

# The Haven Hood: Redefining Portable Units for Communities in Need

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## Abstract

According to the United Nations High Commissioner for Refugees, over a 100 million people worldwide were forcibly displaced from their homes, facing life-threatening poverty, suffering from overcrowding, lack of proper food and water, lack of sanitary methods, mental health challenges such as depression, anxiety, and post-traumatic stress disorder. This study provides a solution suitable for the temporary crisis: a shelter with essential units including residential, educational, healthcare, and outdoor facilities; to increase refugees' self-reliance and improve their life conditions. The best architectural solution for refugees follows transitional shelter typology, which has movable, adaptable, transformable, and interactive features. A shipping container provides a unit that has the previous features in addition to sustainable approaches and flexibility; this makes it the best choice to serve the study goal and to achieve the three main elements of this study, shelter, flexibility, and sustainability, creating a prototype that can adapt different needs.

**Keywords:** Refugees; Temporary Displacement; Shelter; Portable Units; Shipping Containers.

## 1. Introduction

Refugee, a person who fled their own homeland fearing for their safety and life, and the risk of serious human rights violations and persecution, and have crossed an international border to find safety in another country. (UNHCR, n.d.) According to United Nations High Commissioner for Refugees, more than 100 million people worldwide were forcibly displaced from their homes, many of whom are living in camps are far from comfortably livable, facing life-threatening poverty, where they suffer from overcrowding, lack of proper food and water, lack of sanitary methods, mental health challenges such as depression, anxiety, and post-traumatic stress disorder. (UNHCR, n.d.)

"Refugees should be offered a safe place to live and opportunities to access work, education and health care" says Amnesty International Organization (n.d.). In Syrian crisis, 13 million people fled Syria, 6.6 of which are Syrian, the vast majority of them live in neighboring countries such as Turkey, Lebanon, Jordan, Iraq, and Egypt. (Amnesty International Organization, n.d.)

### 1.1 Problem Statement

According to UNHCR, the number of refugees worldwide over a year increased from 20.7 in 2020 to 21.3 million at the end of 2021, which is more than double the 10.5 million 10 years ago. (2022)

With the refugees' numbers increasing, their need for a shelter is a must, but there are many other facilities that they also need to help them restore dignity and self-reliance, improve their social positions, and create an enabling environment for resilience. As well as recovering from mental and psychological issues they suffered all these years.

### 1.2 Project Goal

This project aims to provide the following:

- 1.Shelter for those in need.
- 2.Health care for those with disabilities or injuries resulted by war.
- 3.Educational facilities for those who see no near return to their homeland.
- 4.Sanitation methods to prevent diseases from spreading.
- 5.Any other necessities based on the case and its needs.

These goals will be achieved within a neighborhood/city scope, based on cash-for-shelter programs for whom with capabilities, capacity building and developing skills for whom in need, so they can move on with their lives out of refugee camps.

### 1.3 Project Key Concepts

Everyone deserves to have a healthy, safe, and dignified life. As a result, providing proper shelter for people in need is the main target of this project that focuses on human at the first place, this will not just improve the refugees' life conditions but will also create opportunities that will help them end their suffer.

Furthermore, this project would pave the way for similar projects when dealing with natural disasters victims or illegal immigrants by providing the needed facilities for each case on its own.

This paper starts by showing a historical architectural background of the study, then states the literature review with explanation of the causes, needs, and possible architectural solutions, it then describes the architectural application of the study, finally, it sums up the key points in the conclusion.

## 2. Historical Background

The word 'refugee' is a French word that was first used when *protestant*<sup>1</sup> Huguenots fled the religious persecution by the French King Louis XIV in 1685.

Wars have followed that war, and many people were displaced. In 1914 World War I took place and caused at least 10 million humans to flee internally or across international frontiers.

Followed is World War II in 1939 which resulted huge number of refugees that reached 65 million humans, including those used as slaves labor, ex-prisoners of war, and million whose homes had been bombed to ground. Middle east countries have not been exempted from wars.

Over years *colonies*<sup>2</sup> were built in Arabian and Muslim countries, for instance: Algeria, Tunisia, Egypt, Sudan, Libya, Morocco, Syria, Lebanon, Iraq, and Transjordan. Then, the worst of them all, the occupation of Palestine by Israel in 1967 which resulted more than 7 million Palestinian refugees around the world. Then comes the Syrian crisis with the largest number of refugees in history.

### 2.1 Project Users

This research highlights the Syrian refugees suffer and needs, also any other human in need. According to *UNHCR*<sup>3</sup>, the basic needs of a refugee are, means to survive, access to essential services, dignity of choice, basic sustainable environment, and protective environment. (2018) Statistically, over 3.6 million Syrian refugees fled to Turkey, approx. 800,000 fled to Lebanon, approx. 600,000 fled to Jordan, approx. 300,000 fled to Iraq, and more thousands fled to other neighboring countries as illustrated in (fig.1).



Figure 1. 2022 Statistics of Syrian Refugees Distribution on Neighbouring Countries.

The life in a refugee camp is nowhere near a proper life due to following issues:

- 1.Children cry for food and the supplies hardly fill their small bellies.
- 2.Water is a serious issue, it is not enough, and the available water is not fully clean and pure.
- 3.Overcrowded tents resulting diseases spread and zero privacy.
- 4.Refugees never feel settled, and they are uncertain about their future or when they will go back home.

### 2.2 Type of Architecture

Wars affects human culture, and since architecture is a part and parcel of culture, it is also affected. According to ArchUp, "Architecture can be the first thing attacked and destroyed during wars, due to its new expression of cultures" (2022).

This paved the way for a new type of architecture called the 'colonization architecture', this type of architecture focuses on introducing powerful traits and components of the colonizer's culture to make owners of the land succumb.

Another type of architecture was born out of wars, the 'Post-War Architecture', it focuses on restoring what had been destroyed to its original state, designing large and well-balanced buildings without unnecessary embellishment, and relying on building from scratch.

This research concentrates on the post-war architecture. This type provides the architectural needs in a reasonable design, as a result it would have great aid when dealing with refugees' needs.

<sup>1</sup> Protestant: a member or follower of any of the Western Christian churches that are separate from the Roman Catholic Church.

<sup>2</sup> Colony: a country or area under the full or partial political control of another country, typically a distant one, and occupied by settlers from that country.

<sup>3</sup> UNHCR: United Nations High Commissioner for Refugees

### 2.3 Conclusion Statement

This research has a human value aiming to help the refugees in need, by providing the shelter and other necessary facilities.

Providing such facilities won't just improve refugees' living situation but will also help them to get over the post-war traumas and mental issues, as well as giving them the opportunities to be educated and trained to end their suffer.

### 3. Literature Review

This part of the study highlights the keywords of the research, gives a thematic analysis for each one, and clarifies the relation between research aspects. Furthermore, the causes and the effects of the problem, the tangible and intangible needs, and the architectural styles established for similar problems, were provided, with a proper solution that fulfils the needs of this problem in architectural methods at the end.

#### 3.1 Introduction

The main reason people got displaced from their homes is war. War is defined as a conflict between groups of people within a country or with different countries. During nowadays war, bombs and weapons are used, many houses get bombed to ground, people must flee their homeland seeking safety, many others die, leaving children and women behind. This cause family's dispersion, disabilities, mental issued, and *post-war*<sup>4</sup>*trauma*<sup>5</sup>.

According to the UNHCR, there are three main types of refugees, each of which has sub cases. First, people in need of an international protection; possible *asylum*<sup>6</sup> seekers, asylum seekers, and people with special protection status such as refugees, either complete or subsidiary forms of protection need, and temporary protection need form. Second, people with refugee background; this includes citizenship former refugees, children born from refugees' parents, and reunified refugees family members internationally. Third, people returning after seeking international protection, such as repatriating refugees, repatriating asylum seekers, and returning from international protection internationally.

This project focuses mainly on the first type, the refugees with need of protection.

#### 3.2 Tangible & Intangible Needs

After being displaced, refugees cling to anything that gives them strength to face life challenges. During that, the number of refugees increases day by day, and with more refugees come more needs.

##### 3.2.1 The need for shelter

Shelter is a requirement of each stage when people flee their homes, first when the crisis takes place, then when people get displaced, then when they recover and try to build a home and community somewhere else. It's a lifesaving and a life enabling.

The shelter is expected to provide secure, private, dignified, and healthy physical dwellings. These dwelling should be designed in a way that brings communities together to make them strong against any threats. It should also provide a stable location, where facilities are near, so they can restart livelihoods. Also, to provide a sense of identity, a place that gathers family, community, belongings, and neighbourhoods, to belong to a place, to heal and build the future.

##### 3.2.2 Facilities

In order to figure out the required facilities for refugees, it was necessary to refer to studies in the field. As observed by the global shelter cluster projects – a leader organization in supporting people affected by natural disasters, and refugees resulted by conflicts – facilities need to be accessed easily to have an efficient shelter, such as healthcare, education, *nutrition*<sup>7</sup>, safe and dignified water, and sanitation facilities.

##### 3.2.3 Opportunities

Several case studies by The Global Shelter Cluster shows that the good application of shelter and facilities is predicted to enhance the life conditions for refugees and increase their self-reliance. Some of these applications are:

- 1.Improving security in camps and shelters.
- 2.Providing protective awareness and education.
- 3.Empowering women in reconstruction efforts.

Furthermore, it is essential to integrate between shelter and nature by sustainable methods since these are the main elements of this project, that could be approached by the following applications:

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<sup>4</sup> Post-War: existing, happening or made in the period after a war, especially the Second World War.

<sup>5</sup> Trauma: a deeply distressing or disturbing experience.

<sup>6</sup> Asylum: the protection granted by a state to someone who has left their home country as a political refugee.

<sup>7</sup> Nutrition: the process by which living things receive the food necessary for them to grow and be healthy.

1. Using local material.
2. Adapting the natural climate.
3. Reducing the shelter's construction environmental impact.

### 3.3 Post-War Architecture

Architecture is the physical expression of society needs and thoughts, it shows the history, culture, and identity of any nation. Then war might come, destroying cities, leaving people without homes, where some might suffer from PTSD<sup>8</sup> and other mental issues, and forcing them to flee to other places to survive.

#### 3.3.1 Goal

During displacement, people care for nothing but their lives and essential needs. But after the survival period passes, an urgent opposite movement of what war has made is required to make up these losses and rebuilt the cities, and there comes the post-war architecture.

In Syrian crisis, the war has not ended, and no horizon of post-war era is to be seen as illustrated in (fig.2), displaced people need a proper place to live until the war ends, to let them settle, belong, and thrive, then go back to their homes.

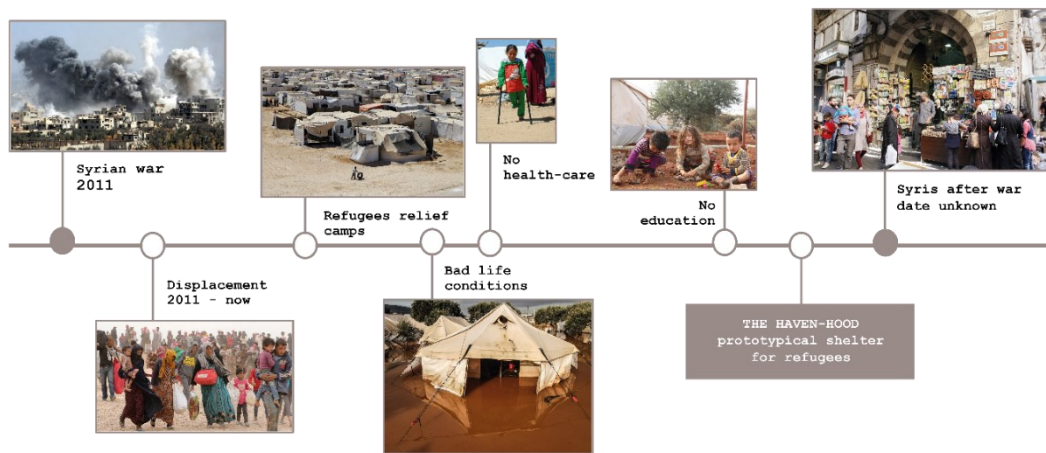


Figure 2. Syrian Crisis Time-line

#### 3.3.2 Characteristics

Post-war architecture was first founded after the second world war, its main characteristics were: Simplicity, clean lines, and focusing on function over form. This style aimed to long lasting design, with considerations of open plan design that ensures families can spend quality time together no matter what they are doing, and expansive windows to increase the quality of life in the space.

Post-war architecture has derived into *brutalist architecture*<sup>9</sup>, which was mainly built by using raw concrete.

### 3.4 Portable Architecture

#### 3.4.1 Housing Typology

According to (Mimi Ho Chu, 2012), in the post-disaster timeline three housing typology are located, the emergency tents in relief camps, transitional shelters, and permanent houses.

The emergency tents in relief camps are lightweight, transported immediately, distributed, and constructed. Despite that, they lack privacy, stability, and does not provide life conditions, such as electricity, heating, insulation, and ventilation.

The transitional shelters provide more durable shelter with a higher level of privacy and allows people to resume normal life during the construction of their permanent houses. In contrast, they cost double due to materials and labour being involved, as well as deconstructing the temporary structure and rebuilding a new house.

The permanent houses on the other hand are structurally durable, and provides better life conditions including electricity, heating, insulation, day lighting, and ventilation. But it takes longer time to be finished and lacks flexibility feature when dealing with lot size and critical site conditions.

To be able to choose the suitable housing typology for this study, the criteria in (table.1) must be considered:

<sup>8</sup> PTSD: a mental condition in which a person suffers severe anxiety and depression after a very frightening or shocking experience, such as an accident or a war.

Brutalist Architecture: an architectural style that emerged during the 1950s in the United Kingdom, among the reconstruction projects of the post-war era.

**Table 1.** Housing Typology Criteria

Criteria/Typology	Emergency Tents	Transitional Shelters	Permanent Houses
Use & Function	●	●	●
Materials & Technology	○	●	●
Climate & Environment	○	●	○
Flexibility	●	●	○
Cost & Maintenance	●	○	○

Criteria key: ● Good | ○ Poor

Considering the goal of this study, it is impractical to use permanent housing since the refugees flee temporary and they are in urgent need for shelter without any delays due to construction work, on the other hand, emergency tents in relief camps are what refugees already have. Therefore, transitional shelter appears to be a feasible solution but needs additional features to assure flexibility, adaptability, and sustainability. This will be discussed in detail in the coming part of the study.

### 3.4.2 Possible Housing Types

Providing housing for refugees is encompassed by challenges, such as lack of resources, lack of supplies, the urgent need, and the uncertainty of future. Consequently, it was essential to think of innovative solutions that provide the needs with least demand on materials and construction work, with sustainable approaches.

### 3.5 Shipping Containers

Container architecture is a type of architecture that is related to re-use of steel shipping containers as a structural element and/or an architectural envelope to host any human activity.

Cargotecture, is a term that defines the use of shipping containers to create building to perform full functions. The application of Cargotecture is featured by strong plating, inexpensiveness, and obtainability in wide range.

#### 3.5.1 Shipping Containers Pros

- 1.Shipping containers are designed to be in storage order, which gives the possibility to place them on top of each other in case of needing extra space.
- 2.Shipping containers are durable against pests and extreme temperatures, and their frame have long lifespan without needing expensive or specific maintenance.
- 3.Shipping containers always have the potential for extension, expansion, and addition, with easy movement, reassembling, and transportation between locations.

#### 3.5.2 Shipping Containers Cons

- 1.Despite easy transportation between locations, cranes are usually needed to place shipping containers in the site and move them.
- 2.Even though they are durable due to being made of steel, condense humidity might cause rust.

### 3.6 Flexible Architecture

“Nothing is permanent. Everything is in constant flux and change. Through day and night, through summer and winter, year after year, from birth to death, life flows in a timeless cycle-” Zuk & Clark quote, 1970 (as cited by Bharatkumar, 2013). And now we must add a new phrase, through peace and war, life flows in a timeless cycle.

War displaced millions of humans, some of them made it to their homes and rebuilt them, some other are still waiting for the unknown future.

According to (Bharatkumar, 2013), “Flexible architecture can be defined as the realm of architecture that allows for change periodically”.

This concept presents itself as the optimum architectural concept to be used for temporarily displaced refugees’ shelters. Flexible architecture has four main categories, the following part of the study gives a brief definition of each one.

#### 3.6.1 Adaptability

Adaptable structures provide repositionable partitions or can change per user. This can be applied as open floor plan, incremental extension, modularity, *pre-fabrication*<sup>10</sup>, and adaptive servicing.

<sup>10</sup> Pre-fabrication: the practice of making sections of something, especially a building, that can be put together later

### 3.6.2 Transformability

This category is related to the capability of adding or removing units or components. Transformable structure can open and close and change form or colour.

### 3.6.3 Movability

Movable structure is the one that can be relocated or repositioned, so that the building can be *dismantled*<sup>11</sup> and *reassembled*<sup>12</sup> in another site.

### 3.6.4 Interactiveness

Responsive buildings that have the ability to respond to climate, external and internal factors are considered as interactive buildings.

### 3.7 Conclusion Statement

Refugees in relief camps are living very bad life conditions, with no ability to reach clean and dignified water or nutrition, their camps are overcrowded and lack for sanitation and other necessary facilities.

The aim of this project is to provide a solution that suits the temporary crisis, a shelter with some other essential units, to increase refugees' self-reliance and improve their life conditions.

Post-war architecture was suggested due to the similarity in needs but not followed due to its permanent characteristics, instead, flexible architecture provided better solutions for this problem.

As a conclusion for this study and observations, the best architectural solution for refugees follows transitional shelter typology, that has movable, adaptable, transformable, and interactive features. Finally, shipping containers provide units that has the previous features in addition to sustainable approaches and flexibility, and as a result it was chosen to be the final solution. The three main concepts of the Haven-Hood project are: Shelter, Flexibility, and Sustainability as shown in (Figure 3).

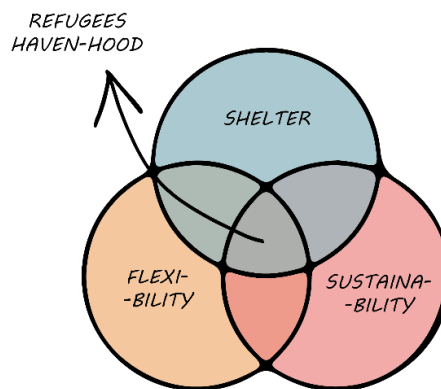


Figure 3. HavenHood Project Main Elements

### 4. Case Studies

The case studies done to engage the theoretical part of the study with the practical part included refugees' dwellings, refugees' neighbourhood model, shipping containers dwellings, shipping containers school, and shipping containers healthcare units. As shown in (table.2) the refugees dwelling (Case A) showed the need for providing special needs requirements, the refugees neighbourhood model (Case B) highlighted the need for providing expandability to keep up with refugees' increasing numbers, the shipping container dwellings (Case C) showed the potential the shipping containers provide in designing one space with transformable functions, the shipping containers school (Case D) provided a clear understanding of the design aspects of container architecture and its sustainable application, finally, the shipping container healthcare units (Case E) explains the design and applications of healthcare containers.

<sup>11</sup> Dismantled: dismantle something is to take apart a machine or structure so that it is in separate pieces.

<sup>12</sup> Reassembled: reassemble something is to fit the parts of something together again after been taken apart.

**Table 2.** Case Studies Summary

Case Studies Summary		Lessons Learned
Case Study		
<b>Case A</b>	Durable Solution for Syrian Refugees	<ul style="list-style-type: none"> <li>• This study is completely relatable to the study.</li> <li>• It helped setting the targeted number of people, shelter size, size per person, and shelter occupancy.</li> <li>• The architectural program in this case study was a key stone to define the spaces and zones that refugees need.</li> <li>• This case study guided to Sphere Standards that sets standards for humanitarian needs, which The Haven Hood will follow in its standards and codes.</li> </ul>
<b>Case B</b>	One Neighbourhood Approach Model for Refugees	<ul style="list-style-type: none"> <li>• It helped setting the targeted number of people, shelter size, size per person, shelter occupancy, and structural material.</li> <li>• This project focuses on the neighbourhood scope modelling that is similar to what Haven Hood approach aims for.</li> </ul>
<b>Case C</b>	Mobile Dwelling Unit	<ul style="list-style-type: none"> <li>• This case study feature transformability by having expandable portions that defines the concept that Haven Hood tries to form.</li> <li>• A clear spaces program and zoning was provided in this case study.</li> </ul>
<b>Case D</b>	Shipping Container School	<ul style="list-style-type: none"> <li>• This case study showed a clear example of using shipping containers to build a school.</li> <li>• It provided a brief architectural program that will define the spaces and sub-spaces in The Haven Hood's program.</li> <li>• Some strategies used in construction and waste management aid the approaches of The Haven Hood project.</li> </ul>
<b>Case E</b>	Shipping Container Healthcare Units	<ul style="list-style-type: none"> <li>• This case study provided clarification of possible healthcare unit uses that will define the sub-spaces in the architectural program for The Haven Hood's healthcare facility.</li> <li>• The shipping containers standard sizes provided in this case study are a great aid in the standards tables and architectural program.</li> <li>• This case study gave a clear program and zoning that a healthcare unit should have, and this aids The Haven Hood project.</li> </ul>

#### 4.1 Case Studies Highlights

Case E provided a list of possible Healthcare units which includes a dentistry, isolation room, primary care, maternity care, test centre, intensive care unit, and surgical suite. Case A follows Sphere Standards which is a set of principles and minimum humanitarian standards in four technical areas of humanitarian response: Water supply, sanitation, and hygiene promotion (WASH) Food security and nutrition. Shelter and settlement. These standards were followed in this study as well to help achieving its humanitarian approach.

#### 5. Results

This study aims to provide the facilities refugees need to have a dignified life; this is an approach that will be applied in a neighbourhood scope with number of refugees equal 2000-2500 people.

The suggested spaces of the neighbourhood are, shelter, school for all levels that could be also used as a training centre for youth and adults at night, healthcare units, shared facilities including masjid/worship areas, laundry rooms, markets, and bus stops, all in unit forms using one or more shipping containers. The spaces in the shelter unit are, bedroom, living area, kitchen, and bathroom, designed in a flexible way that allows users to transform between spaces' furniture according to their needs.

##### 5.1 Users

The statistics show that almost half of the refugees are children with a percentage equal to 47% (1175 out of 2500 being children), this number can also be separated to males and females to specify some spaces, it is noticed that 66.67% of Syrian refugees are males (1667 males in total, 784 children, 883 adults) and since 1667 shows the number of males, (the number of females reaches 833 in total, 392 children, 441 adults) refer to (table.3). These numbers help to provide the spaces based on the need in a way that follows the Sphere Standard.

**Table 3.** Project Users Division

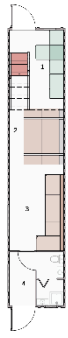
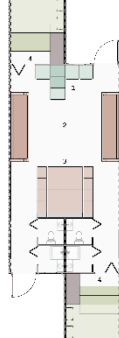


<b>Total</b>	2500 people			
	Male		Female	
<b>Adults</b>	53%			
	1325 adults			
	66.67%	883	33.33%	442
<b>Kids</b>	47%			
	1175 kids			
	66.67%	784	33.33%	391

**5.2 Architectural Design**

The shelter unit designed for refugees is expected to serve two refugees, if more than two members are in the family, another unit can be attached to the first, providing space for 2 more people with a total of 4. If extra space is needed, another unit is provided making a space for 6 family members, and the same method will be applied for 8 family members, refer to (table.3). If the family is bigger and demands more space, this will be reached by replacing the used units in a connected shape, leaving space for a middle courtyard or entrance.

Regarding transformability within spaces, foldable furniture seemed to be the best solution. In the architectural plans illustrated in (table.3), the stairs, sofa-bed, dining table, and some of kitchen cabinets are foldable.

**Table 3.** Shelter Units Design Form

Design Form	Single Unit	Double Unit	Triple Unit	Emergency Unit
<b>Architectural Plan</b>				
<b># Occupants</b>	2	4 - 6	6 - 8	2
<b># Floors</b>	1	1 - 2	1 - 2	1
<b># Entrances</b>	2	2	2	1
<b># Bedrooms</b>	1	2 - 5	4 - 5	1
<b># Bathrooms</b>	1	2 - 3	2 - 4	1

Some other results that enriched this study are, full harvesting capacity that can serve refugees with their consumption and as an income if they sell it in local markets. Also, full on-site water supplies using the wind power water pump to transfer water from any nearby river to the houses for daily uses purposes, and from the rain collecting pools to the harvesting zone for irrigation purposes. Moreover, full on-site energy production using solar panels, solar panels can either be placed on top of shipping containers for lower energy needs, where each 20ft container can hold up to 6 solar panels on its roof producing energy enough to run kitchen appliances and a fridge, or in a solar farm for larger energy needs to run the water pumps, heating and cooling devices, healthcare units, and school units.

Regarding Structural aspects of the design, the shipping containers are a structure themselves and they are designed to be placed above each other without supporting columns.

**6. Discussions**

This study highlighted the conditions refugees face in refugee camps and their urgent need for a better shelter. Shelter problem is not the only problem they face, they also have very limited access to propre water, food, education, and healthcare. As a result, this study found that the better solution should provide not just a shelter but also a functioning neighbourhood with different facilities to help refugees enhance their life conditions and allow them to become capable individuals.

The studies done on previous projects for refugees showed the lack of expandability, transformability, and portability in camps and permanent dwellings, a problem that this study solved by reusing shipping containers as housing units which can be moved, expanded, and transformed according to user’s needs.



The statistics provided on the UNHCR documents served a great deal in understanding the refugees' conditions and needs, in addition to the lessons learned provided by the Global Shelter Cluster Organization.

For further studies, it is recommended to do deeper search on refugee types including natural disaster victims and low-income pilgrims visiting the two holy cities Makkah and Madinah, their resident period, needs, and life condition, to figure out all facilities needed for other possible users. An analysis on sustainable approaches is also recommended to generate energy on site and make refugees' self-reliant. And since this project focused on the shelter unit as it is the main element in the neighbourhood, it is suggested to consider designing efficient healthcare units with the same design approach.

## 7. Conclusions

To sum up, providing a temporary crisis solution, a shelter with some other essential units, and enhancing the life conditions of refugees are the goals of this research, which also has a humanitarian significance. The key concepts of the Haven-Hood project are Shelter, Flexibility, and Sustainability.

These goals will be achieved within a neighborhood/city scope, relying on the bases of cash-for-shelter programs for whom with capabilities, capacity building and developing skills for whom in need, allowing them to leave refugee camps and resume their lives.

Furthermore, this project would pave the way for other projects dealing with natural disasters and floods victims, and low-income pilgrims, by providing the needed facilities for each case on its own.

The observations led to transitional shelter typology as the best solution with movable, adaptable, transformable, and interactive features, which are also provided by shipping containers in addition to sustainable approaches and flexibility, and as a result it was chosen to be the final solution.

The case study analysis helped to learn the spaces needed for refugees and the ratio used per person and per dwelling, the shipping containers dimensions and standards, the zoning and program of the school, the possible healthcare units, and the preferable shared spaces for refugees.

This analysis along with Sphere Humanitarian Standards analysis built the architectural program of the project and illustrated the architectural spaces in shelter units using foldable furniture to allow transformable spaces.

Finally, it is recommended to engage other architectural solutions to enhance the applicability of the design, including vertical expansion of shipping containers forming vertical housing, or other sustainable local building materials that could lower the overall cost or the need of heating and cooling.

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## Conflict of Interests

The Author(s) declare(s) that there is no conflict of interest.

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