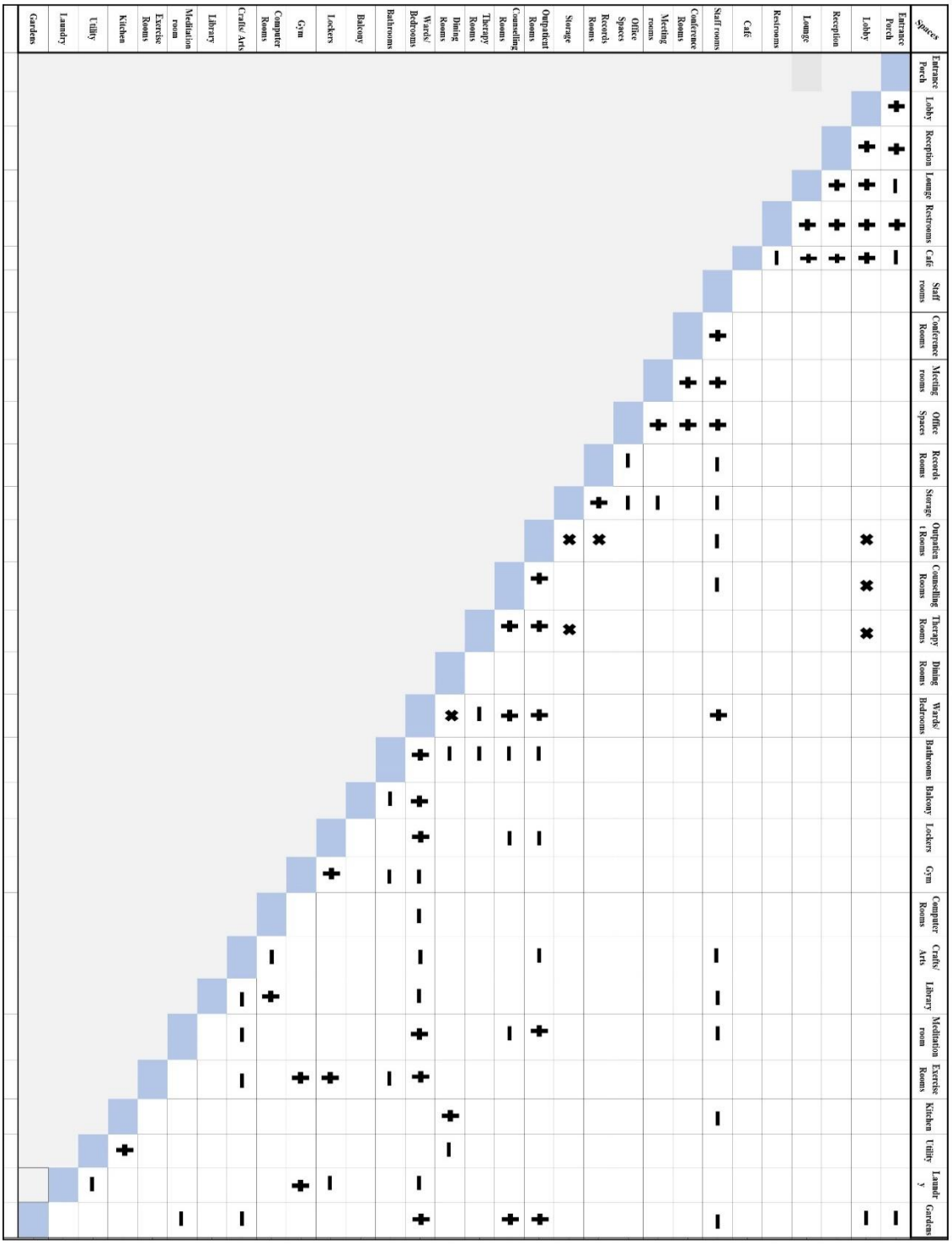
The last aspect of women's shelter is the summation of all the three parameters of design which all end in creating a homely environment that eliminates any alien association with the space in question for the women to feel at their strongest self. The shelter should be flexible for residents to decorate its exteriors and interiors, per their wishes so it looks personalized to each's taste. This involves providing movable furniture, locker spaces, foldable chairs or beds, personal fans and lights, and space around their beds. Through design, the life at a shelter can improve or decline for the residents. It is crucial for researchers and designers to understand spatial qualities, and the manners of interactions between it and the users of a space.

With every project comes the necessity to understand this very aspect, to decide the importance of every space, area, or room, and the planning to create a relationship among them, in a way so that the culmination of them forms more than just a building mass. The table below (6.3) is formed after an elaborate reflection of the hypothesis, the study, the author's analysis derived from thorough observation of all the spaces required. The results of the study were triangulated with the help of professional guidance created a framework for proximity of each space in the proposed facility, that is expressed

through the proximity matrix table below. The spaces were places in four categories based on the activities of the shelter. An additional category was added to place spaces that would qualify for multiple spatial functions.

Public Areas	**Administration Spaces**	**Treatment Spaces**	**Living Spaces**	**Indoor Activity Spaces**	**Miscellaneous**
Entrances/ Porch	Staff rooms	Outpatient Rooms	Dining Rooms	Gymnasium	Kitchen
Lobby	Conference Rooms	Counselling Rooms	Wards/Bed rooms	Computer Rooms	Utility
Reception	Meeting rooms	Therapy Rooms	Bathrooms	Crafts and Arts	Laundry
Lounge	Managers/ Officers/ Social workers' offices		Balcony	Library	Gardens
Restrooms	Records Rooms		Lockers	Meditation room	X
Cafeteria	Storage			Exercise Rooms	

Table 6.3: Spatial Requirements for Shelters



\+ Desired Proximity - Intermediate Proximity Sufficient **X** No Proximity Required

Figure 6.1: Proximity Matrix (S. Chandramouli, 2020)

This chapter summarizes an improved framework, based on the design goals required to develop and restore the health of the women who are taken into the shelter, thereby achieving a holistic approach to recovery of Post Traumatic Stress Disorder, and other ailments that accompanies it. The most important objectives of design attributes focus on instilling, and promoting an environment that are safe, secure, respects privacy while fostering independence, freedom, control, and flexibility. Aspects of the environment that brings these out in its users promises a healthier, interactive and therepeutic space that accelerates mental, physical, emotional and physiological facets of health.

7. SUMMARY AND DISCUSSIONS

Numerous research on Architectural tools in Human Psychology has made it quite evident that the design of any space can improve or deteriorate all the facets of health of the users of the space. This is not specific to just physical wellbeing, but also mental and emotional. Evidence based hospital design is revolutionalizing the fields of architecture, medicine, nursing and public health, but the concept can be redefined and re-formulated for any building typology, to accommodate similar goals, to aid healthy living. This study discusses the design of a shelter that is designed for those women who have been neglected largely by the people around them, as those in need of help. Based on the needs of the people, and the circumstances around them, a trauma shelter needs to provide them with the sense of familiarity, and serenity which would go hand in hand with the medical care being administered. While there have been many studies about shelters for the vulnerable population exposed to domestic violence, human trafficking, schizophrenia, dementia and war veterans, studies on civilian victims of war have been shockingly overlooked. The strong validity of referring to these studies is that there are many symptoms and causal reactions that are quite similar to those relating to PTSD among all of these ailments, meaning that some of the design attributes that were utilized in these studies could be revitalized, and reformulated for a shelter aiding with the recovery of PTSD. The conclusive design toolkit from the previous chapter is derived on the hope that such a design will move the field of psychological care and mental health leapyears forward through architecture.

The journey of this study starts from understanding the role of architecture in psychology, the need for employing architecture to alleviate distress and reduce mental illness in Kashmiri women, analyzing design guidelines for the economical, cultural and social barriers, using precedences to understand cultural architecture in other similar geographical locations. Two case studies were handpicked out of variety of building typologies, to conduct observational and ethnographical immersive studies in Chennai, India. With the help of surveys, interviews, informal conversations, and mapping of the sites, in addition to the elaborate literature review and precendence guided the study to culminate in a set of framework to create the most supportive environment that imitates the feeling of embodiment, and community for the residents.

During the scope of the study, there were glaring challenges that answered the question of this issue being unaddressed. The most important was the economic stigma among the civilians about mental trauma, followed by the unawareness about design as an inclusive tool for medicine and caretaking, and finally insufficient funds, lack of governmental support and bureacracy.

The interesting turn point is that the first two issues can be solved very easily by advertising shelters by avoiding usage of terms that instills fear in patients. “Health Care Centers” or “Rehabilitation”, “Mental hospitals”, or “Asylums” are words that convey negativity to anyone who hears it, thereby preventing them from wanting to visit the centers. The two sites in Chennai were called “The Banyan” to convey the idealogy behind the Banyan Tree that spreads its branches out protecting those under it. The façade of the building can also convey the influence of design on the “hospital”.

Concrete walls of multi-storeyed buildings appear dreary to viewers, and mimick an institution like façade. The center of Human Trafficking in Mumbai, and the refugee camp in Burundi had wide gates, and an open plan to invite people inside. The BALM in Chennai adopted the concept of inside-out planning for its perimeters, with double corridors facing the roadways, and the gardens inside.

Ultimately, this study is written to bring awareness to professionals, students and healthcare workers to create innovations in environments to aid the innovations in the medical fields. By choosing this topic, the author wishes to shed light on the victims of war, armed conflict, or any other disasters that has resulted in a community losing their perception on the purpose of lives, suffer through identity crises, homelessness, neglect, degraded self-worth and psychological torture. The author is hopeful in assuming that this study will elucidate in improving existing healh care centers, any shelter environments to better support the lives of those who would be experiencing these spaces.

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APPENDIX A

UNDERSTANDING ARTICLE 370 AND 35A

Original Text – From the Indian Constitution

370. Temporary provisions with respect to the State of Jammu and Kashmir.

(1) Notwithstanding anything contained in this Constitution, —
(a) the provisions of article 238 shall not apply now in relation to the state of Jammu and Kashmir,

(b) the power of Parliament to make laws for the said state shall be limited to—

(i) those matters in the Union List and the Concurrent List which, in consultation with the Government of the State, are declared by the President to correspond to matters specified in the Instrument of Accession governing the accession of the State to the Dominion of India as the matters with respect to which the Dominion Legislature may make laws for that State; and

(ii) such other matters in the said Lists as, with the concurrence of the Government of the State, the President may by order specify (Cottrell & Jill, 2013).

Explanation

Article 370 of the Indian constitution gave special status to Jammu and Kashmir, the northern most state in the country of India, the larger part of which has been the subject of a lot of conflict between India, China and Pakistan since 1947. The said Article of the Constitution gave Jammu and Kashmir the power to exercise independent autonomy over internal administration of the state, with their own state flag, and the power to have a separate constitution.

When combined with the supporting article 35A, the state of Jammu and Kashmir's residents live under a separate, independent set of laws, including those related to citizenship, ownership of property, and fundamental rights, as compared to residents of other Indian states. As a result, Indian citizens from other states could not purchase land or property in Jammu & Kashmir.

Prime Minister Narendra Modi scraped the article allowing the State to fall under the entire nation so the people from other parts of the country can now own properties or settle inside J&K. This also ultimately means that the state no longer operates under an internal administration as was the previous case, opening them up for the freedom to exercise their rights like in the other twenty-eight states of India.

APPENDIX B

PRISMA TOOL FOR LITERATURE REVIEW

The PRISMA statement or formally QUORUM (Quality of Reporting of Meta-Analyses). for Reporting Systematic Reviews and Meta-Analyses of Studies that Evaluate Health Care Interventions: Brief Explanation and Elaboration.

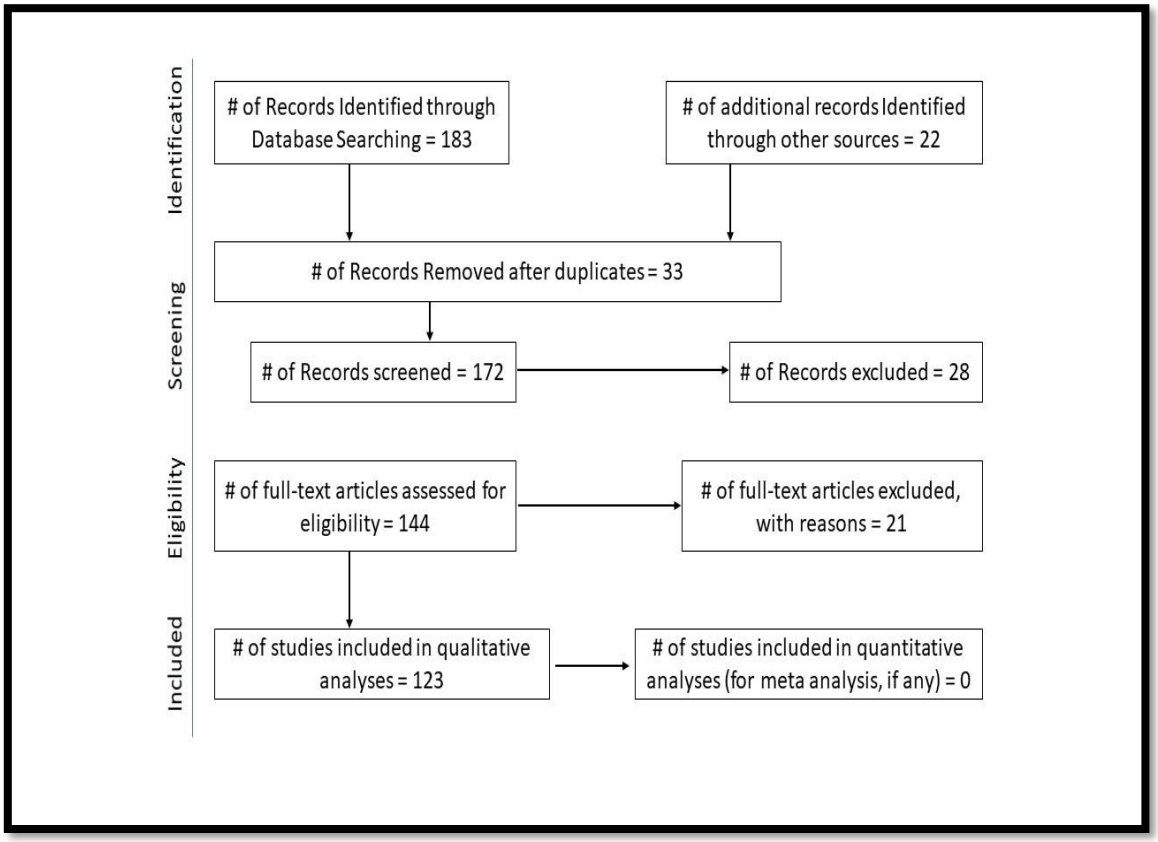
Reviewing a set of literature and analyzing has always an integral to any studies in the healthcare fields. This step is essential to summarize the evidence relating to efficacy and safety in any healthcare interventions. In contrary, poor or improper analyses of the literature leads to a weak foundation, demolishing the study's credibility, and degrading the value of the data to policy makers, healthcare professionals or any other party involved.

PRISMA or the PRISMA statement as its popularly called, consists of 27 items checklist, and a "four-phase" flowchart that narrows all the reviewed and rejected articles and data that was selected initially from the scholarly databases. More about the chosen databases and the number of articles chosen for study has been in Chapter 3 titled "Literature Review". The PRISMA statement allows for transparent data collection, with its detailed headings regarding each article's background and development. The Table is used for either or both Systematic Review and/or meta analyses. This study falls under the former of those, meaning that the review attempts to collaborate and collate all the published evidence that fits the initial hypothesis of the study and answers the research question with its pre-specified eligibility criteria (Moher, Liberati, Tetzlaff, & Altman, 2009). The Statement and the Flowchart focus on certain characteristics: Identification

Process based on selected set of objectives, an assessment to test the validity of the results of the studies, and finally synthesizing the results to direct them towards the context of this study.

Checklist to include when reporting a systematic review (with or without meta-analysis).

Section/Topic	#	Checklist Item	Reported on Page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	



PRISMA Flowchart for Literature Review