Transformation of Disadvantaged Neighbourhoods: Urban Design and Architecture Dimensions of Shaping Liveable, Equitable and Resilient Settlements. The Case of Beirut.

Understanding the efficiency of urban design and architecture dimensions in leveraging life quality in poor urban areas

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Gdańsk University of Technology (Gdańsk Tech, formerly GUT; Polish: Politechnika Gdańska) is a public research university located in Gdańsk, Poland. Founded in 1904 and re-established in 1945, it is one of the oldest universities of technology in modern-day Poland. It is consistently ranked among the leading universities in the country. The university comprises eight academic faculties that provide higher education in 40 fields of study across 14 scientific disciplines. Its campus, located in the Wrzeszcz borough of Gdańsk, covers an area of 80 hectares (200 acres). As of 2023, the university had 15,622 students, including 11,490 undergraduates, 3,644 postgraduates, and 488 doctoral students.

Faculty of Architecture

The Faculty of Architecture provides students with interdisciplinary knowledge combining both technical and non-technical (humanistic) subjects. Architectural and urban design is taught with respect to social, cultural and environmental context and implications. The important parts of the programme are course modules for developing practical skills (architectural drawing, graphic techniques, painting, sculpture and computer techniques). The architectural design programme involves tackling increasingly more complex design problems, commencing from the simplest elements of space composition to complex forms and volumes in diverse contexts. The faculty also takes part in international exchange programmes, including Erasmus+, and maintains academic partnerships with institutions around the world, including the American University of Beirut (AUB) in Lebanon.

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Doctoral Thesis

Keywords

disadvantaged neighbourhoods; architecture; urban design; revitalisation; informal urbanism; urban transformation, sustainable development; revitalisation; urban poor; informal settlements; slum; culture; wellbeing; human-centred; urbanisation; climate change; vulnerable community; immigrations; complex city; Beirut; Lebanon

Note: *In this thesis, the author uses the term "disadvantaged neighbourhoods" to refer to impoverished urban areas that are commonly known internationally as "slums" and "informal settlements". This clarification is essential to avoid confusion, as the terms "slums" and "informal settlements" are occasionally used for explanation and reference. The chosen terminology has emerged from the common challenges, living conditions, and unique characteristics of these settlements. The underlying assumption is that adopting a term free from the romanticization of poverty can help dismantle stereotypes and overcome obstacles, paving the way for a more robust and scientifically grounded approach to support research objectives.*

Letter to my Beloved Beirut

Dear Beirut,

I see our bond as something akin to that of René Descartes and Princess Elisabeth of Bohemia, a connection shaped by distance, where separation became a kind of freedom. Distance unshackled me from the constraints of proximity, emotion, and obligation, allowing my thoughts to take form. In many ways, this thesis exists because of that very distance.

This thesis began in 2019, during your darkest days, and has evolved alongside a series of crises. When your economy collapsed, bringing with it rapid inflation, business closures, and soaring unemployment, young people were left stranded in despair. When you were suffocating under the weight of political and financial turmoil, and power outages became a symbol of your struggle, your lights went out, but your resilience never did. When the October 17 uprising erupted, thousands of voices filled the streets, demanding change. When the COVID-19 pandemic hit you at your weakest moment, your healthcare system faltered, and essential medicines became scarce. It was in those moments that I lost my mother to cancer on March 22, 2023. Amid these hardships, on August 4, 2020, an explosion shattered your port and your very core, taking 218 lives. And as if fate had not yet exhausted its cruelty, the Israeli-Lebanese conflict on October 1, 2024, added more layers of destruction, oppression, displacement, and loss. Thousands of martyrs fell, and the scars were especially deep in your southern suburbs, where the remnants of pain still echo.

However, throughout these years, I was cursed with optimism, I cried in silence and decided not to lose faith, even though it seemed very unrealistic most of the time. I carried you in my heart, mind, and soul, amidst daily anxiety and fear. I did not stop talking about you. In the halls of my university, among friends, and at conferences, your name was always on my lips. I carried both Samir Kassir's "Beirut" and Omar Zain's "Beirut Memory" books close by. Samir Kasir's words were engraved under my skin "Beirut must be reborn, must reinvent itself, must seek a new renaissance to restore the beauty it knew before the civil war." Perhaps because you have always chosen freedom. Perhaps because, in a region of diminishing options, you are looking for another way.

Beirut, I never stopped believing that you would walk on the scars of your wounds, telling a story of resurrection, the uprising of the oppressed in their quest for beauty and renewal, even if rebirth meant transformation. And perhaps this thesis, in its own way, was a balm for the pain, a promise for Beirut, a bridge between longing and action, between memory and possibility.

Your young man Bahaa Bou Kalfouni *Gdańsk, June 2025*

Abstract

Cities in developing countries face increasingly complex challenges due to rapid urbanization, growing socioeconomic inequality, and spatial fragmentation. These forces have contributed to the emergence of disadvantaged neighbourhoods, which are often shaped by weak governance, unregulated migration, and market-driven patterns of development. Such neighbourhoods are frequently located on the periphery of cities or within marginalized inner-city. They usually suffer from lack of access to basic services, insecure land tenure, and precarious living condition, all of which contribute reinforcing urban vulnerability and social exclusion. Middle Eastern cities exemplify these dynamics, as the region contends with political and economic instability, armed conflict, sectarian divisions, and uneven development policies. Lebanon provides a stark example of these complexities, where decades of transformation have shaped a fragmented urban landscape. Beirut, in particular, reflects this trajectory through successive phases of urbanisation, industrialisation, destruction, reconstruction, and regeneration. Its suburbs have become home to disadvantaged neighbourhoods, predominantly inhabited by low-income families and characterized by overcrowded housing, deteriorating infrastructure, and environmental decline.

Efforts to improve disadvantaged neighbourhoods often rely on broad policy frameworks that overlook local conditions and design-specific needs. In Lebanon, recurring crises have often shifted priorities toward short-term survival, further marginalizing long-term improvement and management of disadvantaged areas. This shift has accelerated the physical deterioration of the built environment, disrupted social networks, and undermined the well-being and economic stability of already vulnerable communities. These conditions reveal a critical gap in knowledge and practice.

This research aims to support the transformation of disadvantaged neighbourhoods in Greater Beirut by examining the physical, socio-economic, and environmental challenges shaping these areas and refining methods for identifying the best possible scope for physical improvements in these areas that contribute to enhancing the quality of life. The study focuses on three major neighbourhoods within Greater Beirut: Hay Al-Tanak, Al-Ouzai/Jnah, and Sabra and Shatila Camp, which serve as the primary case study areas.As supplementary aims, the study investigates low-cost, effective design tools to guide the physical transformation of these settlements. It also explores how design interventions can positively impact the psychological and biological well-being of residents. Moreover, preserving cultural essence is central to the research, ensuring that proposed solutions reflect local values.

This study adapts qualitative research methods that emphasize engaging, reflective, and knowledge-rich approaches. It integrates a combination of techniques, including a literature review, mapping, field study observation, photographic documentation, interviews, analysis and assessment of reference projects, and surveys.

This dissertation is a paper-based thesis consists of an overview of the whole work and five published scholarly articles:

Pape I serves as an umbrella for this research, laying the groundwork for the subsequent papers. It adopts a holistic approach to address the transformation of all disadvantaged neighbourhoods in Greater Beirut, outlining context-appropriate spatial improvements and design strategies, demonstrating their potential for driving social, economic, and environmental development. Additionally, it highlights the critical need for a deeper exploration of a broader range of design solutions and assesses their impact on these three dimensions.

Paper II examines the case of Hay Al-Tanak, an inner-city neighbourhood, while **Paper III** examines the second case study, Al-Ouzai/Jnah, a coastal neighbourhood. Both papers focus on achieving environmental sustainability through innovative design solutions that respond to the pressing challenges of climate change in urban contexts.

Papers IV explores the third case study, Sabra and Shatila, an easement neighbourhood, and investigates context-appropriate design solutions and their role in socio-economic development, with a special focus on how a well-designed built environment can enhance community well-being.

Paper V narrows its focus to a micro-scale investigation of the Sabra neighbourhood, a specific area within the third case study, placing an additional emphasis on the social dimension of transformation, driven by the neighbourhood's rich cultural essence, which warrants both revelation and preservation.

Collectively, these interconnected explorations highlight the transformative potential of applying context-appropriate architectural and urban design solutions, demonstrating how such interventions can contribute to transforming disadvantaged neighbourhoods into liveable, equitable, and resilient built environments.

The study also establishes a theoretical framework for understanding informal urbanism, while identifying key knowledge gaps. It provides an overview of Beirut's historical urban development, examining the origin, typology, location and characteristics of disadvantaged neighbourhoods. At the micro scale, the study analyses building typologies, construction materials, spatial configuration, open spaces, and street patterns. Residential testimonies further inform this analysis, offering insights into their challenges, priorities, and visions. Based on the analysis and assessment of successful local and international interventions that address challenges similar to those in the selected case studies, the research proposes a set of Possible Spatial Improvements (PSI) for architecture, urban design, and eco-friendly practices. These PSIs are further evaluated through a community survey, and the findings can offer practical design guide aimed at promoting inclusive, resilient, equitable, and healthy built environments in disadvantaged neighbourhoods.

Contents

Acknowledgements

In the course of conducting this research, I owe a profound debt of gratitude to numerous institutions and individuals whose support was essential. I am especially grateful to my supervisor, Professor Piotr Lorens, whose intellectual guidance and encouragement were indispensable throughout this journey. His insightful feedback, critical perspective, and steadfast support not only ensured I stayed on course but also played a vital role in shaping this thesis into its current form. Professor Lorens continually emphasized the transformative impact of planning and design in shaping urban spaces.

I am also deeply indebted to Professor Dorota Wojtowicz-Jankowska, who has been a constant pillar of support since the beginning of my scientific journey. As the supervisor of my master's thesis at the Department of Environmental Design, her mentorship was instrumental in my achievements, including earning awards and publishing research papers. She persistently encouraged me to advance my work to the research level and introduced me to Professor Piotr Lorens, head of the Department of Urban Design and Regional Planning.

I extend my heartfelt gratitude to the Doctoral School at Gdańsk University of Technology for their unwavering support throughout my academic pursuits. I am sincerely thankful to the dedicated academic staff, whose inspiring lectures and innovative design studios greatly enhanced my learning experience. My deepest appreciation also goes to my fellow doctoral students for their collaboration and steadfast support, particularly Miguel Angel Delso Páez, whose encouragement was a vital source of strength throughout this process. A special acknowledgment is owed to Mr. Robert Orlik, the department's secretary, whose engaging conversations on science, politics, and cinema broadened my worldview and deepened my appreciation for Poland, which I have come to regard as my second home. His invaluable assistance with administrative and technical matters was indispensable during my time in the department.

I am profoundly thankful to the academic community within my department, including Professor Karolina Krośnicka, Dr. Gabriela Rembarz, Professor Justyna Martyniuk-Pęczek, Professor Dorota Kamrowska-Załuska, Professor Izabela Mironowicz, Dr. Magdalena Rembeza, Dr Anna Rubczak, Dr. Łukasz Pancewicz, and Dr. Monika Arczyńska for their insightful feedback and encouragement throughout my studies in Gdańsk. I am also deeply grateful to all participants in the interviews and surveys I conducted for the three case studies: Hay Al-Tanak, Al-Ouzai/Jnah, and Sabra and Shatila Camp. I wish to express special appreciation to the municipality of Ghobeiry in Beirut for their support in helping me understand the geographical boundaries of Sabra and Shatila Camp, one of the empirical case studies on which I published two scientific papers. Lastly, my gratitude goes to Hajji, whose contributions in developing maps significantly supported this research.

Finally, I extend my heartfelt gratitude to my father, Jihad Bou Kalfouni, my brother, Lewaa Bou Kalfouni, and my sister, Lara Delikan, for their unwavering support and understanding during my time away. This work is dedicated to the cherished memory of my late mother, Salwa Bou Kalfouni, who passed away on 22 March 2023. She always believed in my ability to succeed and offered me unconditional support. Despite the generous help I received from everyone, I accept responsibility for the shortcomings, misinterpretations, and conclusions in this work.

Bahaa Bou Kalfouni
Gdańsk, June 2025

List of Publications

This list of publications summarises the progress of my research carried out under the support of my supervisor from the date of my enrolment in the Doctoral School until the date of submission. As planned and agreed with my supervisor, my doctoral thesis will be a written dissertation that includes an overview of the work and five published scientific articles relevant to a particular topic as an independent and separate part of the group work. Articles were scoped to formulate the structure of my thesis and linked appropriately to scientific journals interested in the research topic (minimum 40 points—maximum 100 points). Below is a list of published articles.

Appended publications

All articles are published in peer-reviewed journals. All papers were individually blind peer reviewed and published under open and closed access licences.

Paper I: Lorens, P., Wojtowicz-Jankowska, D., & Bou Kalfouni, B. (2022). Redesigning Informal Beirut: Shaping the Sustainable Transformation Strategies. Urban Planning, 7(1). https://doi.org/10.17645/up.v7i1.4776

Paper II: Wojtowicz-Jankowska, D., & Bou Kalfouni, B. (2020). REVITALIZATION PROJECT OF SLUM TRANSFORMATION: A CASE STUDY HAY-AL TANAK, BEIRUT, LEBANON. Przestrzeń I Forma, 119-132. https://doi.org/10.21005/pif.2020.42.c-01

Paper III: Wojtowicz-Jankowska, D., & Bou Kalfouni, B. (2022). A Vision of Sustainable Design Concepts for Upgrading Vulnerable Coastal Areas in Light of Climate Change Impacts: A Case Study from Beirut, Lebanon. Sustainability, 14(7), 3986. https://doi.org/10.3390/su14073986

Paper IV: Bou Kalfouni, B. (2025), "Design for well-being: from disadvantaged to satisfactory built environment, building places for vulnerable communities", Open House International, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/OHI-12-2024-0394

Paper V: Kalfouni, Bahaa Bou, et al. "Rethinking Design Priorities: Towards Human Scale and Sustaining Culture in Disadvantage Neighbourhoods – A Case Study from Beirut" Środowisko Mieszkaniowe/Housing Environment, vol. 0, no. 0, Sciendo, 2025, https://doi.org/10.2478/he-2025-0012

The Author's Contribution to the Appended Publications

Paper I: The study was designed by Bahaa Bou Kalfouni (author of the doctoral thesis), Piotr Lorens (supervisor) and Dorota Wojtowicz-Jankowska (professor at GUT). The author collected and analysed the data, processed the results, and wrote the article.

Paper II: The study was designed by Bahaa Bou Kalfouni (author of the doctoral thesis) and Dorota Wojtowicz-Jankowska (professor at GUT). The author collected and analysed the data, processed the results, and wrote the article. Piotr Lorens (supervisor) critically reviewed the article.

Paper III: The study was designed by Bahaa Bou Kalfouni (author of the doctoral thesis), and Dorota Wojtowicz-Jankowska (professor at GUT). The author collected and analysed the data, processed the results, and wrote the article

Paper IV: Bahaa Bou Kalfouni independently conducted all aspects of the research, writing, and publication.

Paper V: The study was designed by Bahaa Bou Kalfouni (author of the doctoral thesis) and Karolina Krośnicka (professor at GUT). The author collected and analysed the data, processed the results, and wrote the article. Piotr Lorens (supervisor) critically reviewed the article.

Author's Declaration of Contributions to the Appended Publications (Percentage)

PAPER	AUTHOR	CONTRIBUTION IN PERCENTAGE	SIGNATURES
PAPER I	Bahaa Bou Kalfouni	60%	
	Dorota Wojtowicz-Jankowska	20%	
	Piotr Lorens	10%	
PAPER II	Bahaa Bou Kalfouni	70%	
	Dorota Wojtowicz-Jankowska	30%	
PAPER III	Bahaa Bou Kalfouni	60%	
	Dorota Wojtowicz-Jankowska	40%	
PAPER IV	Bahaa Bou Kalfouni	100%	
PAPER V	Bahaa Bou Kalfouni	70%	
	Karolina Krośnicka	20%	
	Piotr Lorens	10%	

List of Figures and Tables

Background and Motivation for Undertaking the Research

Several factors influenced my decision to pursue this doctoral research topic. These include the interests sparked by the subject of my master's thesis, particularly in terms of its thematic focus, the methodological approach applied, and the outcomes achieved upon its completion. Another important factor is a strong sense of commitment to the field of architecture and urban planning, approached through both education and professional practice, with a focus on addressing global urban issues and challenges. Furthermore, a deep emotional connection to my homeland, coupled with a sincere desire to contribute positively to the lives of vulnerable communities in in impoverished urban areas, has inspired me to investigate the transformative role of architecture and urban design in shaping dignified and satisfactory living environments.

My master's thesis focused on transforming one of the most deprived neighbourhoods in the Beirut district by proposing physical improvement initiatives aimed at creating opportunities for vulnerable communities through revitalization and upgrading. The success of this project served as a significant source of motivation for further academic exploration. The project was recognized and promoted by the Gdańsk University of Technology (GUT), Faculty of Architecture, Department of Environmental Design, and received honours in the 8th edition of the TEAM20 Graduation Project Competition for Architecture and Urban Planning, held in Taiwan. It was also promoted by the BDA and SARP Prize (Stowarzyszenie Architektów Polskich). In 2019 and subsequently, a scientific article was published in the Polish scientific journal *(Przestrzeń i Forma) Space & Form,* co-authored with my master thesis supervisor Professor Dorota Wojtowicz-Jankowska, entitled "Revitalisation Project of Slum Transformation: A Case Study, Hay-Al Tanak, Beirut, Lebanon" (Wojtowicz-Jankowska, D.; Bou kalfouni, B., 2020). This article is included as part of the current doctoral thesis, as it contributes directly to its structure and aligns closely with its overarching aims

The exploration undertaken during my master's thesis provided a compelling impetus to deepen my research and broaden my interests toward evaluating the effectiveness of physical upgrading in deprived neighbourhoods at the city scale. This inquiry forms the foundation of my PhD thesis, focusing on how spatial interventions can catalyse social, economic, and environmental improvements. A literature review on slums and informal settlements, spanning disciplines such as sociology, architecture, urban design, urban planning, and social sustainability, offered fresh insights and underscored the complexity of the subject, further fuelling my motivation to investigate the topic in greater depth. Moreover, field visits and interviews conducted in the Hay Al-Tanak neighbourhood allowed me to contextualise the project within real-world dynamics. This engagement provided a nuanced understanding of the challenges faced and underscored the need for transformative, context-sensitive interventions with long-lasting impact.

1 Introduction

Cities are powerhouses of evolution, where people continuously adapt to evolving realities, often with unexpected outcomes. These transformations resulted from a complex interplay of strategies driven by factors such as urbanisation, industrialisation, profit, encirclement, institutional division, and exclusion (Neil, 2014). Furthermore, cities can indeed present challenges and hostile environments. In this sense, Henri Lefebvre argues that cities have always been 'centres of conflict, change, and transformation (Lefebvre, 2003). His perspective suggests that the city's structure reflects a form of political and social embodiment that can be reconfigured. As Harvey (2007) argues, this capacity for reconstruction extends beyond the physical city to human relationships and societal structures, making the possibility of a more equitable future both visible and inherently embedded in ongoing social struggles.

Today, urbanization is accelerating at an unprecedented scale. For the first time in history, 55% of the world's population lives in cities, a proportion that is expected to increase to 68% by 2050. (United Nations, 2018). However, this growth is uneven. In many developing countries, urban expansion has led to the emergence of slums and informal settlements (United Nations, 2020). Approximately 1 billion people, or one in seven people worldwide, live in poor-quality housing and degraded built environments (WHO, 2018). Rapid and unevenly economic growth has made cities both engines of opportunities and sites of vulnerability. Over the past 15 years, the number of slums dwellers has continued to rise worldwide (Dodman, D.; Archer, D.; Mayr, M., 2018). Citywide case studies showed that it is common for cities to have 30–50% of their population in slums and informal settlements. Although some have a higher percentage. Especially the cities located in the global south, for example, Nairobi (Kenya), 65% in Cairo (Egypt), and 70% in Dar es Salaam (Tanzania) (Rojas, 2018).

This research discusses a global urban phenomenon revolving around informal urbanism. This refers to urban development processes that occur outside formal planning frameworks, often resulting in impoverished, neglected built environments. These areas are known differently around the world, for instance, Favelas in Brazil, Kijiji in Kenya, Jhopadpatti or shantytowns in India, Gecekondu in Turkey, Barriadas in Peru, Kampungs in Malaysia and Mudukku in Sri Lanka, Al Ashiwaiyat in Egypt, Hutong in China and Ahzimat Albus in Lebanon. They all represent urban poverty, exclusion, and lack of adequate planning and services (Ezeh et al., 2017).

Disadvantaged neighbourhoods typically emerge from an entanglement of drivers, including rapid population growth, rural-to-urban migration, housing shortages, inadequate governance (especially in planning, land management, and urban development), land speculation, economic precarity, displacement due to war and climate change, and systemic marginalisation. Residents in these areas face spatial and socio-economic exclusion: they are cut off from urban benefits, access to land and services, and often endure precarious living conditions characterized by pollution, poor

sanitation, overcrowding, and low structural quality. Built environments in these neighbourhoods tend to be unplanned and compacted, with insecure housing, limited public space, poor accessibility, and mono-functional land use (United Nations Human Settlements Programme, 2003).

In the Middle East, urbanization has unfolded in a context of profound political, social, and economic volatility. Factors such as conflict, forced migration, and uneven development have driven a sharp rise in informal settlements across the region. Cities like Amman, Damascus, Baghdad, and Cairo have witnessed rapid urban expansion, often outpacing planning capacities and infrastructure investment. In many cases, informal urbanization has become the prevailing form of city growth, shaped by weak state institutions, refugee influxes, and housing market failures (Van Ham et al., 2021). These facts reflect regional vulnerabilities and the global urban trend, where cities are increasingly shaped by unregulated and interactive development patterns.

Lebanon exemplifies these regional dynamics. As of 2023, 78.4% of the population lives in urban areas, 62% of whom live in precarious built environments (UN-Habitat, 2023). By 2024, the urban poverty rate had more than tripled over the past decade, intensifying challenges that have significantly diminished the overall quality of life (WHO, 2024).

Beirut, the capital, has long demonstrated an boundless capacity for regeneration and urban transition, shaped by colonialism and international commerce, internal and external conflicts, and various waves of immigration (Khalaf. S., 2006). The response to these factors, particularly to the dynamics of urbanization and the growth of the urban population, was in most cases informal, which contributed to the growth of unplanned urban areas. This process resulted in the creation of under-supported neighbourhoods that can be differentiated by various structural, social, and economic dimensions from the formal part of the city. This phenomenon was especially visible in the second half of the 20th century, when the political and socio-economic processes taking place both within Lebanon and in the entire Middle East resulted in increased immigration into the country of large groups of people seeking safety and better economic opportunities. This process resulted in the creation of various types of neighbourhoods, which differ according to the period of their origin, social, ethnic, and religious structure, as well as the urban layout. These changes made these more visible in the structure of the city and changed their reputation: They are no longer perceived as hidden, shameful areas but as places that are not different from the rest of the city of Beirut (Fawaz. M,; Peillen. I, 2003).

Research gaps and justifications - Many experts and practitioners have extensively studied and developed spatial interventions for disadvantaged neighbourhoods, particularly slums and informal settlements in the Global South, through programs targeting critical social, economic, environmental, and health challenges. These comprehensive frameworks, often referred to as “Big-Ticket Policies,” have aimed to drive transformative change. While some of these programs have

achieved limited success, their overall impact often remains difficult to measure or sustain, partly due to their broad, multidisciplinary nature and limited sensitivity to local contexts. Consequently, the application of these frameworks to disadvantaged neighbourhoods has not sufficiently addressed the deeply rooted, place-specific issues they face, revealing a significant knowledge gap (see below **Figure 1** that explains this relationship).

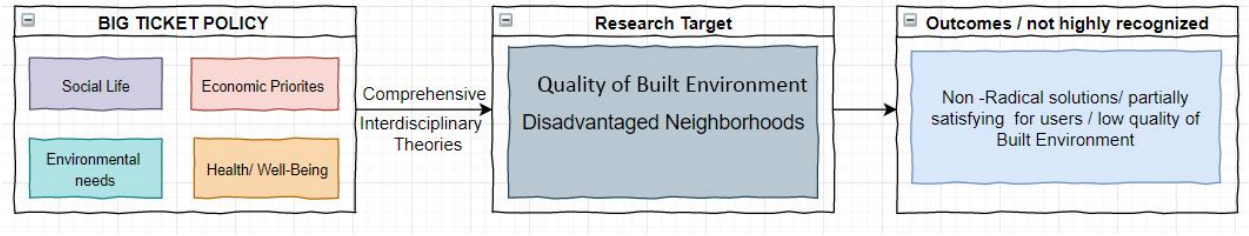

***Figure 1**. The figure illustrates the content of the Big-Ticket Policy issues, the applied theories to disadvantaged neighbourhoods, and the results. Source: Author.*

In the fields of architecture, urban design, and planning, there is an increasing recognition of the need to move beyond generic solutions. Spatial interventions, in particular, have not been sufficiently explored as a central focus of research, especially about their role in promoting resilience and well-being in underprivileged urban areas. Too often, these interventions are treated as purely technical or aesthetic responses, without critically examining their capacity to influence social, economic, and environmental dynamics in vulnerable settings. Consequently, the contribution of spatial configurations, material practices, and context-responsive design methodologies to equitable urban transformation remains underdeveloped.

Although some initiatives have adopted participatory approaches to engage marginalized communities, such efforts tend to be fragmented, project-based, and short-term. Rarely do they empower communities with meaningful roles in shaping or evaluating spatial strategies. This reflects a broader gap in the field: the need to develop inclusive, locally embedded, and critically reflective design processes that position community knowledge as a core asset in the transformation of disadvantaged neighbourhoods.

At the local level, the compounded crises that have affected Lebanon over the past five years have diverted attention from the urgent need to develop and rehabilitate disadvantaged urban areas (Dandashly, 2023). These include, the 2019 economic crisis[1] led to rapid inflation, business

[1] Since 2019, Lebanon has been facing a stifling economic crisis, the worst in its modern history. A combination of factors has led to authoritarianism and the government's financial collapse. This crisis stems from decades of economic mismanagement, corruption, and mounting debt, coupled with the impact of regional and political events.

closures, and high unemployment rates, leading to the outbreak of the October 17, 2019 uprising[2] (Bizri et al., 2022). This was followed by the COVID-19 pandemic[3], which hit Lebanon at a critical time when the healthcare system was unprepared, and resources were already depleted (Bizri et al., 2021). Amid this difficult period, the Beirut Port explosion[4] on August 4, 2020, destroyed the port and the surrounding area (Al-Hajj et al., 2021). Adding to these hardships, the Israeli-Hezbollah conflict[5] that caused extensive physical destruction, particularly in Beirut's southern suburbs (Harel, 2024). These overlapping crises have deepened the vulnerabilities of marginalized communities, especially those residing in physically and socially deteriorated environments.

Building upon the identified gaps, the importance of this research lies in several key factors that justify its urgency and relevance. First, it seeks to revive the debate on disadvantaged neighbourhoods' development in Greater Beirut by addressing a critical but often overlooked issue: the profound impact of the built environment on social, economic resilience, and environmental sustainability. In the face of systemic crises, attention has largely shifted away from the development priorities of these neighbourhoods, allowing their conditions to deteriorate further.

Second, the research recognizes this topic as an urgent concern within both education and practice in the fields of architecture and urban planning. It responds to a global urban phenomenon characterized by interconnected challenges such as rapid urbanization, climate change, migration, conflict, urban poverty, social inequality, and the proliferation of slums and informal settlements. Situating the research within this broader context ensures its relevance to international academic and professional audiences while simultaneously addressing the specific and pressing urban challenges of Greater Beirut.

Third, from the perspective of architecture and urban design, the research aims to expand the body of knowledge and offer scientifically grounded insights and solutions. By bridging theoretical understanding and practical interventions, the study also aims to contribute to both educational discourse and real-world applications. It positions the thesis as a platform for critical explorations and experimentations, enabling a deeper investigation into the complex realities shaping disadvantaged urban environments.

[2] The October 17 Revolution is a series of civil protests that initially erupted over planned taxes on gasoline, tobacco, and internet calls on applications such as WhatsApp.

[3] Coronavirus disease 2019 is a contagious disease caused by the coronavirus SARS-CoV-2. In January 2020, the disease spread worldwide, resulting in the COVID-19 pandemic.

[4] The 2020 Beirut explosion was a deadly blast that took place on August 4, 2020, in Beirut and was one of the largest non-nuclear explosions in history. It was caused by the improper storage of ammonium nitrate in a port warehouse.

[5] On 1 October 2024, Israel invaded Southern Lebanon, marking the sixth Israeli invasion of Lebanon since 1978.[80] The invasion took place after nearly 12 months of the Israel–Hezbollah conflict. On 26 November, Israel and Lebanon signed a ceasefire agreement, mediated by France and the United States.

1.1. Aims

This thesis aims to support the transformation of disadvantaged neighbourhoods in Greater Beirut by developing context-sensitive architectural and urban design solutions. The main aims include examining the physical, socio-economic, and environmental challenges shaping these areas, identifying the key factors influencing their development, and revealing their unique characteristics. It seeks to explore the potential for physical transformation through urban renewal and rehabilitation strategies, such as repair, renovation, extension, adaptation, and reintegration, with emphasis on technical, functional, and aesthetic improvements.

A key objective is to identify Possible Spatial Improvements (PSI) at the architectural, urban design, and eco-friendly levels, guiding the development of liveable, equitable, and resilient urban environments.

A key aspect of this thesis is investigating how context-sensitive design solutions can enhance social, economic, and environmental outcomes, thus improving the overall quality of life for dwellers.

As supplementary aims, the research explores low-cost and effective design tools to support the physical transformation of these settlements. It assesses the impact of spatial interventions on the psychological, biological, and social well-being of residents. Furthermore, it prioritizes the preservation of cultural identity by integrating local values into the design process to promote social inclusion and reinforce community cohesion.

1.2. Research Questions

A structured set of questions has been developed to guide the inquiry of this thesis addressing the overarching problem and the main research gap it seeks to explore. To ensure clarity and focus, the questions were divided into two groups: primary research questions that form the core of the study, and sub-questions that explore complementary and essential aspects of the research framework.

Main Research Questions

The primary questions that guide this study include:

> Q1: How should physical improvement activities be identified, categorized, and examined to properly deal with the specific issues of developing the measurement of social, economic, and environmental factors in the built environment?

Q2: How can lessons and strategies be applied to the case of Beirut?

Q3: What new dimensions must be associated with urban design and architecture in transforming disadvantaged neighbourhoods in Beirut?

Q4: How can improving the physical and social context of inner-city slums make the city of Beirut and its communities more inclusive and resilient?

Q5: How can sustainable design solutions address the challenges of climate change and create an attractive and equitable urban environment in disadvantaged coastal neighbourhoods?

Q6: How does the application of architectural and urban design measurements in transforming disadvantaged neighbourhoods enhance residents' well-being?

Q7: Why is it important to integrate cultural aspects in the process of transforming disadvantaged neighbourhoods?

Sub-Questions:

Although secondary in emphasis, the following sub-questions are crucial to supporting and deepening the understanding of the research topic:

- What defines poor urban areas, such as slums and informal settlements?
- Where are slums and informal settlements located, particularly in the context of Greater Beirut, and how can their spatial distribution be identified and analysed?
- What challenges and issues are associated with urban poverty at both global and local scales?
- How does the existing built environment of these areas affect the quality of the user’s life?
- How do different dimensions of the built environment contribute to social, economic, and environmental outcomes, and overall well-being?
- What is the role of architecture and urban design in the transformation of impoverished urban areas, and how can their effectiveness be evaluated?

- How should the dimensions of architecture and urban design be identified and assessed about their influence on the built environment?

- What implications might the research findings have for urban transformation practices and education, especially concerning poor urban areas

1.3. Hypothesis

Conceptual Setup of the Hypothesis:

Rather than relying on broad, top-down policy frameworks that often lack sensitivity to local conditions, referred to in this thesis as "big-ticket policies" (see Research Gap, pp. 17–18, **Figure 1**), this research proposes a more targeted, design-focused approach. It posits that the application of appropriate architectural and urban design solutions can significantly improve the quality of life in disadvantaged neighbourhoods. This approach highlights the need for physical improvements to be adaptive and responsive to local social, cultural, and environmental conditions, resulting in satisfying human-made environments that are richer, more supportive, more productive, and more resilient.

By focusing on spatial transformation tailored to specific realities, the research suggests that these interventions can collectively generate social, economic, environmental, and health benefits, ultimately promoting the broader goals typically pursued by big-ticket policies (see **Figure 2**).

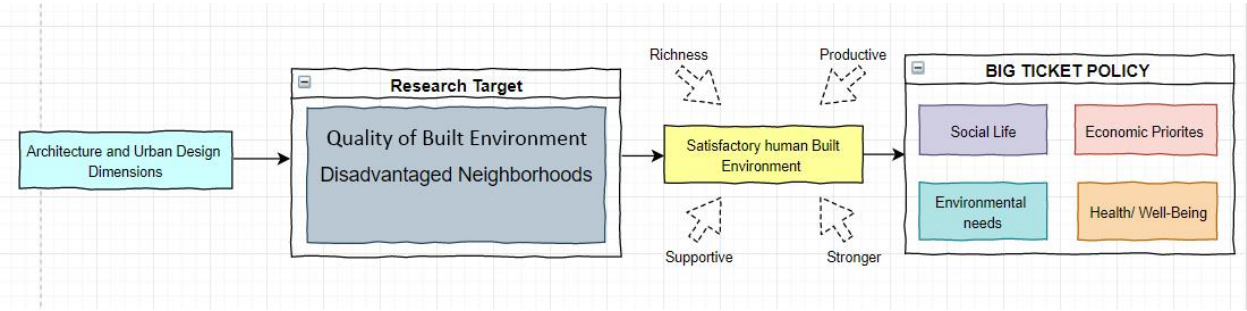

Figure 2. *Hypothesized Framework: applying appropriate context-sensitive architectural and urban design dimensions contribute to creating a satisfactory built Environment that drives Big-Ticket Policy success. Source: Author*

Therefore, the central hypothesis of this research is:

The physical improvement of disadvantaged neighbourhoods, guided by context-appropriate architectural and urban design solutions, can drive social, economic, and environmental development by preserving cultural identity, enhancing community well-being, and building resilience to climate challenges.

This hypothesis is grounded in the following assumptions:

Improving the physical environment contributes significantly to the quality of life

The quality of the built environment in disadvantaged neighbourhoods directly influences residents' quality of life, and its improvement can address dissatisfaction and enhance well-being.

Architecture and urban design are key tools for physical improvement.

Context-appropriate architectural and urban design solutions are effective methods to transform degraded built environments into attractive, functional, and inclusive places.

Place quality has measurable social, economic, environmental, and health outcomes

There is strong evidence that improvements in place quality led to positive outcomes across social cohesion, economic activity, environmental sustainability, and public health.

A multidisciplinary approach enhances the design framework

Integrating knowledge from health, culture, economics, engineering, and policy fields strengthens the applicability and impact of design strategies for urban transformation.

Understanding contextual factors is essential for effective interventions

The unique conditions, origins, and developmental patterns of informal or disadvantaged settlements must be studied and understood to inform appropriate and impactful design strategies.

Physical improvement strategies should support a wide range of actions

A successful approach should facilitate rehabilitation, revitalisation, reconstruction, adaptation, and extension, depending on the needs and conditions of each neighbourhood.

Architectural and urban design solutions can preserve cultural identity

Integrating cultural values and local identity into physical improvement strategies is necessary for social cohesion and the creation of meaningful spaces.

Physical transformation can strengthen urban integration and resilience

Upgrading disadvantaged neighbourhoods through design can enhance their integration into the broader urban structure and increase resilience to social and environmental shocks.

1.4. Geographical Limitations and Case Studies

This research is situated within the national context of Lebanon, a country located on the eastern shore of the Mediterranean Sea, at the crossroads of the Arab world and Europe. Within this national framework, the study focuses on Greater Beirut (Arabic: بيروت الكبرى), the country's largest urban agglomeration. Greater Beirut encompasses the city of Beirut, which forms the Beirut Governorate, along with several surrounding municipalities located in the adjacent Mount Lebanon Governorate. Although it does not represent a single administrative entity, Greater Beirut functions as a unified urban agglomeration, extending southeast and north from the core of Beirut, with the Mediterranean Sea forming its natural boundary to the west (see **Figure 3**). As of 2025, Greater Beirut is home to an estimated 2.4 million residents (CityPopulation.de. (n.d.), 2025). Demographically, Greater Beirut is characterised by significant religious and sectarian diversity, with the population roughly divided between Christians and Muslims. West Beirut is predominantly Sunni Muslim (around 70%), alongside smaller communities of Shia Muslims, Christians, and Druze. East and North Beirut are primarily Christian, with approximately 65% identifying as Maronite or other Catholic denominations, and 35% as Greek Orthodox. The southern suburbs, known as the Dahiyeh, are predominantly inhabited by Shia Muslims (approximately 85%), with smaller Sunni and Christian populations coexisting (U.S. Department of State, 2022).

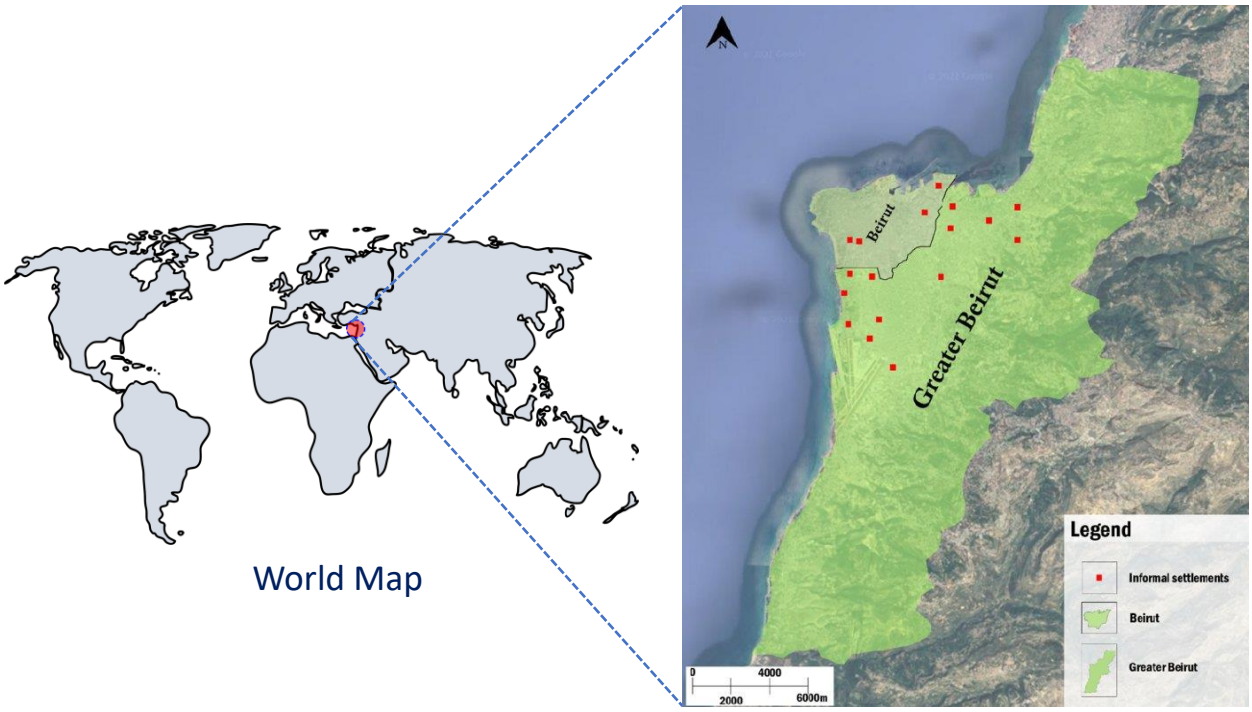

***Figure 3**. Location of Lebanon on the world map, geographical boundaries of Beirut and Greater Beirut, and distribution of disadvantaged neighbourhoods. Source Satellite image sourced from Google Earth, captured (2022), elaborated by the Author.*

Within the context of Greater Beirut, seventeen disadvantaged neighbourhoods have been identified that fall within the broader classifications of slums and informal settlements, an observation first documented and later substantiated by research conducted by Professors Mona Fawaz and Isabelle Peillen [6]. These areas form part of the urban fabric of the city, with a minority located within the municipal boundaries of Beirut and the majority extending across its peripheries. Despite being spatially and administratively fragmented, these settlements reflect complex socio-spatial dynamics and urban inequalities. They exhibit physical and structural characteristics that differ significantly from those of formal neighbourhoods in the city.

These settlements can be classified according to their origins, stages of development, and the triggering events that contributed to their formation (see below **Table 1** and the legend of **Figure 4** page 27). In terms of origin, three main categories are identified:

• *International refugee-driven settlements*, shaped by successive waves of regional displacement;
• *Rural-to-urban migrant-driven settlements*, formed through internal migration driven by socio-economic pressures;
• *Squatter settlements*, established through the unauthorised occupation of land.

***Table 1**. Typology of disadvantaged Neighbourhoods in Greater Beirut: Origins, Periods, and Triggering Events. Source: Author.*

TYPOLOGY OF DISADVANTAGED NEIGHBOURHHODS	PERIOD	ORIGIN	TRIGGERING EVENT
1. INTERBATIONAL REFUGEE	1920–1955; 2011–present	Armenians, Palestinians, Kurds, Syrians	Regional wars and displacement (e.g., genocide, Arab-Israeli conflict, Syrian civil war)
2. RURAL-URBAN MIGRATION	1950–1960	Mount Lebanon, North & South Lebanon	Urbanisation, industrial growth, internal economic migration
3. SQUATTER SETTLEMENTS	1970–1990	Primarily Lebanese	Lebanese Civil War, Israeli invasion (1978, 1982)

[6] Fawaz, M., & Peillen, I. (2003). Urban slums reports: The case of Beirut, Lebanon.

From a developmental perspective, these settlements can be categorised as temporary settlements, originally constructed with tents; transitional settlements, which gradually evolve into more permanent structures; and consolidated settlements, which develop into regularised neighbourhoods with semi-formal housing and infrastructure.

Despite their heterogeneity and the spontaneous nature of their growth, many of these neighborhoods share common features in terms of location, topography, urban infrastructure, and building typologies. Their spatial character can be further analysed through three primary typologies based on location:

- **Escarpments**: Settlements like Roueissat are situated on elevated, rocky hills. These areas are prone to strong winds and rainwater infiltration during the winter. The urban fabric is shaped by curved streets, long staircases, and narrow sloping pathways, resulting in unique spatial arrangements (see **Figure 4** and **Figure 5).**
- **Waterfronts**: Settlements such as Jnah and Hay Sellom are located along the Mediterranean coast and partially on the Ghadir River, which flows into the sea south of Beirut beneath the Beirut International Airport. This waterbody dries up completely during the summer and is considered the most polluted river in Beirut. These waterfront settlements are exposed to environmental hazards such as flooding and winter storms, making them particularly vulnerable (see **Figure 4** and **Figure 6**).
- **Easements**: These settlements are located near or adjacent to major urban infrastructure barriers. For example, the Shatila refugee camp is bounded by two other informal settlements, while Borj el Brajneh and Hay Sellom are located in close proximity to the runways of the Rafic Hariri International Airport. Such locations impose additional constraints on the liveability and development of these neighbourhoods (see **Figure 4**).

The detailed study focuses on three case studies: Hay–Al Tanak, Al-Ouzai/Jnah, and Sabra and Shatila Camp. See next page. These neighbourhoods are highlighted in **Figure 4,** marked by rectangular frames.

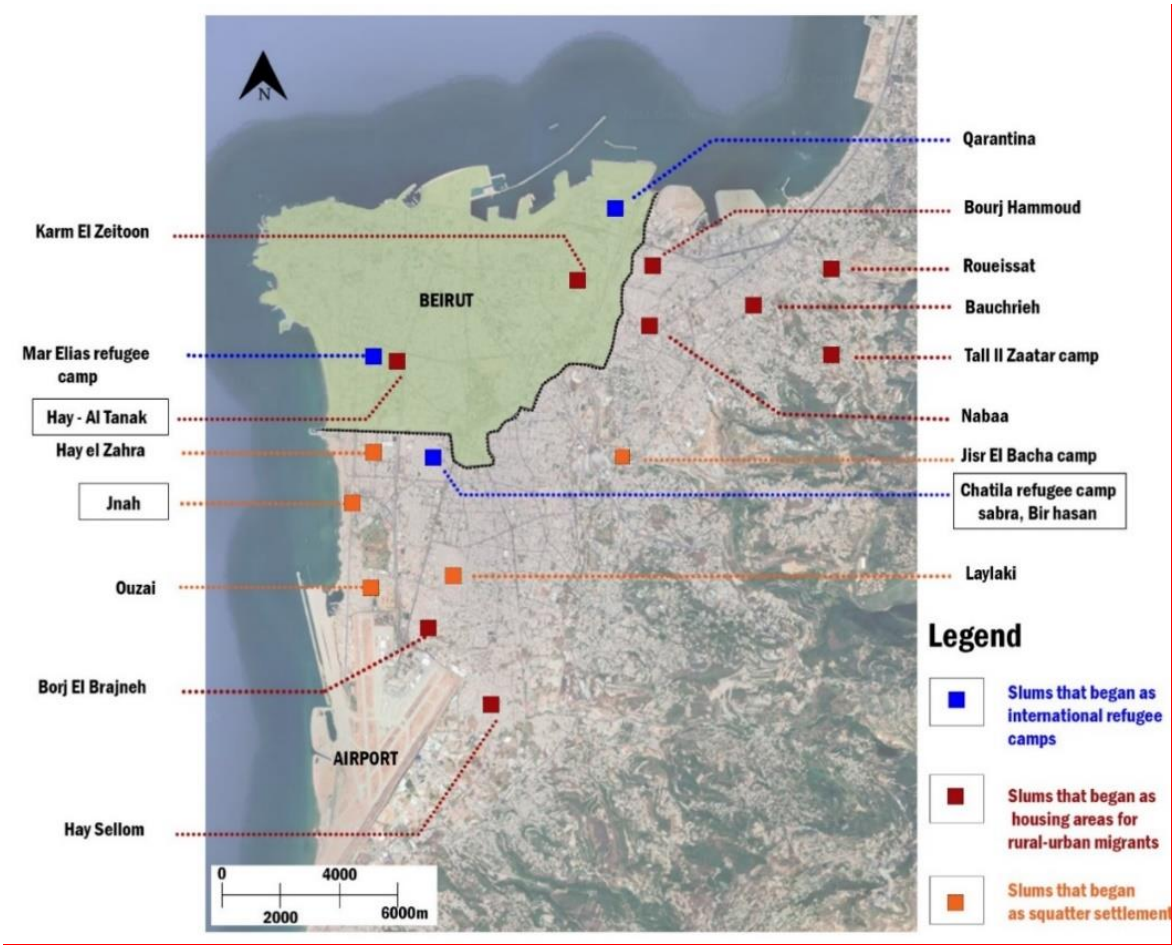

***Figure 4**. Typology of informal settlements in the metropolitan area of Beirut as a result of their different typology, nature, and origin. The case studies: Hay–Al Tanak, Al-Ouzai/Jnah, and Sabra and Shatila Camp. Source: Satellite image sourced from Google Earth, captured (2022), elaborated by the Author.*

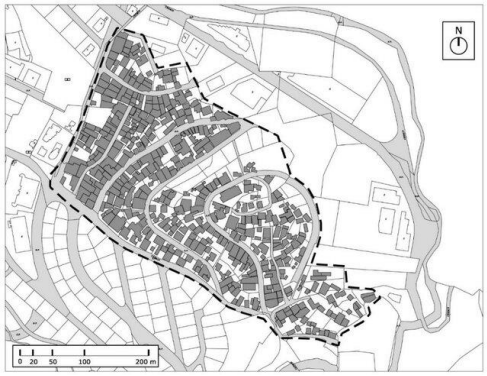

***Figure 5**. Rouweissat neighbourhood. Urban fabric. Source: Hassan Zaiter*

***Figure 6**. Rouweissat neighbourhood. Urban fabric. Source: Hassan Zaiter*

The selection of the three case studies was guided by multiple criteria, including their alignment with the research objectives, accessibility of the sites, applicability of the research methodology, and feasibility of data extraction, specifically, the collection of qualitative and spatial data through methods such as field observations, interviews with residents, conducting surveys, and participatory mapping exercises. The main focus was placed on selecting extreme cases that define specific typologies that encompass the full spectrum of cases in Greater Beirut, as well as exemplary cases that represent critical scenarios. The logic behind this approach is that the conclusions drawn are likely to apply to all cases within the same typology. However, sampling criteria are specified, and cases that meet the characteristics of the pre-specified criteria are selected for in-depth study. Each neighbourhood represents a distinct characteristic based on historical events, demographic structure, physical characteristics, and geographical location that offer a suitable framework for testing how physical improvement can contribute to social, economic, and environmental development.

Hay -Al Tanak neighbourhood:

The selection of Hay Al-Tanak was motivated by its location with urban core of the Beirut district (see **Figure 7**), which reflects a distinctive pattern of urban deterioration and segregation. It is also considered one of the most precarious neighbourhoods among other cases. The neighbourhood is an example of a settlement that initially grew to accommodate rural-urban migration and later developed into a squatter settlement. The name Hay Al-Tanak which translates to "the tin neighbourhood" reflects its structure. It is inhabited mostly by members of the Druze community, who migrated from the Lebanese mountains and Jabal al-Druze in Syria. The neighbourhood developed on a plot of land measuring 13,481 square meters; an area characterised by disputed property rights. It is characterised by high density of population and suffers from poor technical infrastructure. In addition, it faces severe social, economic and environmental challenges ((Fawaz. M,; Peillen. I., 2003, pp. 19-20).

***Figure 7**. Urban core settlement, Hay -Al Tanak neighbourhood. Source: Satellite image sourced from Google Earth, captured (2023), elaborated by the Author.*

Al-Ouzai/Jnah neighbourhood:

Ouzai/Jnah is a disadvantaged coastal neighbourhood, located in the southwestern suburbs of Beirut (see **Figure 8**), highly vulnerable to the impacts of climate change. Projected climate scenarios are expected to exacerbate risks by increasing the frequency and intensity of extreme natural hazards, including floods, heatwaves, droughts, landslides, storms, wildfires, hurricanes, coastal erosion, and marine disturbances. The emergence of this area began with land development initiatives. The land in the southwestern area of Beirut began to be parcelled in the 1930s under the French Mandate, although Beirut's city border reached the north of the area as early as 1914. Dunes and forests cover the largest part of the area. After the establishment of the airport in 1936, more attention was drawn towards the South. In the 1930s, the first beach resorts started to be planned and built on the north of the coastline. At this time, the city reached the area and wished for beach resorts to evolve, as tourism was becoming popular. The next step in the development of this area was connected with beaches that were closed to the wider public and became private (Burckhardt & Heyck, 2009, p: 18,22). During the 1960s, the beach resorts were developing and from this time, the degradation of the coastline began. Later on, the sprawl of informal settlements is visible in this place, triggered by the Lebanese civil wars (1975, 1990) and two Israeli Invasions (1978 and 1982), and the Israeli occupation of South Lebanon (1978 to 2000). Nevertheless, squatting and informal settlements have existed in the Al-Ouzai/Jnah area since the 1950s. The Israeli invasions of southern Lebanon in 1978 and 1982 forced thousands of families to flee to the southern suburb of Beirut, which led to them occupying the vacant hotels and transforming them into housing blocks. Other structures were modified through the addition of more floors, and new houses were also built through encroachment on land (Burckhardt & Heyck, 2009, p: 26, 30). The fallout from the war had a strong impact on the Al- Ouzai/Jnah coastline in particular, where refugees from Qarantina and Palestinian camps settled in the area.

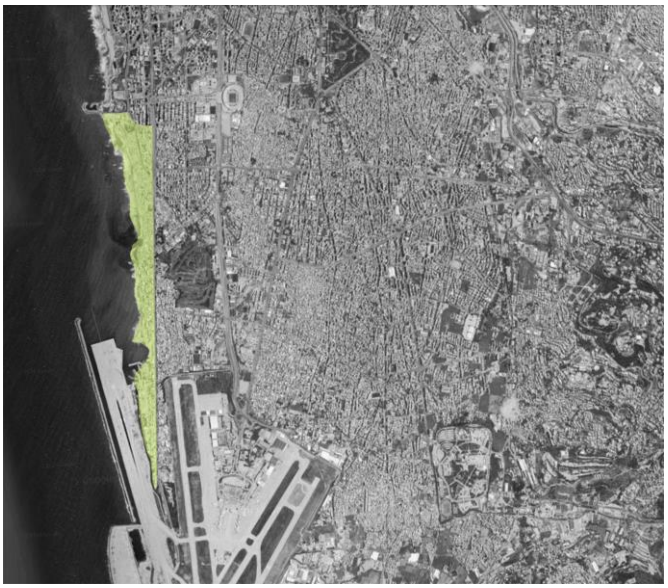

***Figure 8**. Waterfront Settlement, Al-Ouzai/Jnah neighbourhood. Source: Satellite image sourced from Google Earth captured (2023), elaborated by the Author.*

Sabra and Shatila neighbourhood:

Sabra and Shatila can be considered of great contextual interest due to its unique and representative status, which should offer valuable lessons and understanding regarding its degraded urban and socio-economic structure. In addition, it is a great example for interstitial easements lining transport and deeper urban spaces behind the formal street walls. located in the southern suburbs of Beirut, from the north aligned by the border strip of the Beirut district. It belongs to the municipality of Ghobeiry and is located in the Mount Lebanon Governorate (see **Figure 9**). The neighbourhood emerged in the context of the 1948 Arab-Israeli war (Nakba) and the influx of Palestinian refugees into Lebanon and developed during the 1960s when temporary huts were built illegally on private land, mainly by families who fled from southern Lebanon. During the Lebanese Civil War (1975-1990), the area was the scene of frequent clashes, resulting in widespread physical destruction and the displacement of existing refugees. After the end of the civil war, Sabra and Shatila became a point of interest for many non-Palestinians, including illegal immigrants and domestic workers, as well as Iraqi and Syrian refugees (Fawaz & Peillen, 2003). After the end of the civil war (1998-1990), the neighbourhood became a point of interest for many non-Palestinians, including illegal immigrants and domestic and national workers, mainly Ethiopians and Egyptians, as well as Iraqi and Syrian refugees(source?). With the outbreak of the Syrian war in 2011, the arrival of displaced Syrians to the area contributed to changes in the demographic characteristics of the neighbourhood, as Syrians became the largest non-Lebanese group.(UNHCR, 2020).

***Figure 9**. Easement Settlement, Sabra and Shatila neighbourhood. Source: Satellite image sourced from Google Earth, captured (2023), elaborated by the Author.*

1.5. Thesis Design

The thesis design aims to establish the conditions necessary for effective data collection and analysis, ensuring alignment with the research purpose throughout the process. It outlines the key components of the study, including its focus, rationale, geographic scope, required data types, data sources, collection techniques, and methods of analysis and presentation. As such, the research design defines a logical sequence for gathering and interpreting data, ultimately leading to the conclusions drawn in response to the research questions

This thesis includes an overview and five published articles (Paper I-V), each contributing independently to the overall study and addressing specific topics and case studies (see Error! R eference source not found. on page 33). The thesis is designed as follows:

The design of this thesis follows a structured and interconnected approach, ensuring coherence between the problem formulation, research objectives, methodological framework, and findings.

The study begins with the problem area formulation, which identifies key challenges related to degrade urban neighbourhoods in the context of Greater Beirut. This sets the foundation for the research, defining the core issues that the study aims to address. Building on this, the research objectives and questions guide the inquiry, ensuring a focused investigation into the dynamics of informal urbanism, the role of architecture and urban design tools in transforming disadvantaged neighbourhoods, and the pursuit of socio-economic, environmental, and cultural sustainability. To frame the research within a structured academic discourse, a theoretical and conceptual framework is developed. This framework situates the study within existing literature and theories on informal urbanism and economy, well-being, and cultural essence, providing a basis for analysis.

All these foundational elements are directly connected to a city-level informal typological study, which examines Beirut's urban landscape to classify and understand different typologies of disadvantaged neighbourhoods. This, in turn, informs the design of data collection methods, including mapping, interviews, surveys, project assessments, and spatial analyses. These methods ensure that the study captures both macro- and micro-level urban dynamics. For detailed study three cases are selected that define specific typologies that encompass the full spectrum of cases in Greater Beirut.

The thesis follows a paper-based format, where each appended publication contributes to the overarching research structure. **Paper I** serves as an umbrella that provides an overarching framework for understanding the broader research theme introduces the overall objective, links all subsequent case studies, identifies the location and characteristics of informal settlements in Greater Beirut, describes one of the key methods used in the research, provide a concise summary of the main findings, and highlight how these findings align with the research objectives and questions.

Further, it provides macro-level recommendations for transforming informal settlements. Since the first paper established the broader context and addressed overarching themes, particularly the research objective of exploring a possible set of context-appropriate spatial improvements and design strategies and demonstrating how these solutions can drive social, economic, and environmental development within the context of Greater Beirut. There is a critical need for a deeper exploration of a wider range of design solutions and assessing their impact on the three levels. Therefore, the subsequent papers (**Paper II, III, IV, V**) build upon this groundwork. Three case studies belonging to three different typologies have been considered an appropriate opportunity to focus on exploring specific design strategies and actions in detail and examine the socio-economic and environmental impacts of these strategies, offering nuanced insights beyond the initial publication's scope.

Paper II focuses on Hay-Al Tanak, an inner-city neighbourhood that evolved as a settlement driven by international refugee migration**. Paper III** examines Al-Ouzai/Jnah case study, a coastal neighbourhood shaped in response to rural-urban migration. Both case studies, due to their relevance and contextual significance, operate within the domains of architecture and urban design, contributing to sustainability across social, economic, and environmental dimensions. However, particular emphasis is placed on presenting visons revolving around technical design solutions to address the urgent and critical challenges posed by climate change in urban settings.

Paper IV focuses on the third case study, Sabra and Shatila, an easement neighbourhood a deeper urban space behind the formal street walls, evolving as squatter settlements. The research emphasises exploring appropriate-context design solutions and their role in socio-economic development, with a particular focus on how a well-designed built environment can enhance community well-being.

Paper V focuses on a specific area within the third case study, narrowing its scope to the Sabra neighbourhood at a micro-scale. This paper places additional emphasis on social aspects, driven by the neighbourhood’s rich cultural value, which merits both revelation and preservation.

During the broader investigation conducted for **Paper IV**, the Sabra community demonstrated a welcoming attitude and a willingness to engage in participatory efforts. This positive response reinforces the purpose of **Paper V**, which serves as a synthesis of the findings from **Papers I, II, III, and IV**. **Paper V** presents these findings in the form of design guidelines, presenting the best possible spatial improvements derived from the individual case studies and lessons learned from the analysed interventions. It also promotes participatory decision-making, allowing the community to assess and validate the proposed design solutions, ensuring their acceptance and alignment with local needs and aspirations.

The dataset was developed progressively, adapting from one case study to the next in response to site-specific conditions. Lessons learned, along with any shortcomings encountered, were applied to improve the effectiveness of data collection across the different cases. This iterative approach proved especially valuable during initial phase, in which interviews and observation methods were piloted in the Hay-Al Tanak neighbourhood, which served as a preliminary and experimental case. A similar methodology was later applied in the other case studies, with greater precision and heightened awareness. The research also addressed the challenges of generalisation inherent in the case study approach. Rather than aiming for statistical generalisation, the study pursued analytical generalisation, enabling the insights gained from these cases to inform other contexts with similar conditions.

Ultimately, each paper addresses specific research questions, contributing distinct insights to the overall study. While some questions are explored in individual papers, others are examined across multiple papers, allowing for a more diverse and cohesive analysis. Taken together, these findings provide a broader understanding of the topic (see **Table 2**). This process culminates in a discussion that critically engages with the implications of the findings, situating them within broader academic and professional debates about urban transformation, sustainability, and well-being in disadvantaged neighbourhoods. The thesis then moves towards its conclusions, where key points are expressed, followed by recommendations that suggest potential interventions, policy directions, and architectural strategies. Finally, the study identifies future research directions, suggesting areas for further investigation that arise from the findings. It is important to note that the design of the entire thesis follows a cyclical logic, with the conclusions and recommendations responding directly to the formulation of the initial problem area, ensuring that the research remains coherent and systematically addresses the core urban challenges initially identified.

Table 2. *Overview of Research Questions Addressed Across the Paper. Source: Author.*

Paper	***Q1***	***Q2***	***Q3***	***Q4***	***Q5***	***Q6***	***Q7***
Paper I	X	X	X				
Paper II			X	X			
Paper III		X	X		X		
Paper IV			X			X	
Paper V		X	X				X

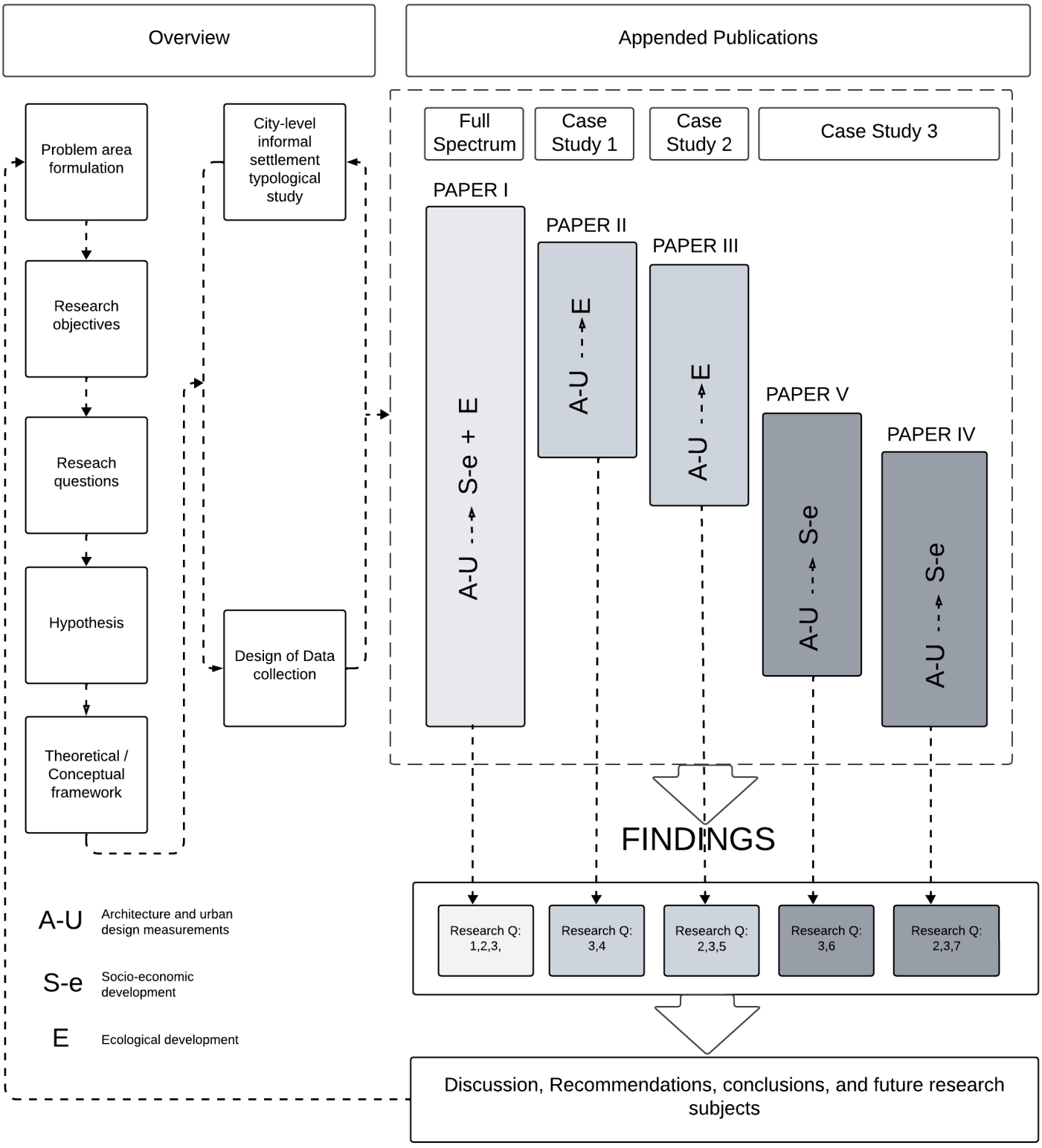

***Figure 10**. The graphical representation of the thesis design framework. Source: Author.*

2 Explored Areas and Identified Knowledge Gaps

This section presents the theoretical foundations and conceptual perspectives that inform and support this thesis. It synthesises themes discussed across the five appended articles: Paper I (Section 2), Paper II (Section 1), Paper III (Section 1), Paper IV (Sections 1, 2, 3), and Paper V (Section 2) and highlights the areas of knowledge that have been critically explored, alongside those that remain underdeveloped.

The literature reviewed engages with diverse strands of urban research and practice, particularly in the fields of architecture, urban planning, and social sciences. It addresses key topics such as slums and informal urbanism, the dynamics between formal and informal spatial practices, the informal economy, socio-cultural identity, urban heritage, and the impact of the built environment on well-being. These domains are highly relevant to the thesis's core aim: to explore how context-sensitive architectural and urban design strategies can serve as tools for advancing equity and improving the quality of life in disadvantaged neighbourhoods.

Influential thinkers and institutions referenced include M. Davis, A. De Castro, A. Brillembourg, C. MacFarlane, M. Waibel, M. Lombard, H. Sarmiento, Ch. Tilly, T. Cruz, A.K. Sen, N. Salingaros, S.W. Goldhagen, and Colin Ellard, alongside global entities such as UNESCO and UN-Habitat. Their work has contributed to a nuanced understanding of essential concepts, such as spatial justice, informality, resilience, and the intersection of cultural and physical space. The reflections and critiques that emerged from this body of literature have helped clarify the research's conceptual direction and have significantly contributed to identifying knowledge gaps that this thesis seeks to address.

2.1. Slums

One of the most well-known interpretations of slums was presented by Mike Davis in his influential book *Planet of Slums*, where he associated slums with "criminal trade." In his account, the term "slum" does not refer to a place but rather describes a deprived social condition. Davis goes beyond simply diagnosing the phenomenon; he attempts to uncover its root causes, which he primarily attributes to postcolonial neoliberal policies a form of liberalism driven largely by free-market capitalist principles. He notes that in 1950, only 86 cities worldwide had populations of one million or more, whereas by 2005, the year the book was published, there were around 400 such cities. Davis predicted that by 2015, the number would rise to 550. He also emphasises that the future of urbanisation is not the idealised vision of cities made of glass and steel as imagined by earlier generations of urbanists, but rather a proliferation of slums "built largely of raw bricks and thatch, and recycled plastics, cement blocks, and scrap wood" (Davis, 2006).

Among his examples are Quarantina in Beirut, Santa Cruz Meyehualco in Mexico City, the slums of Rio de Janeiro, and the 'City of the Dead' in Cairo, where up to a million people live in shelters made of components from actual graves. Davis defined slums as a synonym for "criminal trade". The term "slum" was not used to refer to a place, but to describe a deprived social condition (Davis, 2006).

In the 20th century, the term "slum" began to be associated with spatial definitions, often used to describe physical manifestations of urban problems. French philosopher Henri Lefebvre introduced the concept of the *Right to the City* in 1968, emphasising the blurring boundaries between urban and rural spaces and the creation of porous zones characterised by uneven geographic development. These zones ignored conventional zoning and often emerged near employment hubs, thereby defining the spatial logic behind slum localisation (Lefebvre, 1968).

A new perspective has emerged that reframes the phenomenon of slums, suggesting that they should not be viewed as the problem per se. Instead, slums are understood as the spatial manifestations of urban poverty, social exclusion, and inadequate or misguided government policies (Sclar & Northridge, 2003). Further, urban planner, Alejandro De Castro, defined slums as the physical manifestation of urban problems related to poverty and/or inequality. De Castro, by analysing the concept of 'slum,' explains that "its construction as a massive problem at a global level demanded an ambiguity that allowed it to adapt both to the different realities and to the expansive interests of the global agencies in charge of solving it" (De Castro Mazarro, 2023).

More recently*, The Global report on Human Settlements 2003: The Challenge of Slums* provides a working definition of slums and offers the first global estimates of the urban slum population. It discusses the local, national, and international factors behind the formation of slums. Socio-spatial and economic analysis characteristics and dynamics of slums. It assesses the impact of major policies on urban slums they have been adopted by governments, civil society groups, and international organisations. Also identify best practices that will enable all relevant actors to overcome the apathy and lack of political will that have been an impediment to progress and move forward with greater determination and knowledge in our joint efforts to help the world's slum dwellers achieve a life of dignity, prosperity, and peace (UN-Habitat, 2003).

In Lebanon, the first study of slums *The Case of Beirut, Lebanon* was published by in 2003 by urban specialists Mona Fawaz and Isabel Peillen. Drawing on qualitative data from Beirut, the authors define slums as areas where the majority of residents live in precarious economic and/political conditions, with high levels of vulnerability, and where services and living conditions appear to be lower than other sections of the city (Fawaz & Peillen, 2003).

2.2. Informal Urbanism and Economy

This research approach requires an understanding of the term informal urbanism and its relationship to urban development. In this sense, back in the early 1970s, the debate about informality began with the advent of the concept of the "informal sector." This occurred as a way to describe the migration of workers to cities in the 1950s and 1960s (Roy & AlSayyad, 2004) which accompanied the phenomena of industrialisation and urbanisation. Later on, by the late 1970s, Moser described the informal sector as the "urban poor," a term associated with people living in slums or informal settlements (Moser & Peake, 1994). At the same time, informal urbanism has been recognized as one of the many existing legitimate processes that contribute to city creation (Boano & Astolfo, 2016). It is also understood that urban informality can range from informal settlements to street vending and informal transportation (Kamalipour & Peimani, 2021). In the context of informal settlements, it is estimated that, at present, more than one billion people live in these settlements, and this number is expected to double by 2030 (UN-Habitat, 2006).

Regarding the informal economy, about two-thirds of the working population of the world are expected to participate in informal sector activities by 2030 (Neuwirth, 2012). The informal economy includes, among others, activities such as street vending and informal transport; these provide job opportunities, generate income for the urban poor, and bridge formal urban development gaps by negotiating space and visibility in the public sphere. As a result, described urban informality as a specific mode of production and organisation of space. It acts as a hub for managing the pressing challenge of poverty and thus becomes an integral part of providing sustainable livelihoods (Roy, 2015).

2.3. Formal and Informal spaces

For the purpose of this research, it is important to develop a better understanding of how formal and informal urban spaces are defined based on different forms and systems that can be differently conceptualised as territorial formation (slum/city), categories of particular economic groups (informal and formal labour), forms of organisation (structured/unstructured), and as modes of city manifestations (McFarlane & Waibel, 2012). Informal settlements and slums exist in urban contexts all over the world. Urban informality is more visible in cities of the Global South where this phenomenon is dominant, taking into account cases such as Kibera (Nairobi, Kenya), Medellin (Colombia), Rocinha (Rio de Janeiro, Brazil), Dharavi (Mumbai, India), Dulce Nombrede Jesús de Petare (Caracas, Venezuela), Khayelitsha (Cape Town, South Africa), Ciudad Neza (city in Mexico), and Garbage City (Cairo, Egypt) (see **Figure 11**).

In the context of Lebanon, the term "Informal Settlements" was used for the first time in the Lebanon Crisis Response Plan, between 2017 and 2020. It referred to poor and illegal urban environments, which were established without the intervention or support of the official Lebanese authorities and in response to the needs of the population for temporary shelter (UNHCR, 2019). However, each of them is different, as is the political and social situation in these places, and also can be found in developing countries in different measurements as housing informality and substandard living conditions.

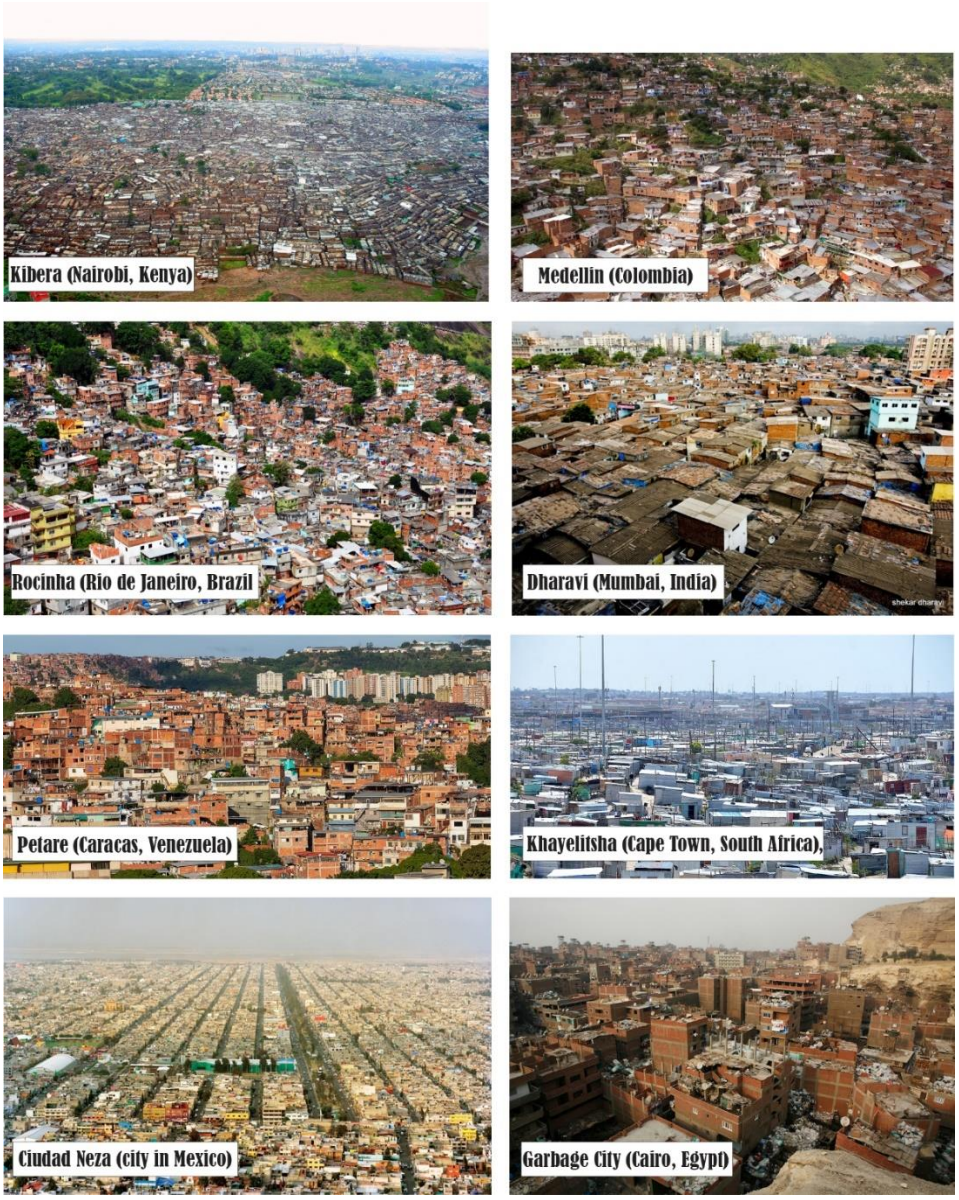

Figure 11. *Examples of well-known slums and informal settlements on the global level. Source: Google images.*

2.4. Built Environment and Well-being

In recent years, unprecedented global challenges have heightened interest in well-being, making architects, urban planners, medical professionals, and policymakers more aware of the profound connections between our mental and physical health and the built environments we inhabit, looking for an integrated approach to creating well-being through built environments (Turnbull, 2021). Despite this awareness, interdisciplinary studies on design and well-being often exclude vulnerable communities and disadvantaged neighbourhoods, resulting in a knowledge gap. Part of this thesis addressed this gap and emphasises the ethical responsibility to explore and address health issues and design processes in such neighbourhoods. Also, to promote the idea of how places can shape human behaviour and influence the cognitive mind of production and satisfaction which is consistent with the aim of this research: looking for the best possible scope that strictly deals with physical improvement (satisfactory built environment in disadvantaged areas) to contribute to the generation of satisfactory human settlements (This point is a core issue for **Paper IV**)

One of the basic principles of behavioural science is the realisation that the nature of the built environment plays a pivotal role in shaping our identity and well-being. This principle highlights the profound influence that our surroundings have on our thoughts, actions, and interactions. Park (1967) argued that the kind of city and spaces we desire are inherently intertwined with the type of people we aspire to be, the social connections we cultivate, the natural environment we value, the technology we adopt, and the cultural values we uphold.

Alexander (2002) suggested in his work a new way of thinking about design and cities. He was interested in human desires for comfort, the spirituality of the place, and other subjective values. In the first book of *The Nature of Order* series he presented fifteen fundamental properties based on the concepts of wholeness and centres, as follows (levels of scale, strong centres, boundaries, alternating repetition, positive space, good shape, local symmetries, deep interlock, and ambiguity, contrast, gradients, roughness, echoes, the void, simplicity, and inner calm, not separateness). He argued that these characteristics, and the vitality they convey, are key to establishing design principles that promote well-being. Salingaros (2007) similarly highlights the attractiveness of urban form and the quality of the built environment in shaping user experience. He explains that the built environment generates neural responses when we absorb information from our senses, which affects human physiological and psychological health. In his book *The Theory of Architecture,* Salingaros defines design as user-friendly and presents the organisation of matter, structure, spaces, and surfaces in a manner appropriate to human health. He further argues that users feel tired and anxious when experiencing random and unstructured environment. The potential built environments to inspire and engage, thereby enhancing users lives, is closely tied to Pallasmaa, (2012) classic theory, which emphasises our experience of the world through a

neglecting other sensory realms. This imbalance impoverishes the built environment, causing feelings of disconnection and isolation. Carmona and De Magalhães (2009) worked on the topic of *Place Shaping and Liveability* in establishing acceptable standards in England; they define twelve measurable elements of local environmental quality: clean and tidy, accessible, attractive, comfortable, inclusive, vital and viable, functional, distinctive, safe and secure, robust, green and unpolluted, and fulfilling. Each of these elements, in turn, represent a complex amalgam of issues that is experienced relatively, in the sense that the experience of it can be either positive or negative. Furthermore, Eleni and Caperna (2021) introduce the concepts of "Biourbanism" and "Biophilia" as a new way to design or revitalise cities and neighbourhoods. These are new planning tools that focus on social and economic regeneration through the development of healthy communities. The concepts integrate technical aspects such as energy efficiency and zero emission with promoting social sustainability and human well-being. This paradigm endorses principles like geometrical coherence and biophilic design in urban design and policies to ensure man-made changes are not harmful to humans

Numerous studies suggest that green spaces help people cope more effectively with stress and personal conflicts. Several subsequent studies also confirm that regular access to nature reduces crime, relieves stress, and enhances cognitive abilities. Landscape designers Navarrete-Hernandez and Laffan (2019), demonstrated this by simulating images of streets with and without green spaces establishing a causal relationship between the presence of plants in streetscapes increasing happiness and decreasing stress. The presence of nature indoors, for example, incorporating greens into interior spaces, increases the well-being of those in offices, classrooms, and hospitals (Larsen et al., 1998).

Another important issue is reviewed in the subsection related to how humans experience spaces and how these experiences affect our well-being. Experiencing spaces is fundamental to our physical and mental health. This interaction occurs through filtering and interpretation of the myriad of elements and objects (geometry, colours, proportions, light, ornaments, patterns, and texture) that are encountered through a multisensory experience including sight, touch, sound and smell (Adams & Tiesdell, 2013). Visual perception is often conceded as the dominant sense in experiencing built environments, as it enables us to observe and assess features. For instance, curved spaces evoke greater pleasure and arousal compared to linear ones (Banaei et al., 2017), high ceilings and the presence of wood increase positive feelings measured at the neurophysiological level (Tsunetsugu et al., 2005). Angular objects can subconsciously dampen playful impulses, while rounded shapes promote lively and engaging interactions, turning spaces into hubs of activity (Lee, 2018, p. 142). Exposure to natural light plays an important role in regulating the circadian cycle, our biological clock (Bedrosian & Nelson, 2017); it boosts our energy, focus and productivity during the day while promoting relaxation and improving sleep quality at night.

Adequate sleep is essential for enhancing creativity and facilitating problem- solving abilities (Andréa De Paiva, 2018). Using natural materials and texture in our built environment stimulates not only our visual and tactile systems but also our proprioceptive system. Compared to metal, wood maintains a fairly constant temperature. The way we evaluate surface materials and textures goes through different systems in the brain, and this system includes our emotional salience (Gibson, 2017). Research shows that people integrate with complex patterns, as they aid in making sense of the environment. In contrast, simple patterns can cause stress, as studies measuring cortisol levels have shown that walking through monotonous streetscapes raises cortisol levels. People naturally seek cognitive stimulation and enjoy built environments that offer variety and dynamic changes (Goldhagen, 2020). Other elements, such as sounds and noise, can provide subtle cues as to the identity or proportions of a space and even hint at its function (Blesser & Salter, 2009). In places where noise protection ordinances are absent, the user's well-being is in extremely deteriorating condition. When the noise level exceeds the normal range due to a high density of people in one place and heavy traffic sounds at the same time, it leads to aggressive behaviour and increased susceptibility to mental illness (Hornberg & Pauli, 2011). Additionally, the smells we experience in built environments vary widely, ranging from unappealing to appealing odors. These factors greatly influence how people perceive and experience their surroundings (Spence, 2020).

2.5. Cultural Essence and Development in Disadvantaged Neighbourhoods

Envisioning a new urban future requires reevaluating the way we view disadvantaged neighbourhoods. These areas are home to vulnerable communities that hold significant cultural values. In this sense, the discussion highlights the importance of restoring the cultural significance of residents in disadvantaged neighbourhoods within development initiatives (This point is a core issue for **Paper V**).

Culture gives quality and value to the meaning of everyday life and is fundamental in the development of societies. Poor urban areas have piqued the strong interest of researchers and experts from various fields because of their complex nature. This complexity acts as the centre of everyday life, from social and economic networks to homes. So, what is crucial in this process is the recognition that these communities have their local knowledge that is embedded in daily practices and is not formally defined or learnt in a formal setting. To emphasise this, we bear witness to Bansal and Gandhi (2012), who published stories in their book*, Poor Little Rich Slum*, about people living in one of the largest slums in India, Dharavi, with a population of 1 million. The authors developed this book based on interviews and several slum walks. The real stories written in this book imply a strong sense of belonging to a place. It also highlighted some facts

associated with the different interventions (improvement, clearance, and redevelopment) in Dharavi and addressed findings and feedback towards these interventions. This critically demonstrates a better understanding of the cultural value in such spaces and draws attention to the goal of this research in terms of the relationship between delivering a quality-built environment through transformation activities and user satisfaction and how it can be achieved (Bansal & Gandhi, 2012). Furthermore, we bring evidence relying on the Can Xue (2020) novel, *I Live in the Slums*, in which the writer presents a collection of stories set in the slums. The narrators in the novel craft a unique picture of the lifestyles of slum dwellers in different types of spaces. As a result of the daily struggle for survival, various human activities and practices seemed to respond appropriately to the nature and conditions of these places. This culture seems to be the essence of survival and continuity in slums (Xue, 2020).

Planning standards and practices often focus on identifying and preserving buildings, neighbourhoods, and heritage sites. However, in many disadvantaged neighbourhoods especially those shaped by informal or semi-formal development, these efforts frequently overlook the lived cultural and spatial complexities present within them. From an aerial perspective, such areas may appear as dense, compact clusters of rooftops seemingly impenetrable. Yet on the ground, these neighbourhoods are dynamic, evolving, and socially rich environments. The viability of these neighbourhoods does not emerge in isolation but depends significantly on the presence and support of the state.

This research build on the framework established by Goal 11 of the United Nations Sustainable Development Goals (SDGs), which pledges to make cities 'inclusive, safe, resilient, and sustainable' (United Nation, 2022). This cannot be achieved without proper planning, which includes fostering a sense of place and belonging. In line with this, UNESCO's Historic Urban Landscape (HUL) approach calls for the integration of urban heritage conservation with social and economic development objectives (UNESCO, 2013). This perspective aligns with the core argument of this thesis, particularly in Paper V, which emphasises the cultural significance of residents in shaping sustainable development pathways.

Further aligning with these concerns, Habitat III, in cooperation with UNESCO, issued a paper entitled *Urban Culture and Heritage*, which calls for a new paradigm in urban development. This paradigm must" rehumanise" urban environment, both by adapting scale and by cultivating a sense of social cohesion and belonging. It advocates for reducing segregation, increasing equity in the distribution of urban resources, and fostering inclusive governance (United Nations, 2016). These values resonate with the overarching aim of this thesis: to explore how culturally grounded planning approaches can support just, resilient, and meaningful regeneration in disadvantaged urban settings.

Culture, as the literature increasingly affirms, is no longer a peripheral concern in urban planning but a cornerstone of sustainable development. As Duxbury et al. (2016) note, the international community now recognises culture as a key innovation within the New Urban Agenda and an essential component of strategic urban planning. This aligns closely with the insights of Amartya Kumar Sen (1999), whose seminal work *Development as Freedom*, deepen our understanding of the role of culture in human development. Sen argues that freedom is a fundamental goal of development and a means to achieving other dimensions of well-being. At the heart of this lies the role of local culture, which enables individuals to regain meaning, dignity, and agency in their lives. According to Sen, prevailing cultural values also shape economic and political relations, influencing levels of trust, the prevalence of corruption, and the strength of civic engagement. This conceptual foundation is particularly relevant to the case studies and arguments presented in this paper, particularly in Paper V, which examines how cultural identity and local values can be refocused in urban transformation processes. By highlighting the cultural essence of deprived neighbourhoods, this paper calls for planning approaches that are not only spatially inclusive but also ethically grounded, engage with the local context, and empower the community.

2.6. Theoretical Perspectives Toward Development Approaches

A review of both historical and contemporary approaches to the research topic has facilitated an understanding of the existing body of knowledge surrounding disadvantaged neighbourhoods, particularly about development and transformation strategies. This review encompasses an array of theoretical frameworks, planning paradigms, and design interventions within the fields of urban planning, architecture, and social development. Critically engaging with this literature has also made it possible to identify key gaps and limitations in current understanding, especially regarding the socio-spatial complexities and cultural dimensions of slums and informal settlements. While numerous studies have addressed the physical upgrading of these areas, few have sufficiently examined how transformation processes intersect with issues of cultural identity, community cohesion, or user satisfaction. Some core concepts and approaches to intervention in disadvantaged neighbourhoods (including slums and informal settlements) are identified and discussed here through different scholarly lenses.

Jane Jacobs (1993; 2011) was one of the earliest critics of slum clearance, arguing that does not respect the needs of the dwellers, and advocates for a certain scale and character of the urban fabric to support a diverse social ecosystem of interests, activities, and people. She clarified the danger of displacement and considered it a crime against identity. In a more recent context, Bansal and Gandhi (2012), highlight some facts associated with the various interventions (improvement, clearance, and redevelopment) in Dharavi, and address the negative findings and feedback toward this intervention which did not achieve overall success. This critically demonstrates a better understanding and drew attention to the aim of this research in terms of the relationship between

delivering a quality-built environment through the transformation activities and user satisfaction and how to achieve it. Moreover, Judith A. Hermanson (2017) highlighted that since most of the growth in rapidly developing countries is taking place in informal settlements, she drew attention to comprehensive sustainable strategies that emphasise the role of community engagement and participation in this process to achieve equitable development (Gray & Ocampo, 2017). Adding to this, the Informal Urbanism Research Hub (InfUr), based at the Faculty of Architecture, Building and Planning at the University of Melbourne, has made significant contributions to understanding the physical characteristics of informal settlements. The researchers map the emergence and transformation of street and laneway networks, as well as building forms, across a wide range of informal settlements and slums. By analysing building types, plots, blocks, streets, and lanes, they aim to uncover the informal rules or spatial logic embedded within these morphologies. This emerging body of research sheds light on how informal settlements function to generate habitable land, affordable housing, and public space. As Dovey et al. (2020) suggest, these findings offer a valuable knowledge base for understanding how such practices may or may not result in 'slum' conditions, how upgrading efforts can be improved, and how informal processes might be anticipated and constructively harnessed.

While various programs in poor urban areas, such as participatory planning and community-led development, seek to empower people to make decisions about their lives, institutionally and organizationally, we are not yet able to see these principles put into practice. This gap between theory and execution underscores the need for more effective integration of participatory approaches in formal planning and policy systems.

2.7. Contemporary Programs and Policies

A review of contemporary urban policies and programs reveals a persistent tension between exclusionary and integrationist strategies in developing deprived neighbourhoods. Over the past decades, a wide range of approaches has emerged, ranging from large-scale clearance and relocation, site-based development, and participatory development. These responses reflect broader shifts in urban governance, development ideologies, and social and political priorities, yet many remain unable to address the multidimensional challenges faced by low-income urban communities. It is important to recognise the diversity of these strategies, particularly as they directly impact the physical form, social cohesion, and long-term sustainability of deprived neighbourhoods. Given that this thesis focuses on the transformation of deprived areas, particularly in contexts of social and spatial marginalisation and informality, understanding these contemporary practices is crucial. They reveal not only effective policy instruments but also the underlying values and power dynamics that shape urban futures. The strategies identified in the literature are as follows:

Forced Eviction and Clearance Strategies: Despite growing global recognition of the right to adequate housing and the importance of inclusive urban development, eviction remains a widespread practice, often justified in the name of urban renewal, infrastructure development, or environmental risk mitigation. These clearances are frequently framed as necessary or temporary measures, yet they cause long-lasting harm to the communities they displace. Typically implemented without sufficient consultation, legal safeguards, or viable alternatives, eviction policies have faced increasing criticism for exacerbating urban inequality and deepening social exclusion (UN-Habitat, 2011). Numerous cases illustrate how eviction, frequently justified through discourses of modernisation, safety, or beautification, has led to the displacement of tens of thousands of residents, with minimal consideration for their rights, livelihoods, or social networks. At the local level, The Elissar Project[7], proposed in the early 1990s, aimed to demolish parts of the disadvantaged neighbourhoods / informal settlements in Beirut's southern suburbs, including Jnah, Ouzai, and Sabra, and redevelop the area into tourist and service areas (see **Figure 12**). However, forced eviction attempts, often involving the army and bulldozers, met with fierce resistance from local communities and influential families, ultimately leading to the project's demise (Harb El Kak & Abu Zeïd, 2002).

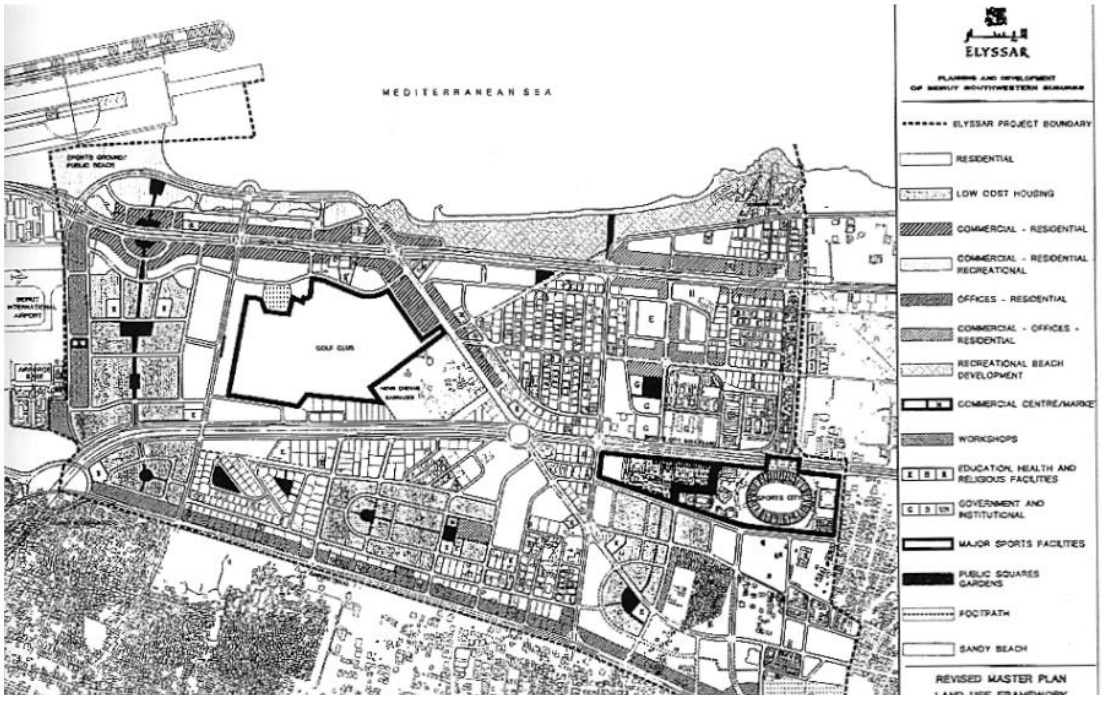

***Figure 12**. Elyssar master plan for transformation of the southern suburbs of Beirut. Source: Dar Al-Handasah, 1996*

[7] Elyssar's plan, named after the company responsible for its design, was conceived to guide Beirut's post-conflict reconstruction. It envisioned the development of all primary and secondary roads, essential infrastructure, and public services, along with the construction of over 10,000 affordable housing units over a 14-year period. The project also included manufacturing parks, warehouses, and workshop centres. Central to the plan, however, was a scenario of urban violence and displacement, whereby residents of informal settlements were to be relocated.

At international level, since late 2021 and into early 2022, Saudi authorities have undertaken large-scale evictions across the country, frequently without prior warning. In Jeddah, the second largest city, the demolitions of neighbourhoods many homes to immigrants and working-class communities have occurred with little notice or provision for compensation or alternative housing (See **Figure 13**). Although these projects are being proposed as part of a national economic strategy to create modern urban areas, they risk erasing the city's diverse and cosmopolitan identity and Similar patterns of eviction and displacement have been observed elsewhere: in Burundi (2003-2004), where recurring conflict displaced tens of thousands monthly; in Cameroon (2005), where settlements in the Bastos and Njongolo neighbourhoods of Yaoundé were demolished with short notice; and in Egypt (2004-2005), where slum clearance initiatives displaced families without adequate compensation, often relocating them to expensive and inadequate housing far from their communities of origin (COHRE, 2006).

***Figure 13**. Demolition of neighbourhoods In Jeddah to make way for a new development. Source: Sebastian Usher*

Self-help housing / Sites-and-Services (S&S) Schemes: Self-help housing approaches such as Sites-and-Services (S&S) schemes were widely implemented across the Global South between the 1970s and 1990s to address urban displacement (Wakely, 2014). These programs provided low-income families with serviced plots on the urban periphery, allowing them to incrementally build homes. Although rooted in the idea of housing as a productive asset, many of these schemes were later abandoned, often evaluated prematurely using narrow success criteria.

The Ambedkar Nagar resettlement project in Chennai, initiated in the 1990s, serves as a key example illustrating both the promise and limitations of S&S approaches. While the project offered legal tenure and basic infrastructure, the remote location, insufficient transport connectivity, and limited economic opportunities led to profound social and economic isolation (Van Eerd & Schelkshorn, 2024). The lack of sustained government support and limited access to credit further limited residents' ability to improve their homes, often resulting in living conditions worse than those in their original informal settlements. However, despite these structural deficiencies, many residents engaged in incremental improvements over time, such as consolidating plots, constructing one- to three-story buildings, adding balconies and rooftops, and paving local streets. The small plot sizes encouraged vertical expansion, highlighting the role of housing as a productive asset and a base for long-term adaptation (see **Figure 14**). Similar challenges were observed in other cities for instance, Nairobi (1980s–1990s), families were resettled with basic services, but remote locations, limited economic opportunities, and poor maintenance undermined their livelihoods. In Dhaka, Bangladesh (1980s), relocated residents often returned to slums due to isolation and poor infrastructure at resettlement sites. In Manila, Philippines (1970s and 1980s), the government provided serviced plots, but poor job opportunities and incomplete infrastructure reduced the program's effectiveness. Ahmedabad, India (1990s) experienced similar challenges, with families evicted from central slums facing social unrest and inadequate services in their new locations (Rondinelli, 1990). Ultimately, although site and service schemes offer an alternative to direct eviction without resettlement, critics argue that they often re-establish rather than resolve poverty, leaving families in even more precarious and disrupted living conditions than before.

***Figure 14**. Many houses were given one, two, or even three stories, plots and houses were combined, balconies and rooftops were built, and streets were paved. The small plot sizes encouraged the gradual vertical expansion of houses. Source: Maartje van Eerd & David Schelkshorn.*

On-site slum upgrading On-site Slum Upgrading has gained prominence as a sustainable and socially responsible approach to improving informal settlements and slums without displacing residents. These programs focus on enhancing existing neighbourhoods by providing incremental improvements to infrastructure, such as sanitation, drainage, roads, water supply, and public spaces, while maintaining residents' social networks and economic activities. Community participation and ownership are central, empowering residents to actively plan, implement, and maintain upgrades (UN-Habitat, 2003). A noteworthy local example is the rehabilitation of Al-Jazzar Street, where 22 building facades were refurbished, improving traffic flow and street safety (see **Figure 15**). This was a community-led development initiative (UN-Habitat, 2021). However, despite the valuable physical improvements, the project lacks a deeper integration of context-sensitive architectural and urban design strategies. While community engagement was part of the process, the project does not demonstrate how cultural identity, local heritage, or key features of the place were reflected in the design. Furthermore, the focus remains on rehabilitation and technical solutions, without addressing broader transformation strategies that could respond to the changing needs and potential of the neighbourhood. There is also little evidence that the project systematically considered how physical design can enhance social well-being or climate change resilience as part of a long-term, sustainable urban transformation.

***Figure 15**. A view from El Jazzar Street in Sabra, Beirut. Renovated building façades line both sides of the street, which has been newly paved with stone. Several residents, including children and adults, are seen actively using the space. Source: UN-Habitat Lebanon.*

One notable example at the international level is the Favela-Bairro Program (1995–2000) in Rio de Janeiro that represented a paradigm shift from slum clearance to on-site development. The project focused on upgrading informal neighbourhoods by providing basic sanitation, street paving, underground infrastructure, and shared spaces, enhancing integration between the formal and informal city (see **Figure 16**). While it resulted in better living conditions and property values, limited social support and community involvement were noted as drawbacks (Perlman, 2011). Similar examples as The Orangi Pilot Project in Karachi (1980s–Present) is a landmark community-led initiative where residents contributed labour and resources to build sanitation systems, resulting in improved health outcomes and sustainability (Hasan, 2006). Medellín's slum upgrading (2000s–Present) combined infrastructure investments with social programs and innovative transport solutions to enhance mobility and social inclusion in hillside settlements (Meninato & Marinic, 2024). In Nairobi's Kibera (2009–Present), incremental improvements supported by government and NGOs have improved sanitation and housing, but progress is slowed by funding and tenure challenges (Kiyu, 2015). Lastly, Thailand's Baan Mankong Program (2003–Present) offers grants and loans to communities to upgrade housing and infrastructure in situ, securing tenure and fostering empowerment.

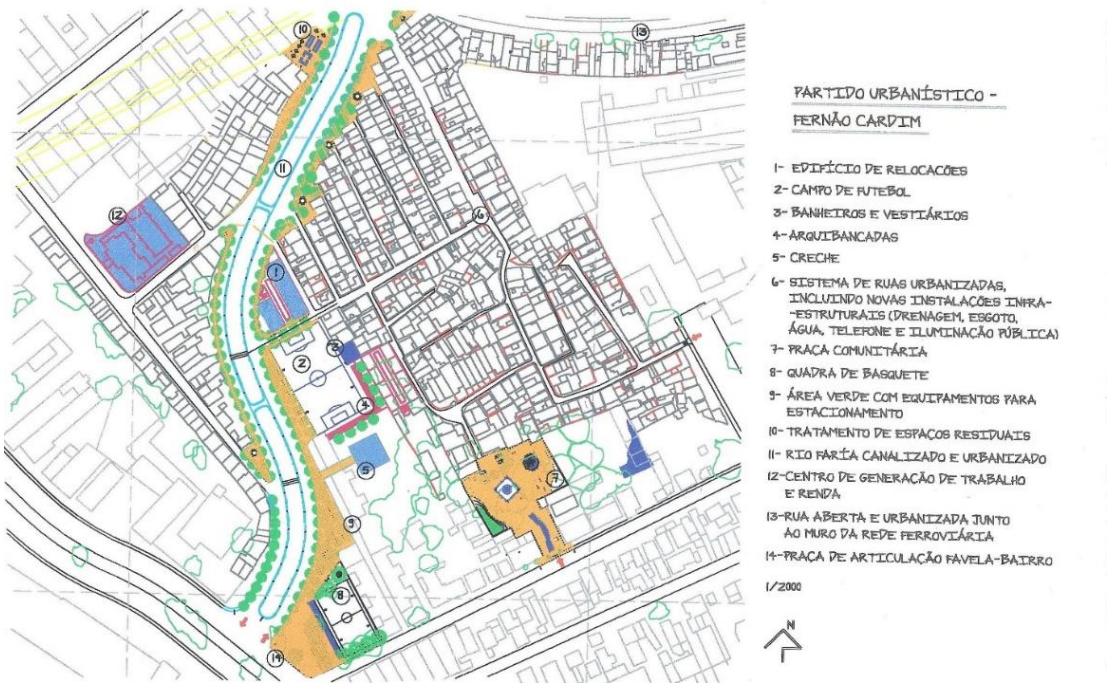

***Figure 16**. Plan for Favela Fernao Cardim (Rio de Janeiro). Source: Jorge Mario Jauregui*

Despite the growing recognition of on-site upgrading as a socially just and sustainable approach to improving informal settlements, several persistent gaps and challenges continue to limit its effectiveness and long-term impact. A major issue lies in the reliance on one-size-fits-all approaches. Many upgrading initiatives apply standardised technical solutions that overlook the unique social, cultural, and spatial dynamics of individual communities. This often undermines the relevance, adaptability, and sustainability of interventions. In addition, technical and spatial limitations also present significant barriers particularly in densely built environments, where limited physical space can obstruct the installation of essential infrastructure such as sewage systems, drainage, and access roads. In such cases, upgrades often require deblocking or partial demolition, which may provoke resistance and lead to social disruption. Moreover, underfunding remains another critical obstacle. Many upgrading programs operate with constrained budgets, resulting in fragmented or incomplete interventions that cannot be sustained over time. The lack of long-term maintenance strategies further exacerbates this issue, as infrastructure and services often deteriorate soon after implementation, eroding the gains achieved. Moreover, while community participation is widely endorsed as a guiding principle, it is frequently superficial in practice. Many programs fall short of meaningfully involving residents in planning and decision-making, resulting in mismatched priorities and limited community ownership. Insecure land tenure also discourages resident investment in home improvements and contributes to uncertainty about future displacement. In addition, upgrading efforts often focus narrowly on physical infrastructure, without addressing broader dimensions of urban integration such as transport access, healthcare, education, and public spaces. The absence of coordinated, city-wide planning diminishes the long-term effectiveness of these initiatives, isolating upgraded settlements from the larger urban fabric.

2.8. Summary - Identified Research Gaps

Despite decades of efforts to develop slums and informal settlements, especially in the Global South, gaps remain in both the theory and practice of sustainable urban transformation. While many interventions have focused on improving physical conditions through infrastructure, housing, and public service provision, these efforts often fail to produce long-term, transformative change. They typically adopt standardised technical models that overlook the deep social, cultural, and spatial specificities of each context. This has limited their ability to respond effectively to local needs or generate sustained community resilience.

Contemporary upgrading strategies frequently prioritise “Big-Ticket” policies and large-scale frameworks. While ambitious, these approaches are often difficult to measure, replicate, or sustain, especially when they treat spatial design as a secondary or purely aesthetic concern. This has led to a critical under exploration of the architectural and urban design dimensions of transformation, particularly how these dimensions can advance well-being, environmental sustainability, and cultural continuity in disadvantaged urban areas. Compounding these challenges is the superficial nature of community participation. Although many programs claim participatory intentions, they

often fail to meaningfully engage residents in the design, decision-making, or evaluation processes. The result is a misalignment between community needs and intervention priorities, weak local ownership, and limited long-term impact. Moreover, a lack of coordination with broader urban systems and the absence of post-upgrading maintenance leaves many projects fragmented and short-lived. In complex, high-density environments like those found in Greater Beirut, spatial constraints and contentious land tenure further limit the feasibility of conventional technical upgrades. Space limitations, political tensions, and chronic underfunding undermine efforts to reconfigure infrastructure or implement top-down plans. These realities highlight the need for design strategies that are adaptive, inclusive, and deeply rooted in local contexts. This research responds to these gaps by advocating for a paradigm shift from, technocratic upgrades to holistic, design-led urban transformation. It positions architecture and urban design not as aesthetical and functional elements, but as strategic tools for addressing systemic inequalities and enhancing spatial justice (quality of life). By focusing on the specific challenges of Greater Beirut, the research underscores the importance of place-based knowledge, participatory design, and context-sensitive interventions as foundations for sustainable change.

This thesis contributes to bridging the gap between theory and practice. It Intends to redefine the role of the built environment in advancing community well-being, urban resilience, and cultural preservation. In doing so, it aims to add critical insights to global discussions on equitable urban development, while providing practical frameworks that can inform localised action in similar contexts. Ultimately, this study calls for inclusive, integrated, and reflective approaches that recognise residents of disadvantaged neighbourhoods as active agents in shaping their built environments. It also seeks to lay the groundwork for more equitable, sustainable, and human-centred urban futures, both in Lebanon and beyond.

3 Research Methodology and Data Collection

This section outlines the scientific methods selected for the study and their application to the research subject. A case study approach is adopted, using multiple sources of data and data collection methods. The approach employed in this study is based primarily on qualitative rather than quantitative data, as there is limited definitive information available in terms of statistics. Moreover, the field of research discussed cannot be fully captured through numerical data, as the main interest of the research is oriented toward the physical development and spatial qualities of disadvantaged neighbourhoods, factors that profoundly influence the preservation of cultural essence and the enhancement of community well-being.

In considering the methodological framework, it is important to distinguish between quantitative and qualitative research paradigms. The quantitative approach on the ground supports that the world consists of facts that can be observed and measured, in contrast, the qualitative approach on the ground supports that the world is socially constructed, complex, and always in the process of change. Each approach emphasises the strength of its model. In this research, the priority is to understand why and how things happen, best investigated through qualitative methods that provide data about perceptions, attitudes, and behaviour.

The qualitative method involves the analysis of urban and architectural settings for the selected case studies (phenomenological study). There are many ways in which these settings can be analysed. Based on architectural theorist and urban planner Léon Krier, who defined urban spaces as all kinds of spaces between buildings, and that the space will be consciously perceived as an urban space when there is a clear clarity of its geometric characteristics and aesthetic qualities. By this definition, Krier's concept of urban setting leans more towards the physical structure of the built environment (Krier, 1992). Another approach by Kevin A. Lynch to urban setting is by analysing the physical environment to obtain the perceptual structure of urban space. Lynch identified many of the physical elements that make up the city's legibility and imageability. His theory of urban structure is based on the mental image of the city society in which they live (Lynch, 1960). Another perspective, relating to Danish architect Jan Gehl, focuses on the human scale in creating spaces. Human dimensions are rights and required meanings. Gehl's perspective focuses on the interaction of people (walking, standing, sitting, and protection) and places and how this affects the way settings function (Gehl, 2010).

An understanding of the urban architecture in the selected case studies requires a practical approach that integrates aspects of urban structure analysis. This includes analytical representations of spatial and tectonic features, taking into account different dimensions such as morphology, perception, social dynamics, visual identity, function, and temporality. By employing this approach, the influence of these dimensions and the built environment as a whole on the lived experiences of the selected disadvantaged neighbourhoods can be effectively examined.

The latter includes a literature review of publications such as official documents, reports, and plans conducted using reference management software (e.g., Zotero); mapping through platforms like Google Earth Pro and Adobe Illustrator; and an in-depth field study involving the use of a field diary, direct observations, time-lapse cameras, forage analyses, photo documentation, and both high-resolution cameras and smartphones. Interviews were conducted using an audio recording device, complemented by field notes. Additionally, the analysis and assessment of reference completed projects were supported by tools such as SWOT analysis and multi-criteria decision-making methods. Surveys were evaluated using statistical analysis tools, and data visualisation was carried out in Microsoft Excel. These methods are discussed in detail on pages 55 to 64, while **Figure 17** and **Figure 18** visually illustrate the methodological process and the tools applied throughout the research.

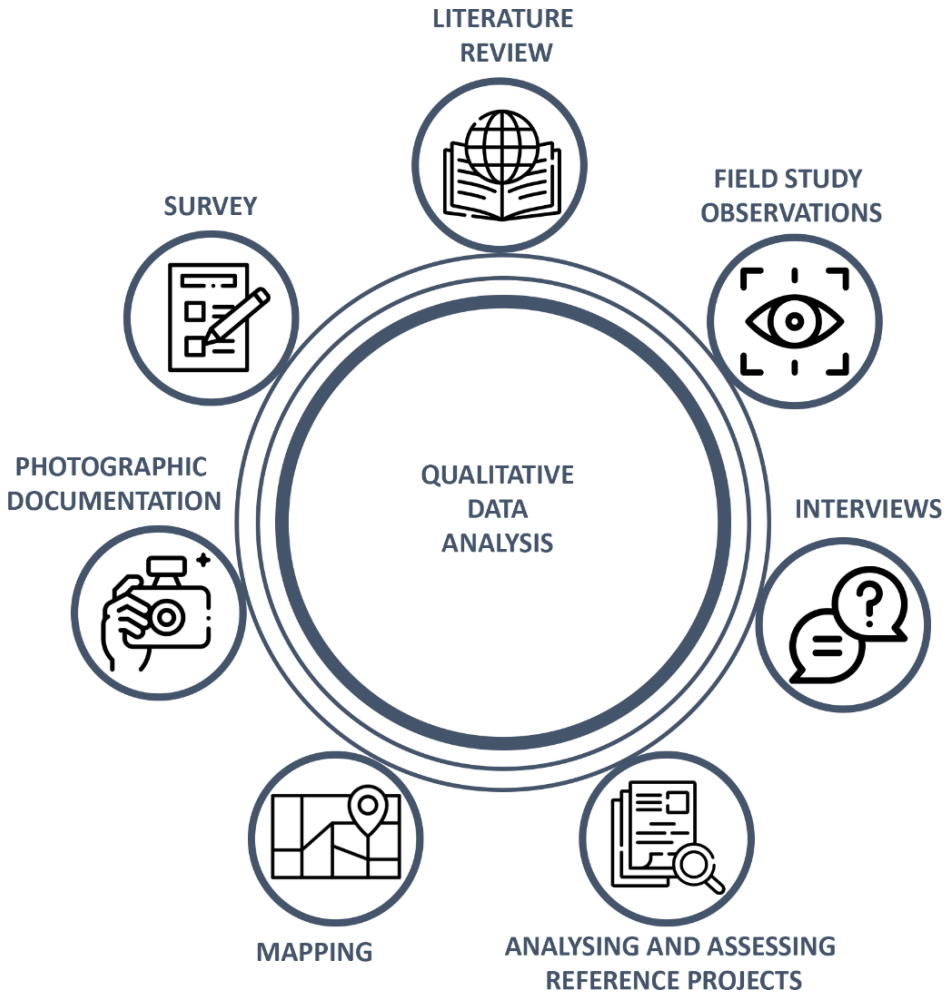

***Figure 17**. Diagram of research methods applied in this doctoral thesis. Source: Author.*

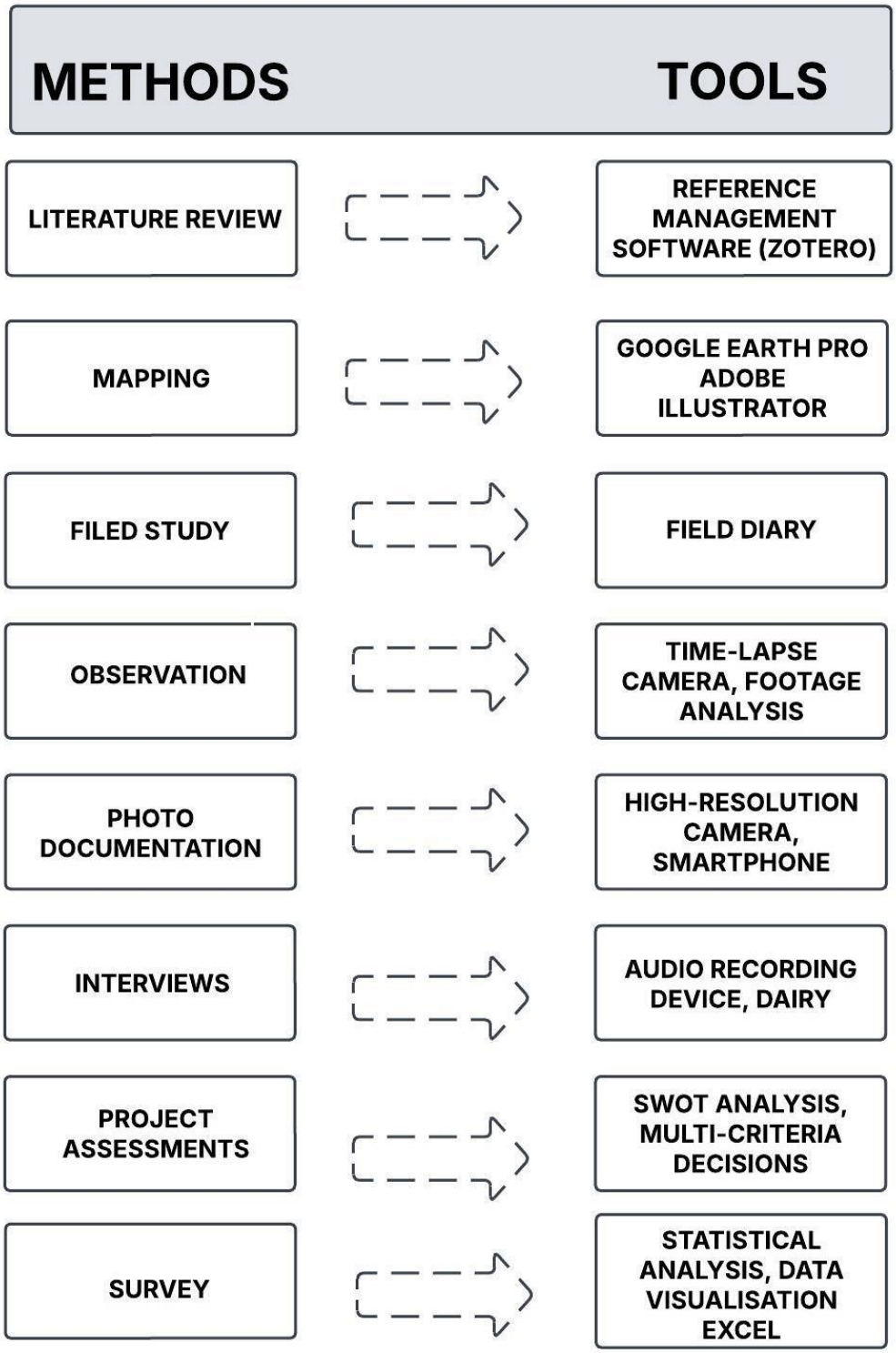

Figure 18. *The scheme shows the method and tools applied in this thesis. Source: Author.*

3.1. Mapping

Spatial conditions are often limited to what can be obtained from an external observational model of spatial representation, towards highlighting diverse spatial forms, contexts, and lived realities. Before selecting the three case study areas, a high-resolution satellite imagery method is used that covers the entire built-up and unbuilt landscape of Greater Beirut. This approach enabled the identification of disadvantaged areas by distinguishing them from other parts of the city based on key characteristics such as location, typography, infrastructure, density, and building use. The satellite imagery also facilitated accurate analysis of distances, boundaries, and surface areas, as well as the interpretation of physical features critical to understanding spatial dynamics. Urban forms were categorised through areas photos analysis using criteria related their morphological appearance and historical origins. Settlements were father classified by their topographical positioning, whether along waterfronts, escarpments, or within narrow easements. Based on this rigorous spatial analysis, three heterogeneous and emblematic case study areas were selected within Greater Beirut: Hay al-Tanak, Al-Ouzai/Jnah, and the Sabra and Shatila neighbourhoods. Each represents a distinct typology, urban form, and historical trajectory, allowing for an exploration of disadvantaged urban environments across varying scales and contexts.

3.2. Filed study - Observations

During the field study, the observation method was employed as a primary method to analyse the physical structure and characteristics of the selected neighbourhoods. This approach addressed various spatial scales and dimensions, including residential building typology, building uses and materials, interior configurations, open spaces, streets, and commercial markets (souks). At the residential level, observed variables included building types, number of storeys, number of rooms, household size, construction materials, overall building size, and types of entrances. Interior variables focused on apartment size, room count, available facilities, partition layouts, thresholds, presence of electric cables and piping, sources of natural light and ventilation, flooring materials, and furniture arrangements. Building use was classified into four main categories: dwellings only, dwellings combined with trade or business activities, trade/business only, and institutional buildings. Economic activities on ground floors comprised a range of functions such as retail shops, restaurants, bakeries, entertainment venues, small-scale manufacturing, medical services, and beauty salons. Business structures typically included small private offices and storage facilities, while institutional buildings consisted of schools, clinics, hospitals, mosques, and community or educational centres. Regarding open spaces, observations covered a variety of conditions, including cemeteries, residual spaces between buildings, car parking areas, private gardens, wild and unmaintained patches, playgrounds, and sports fields. Street-related observations examined everyday mobility, street vending practices, informal trading areas, access points, shared commercial streets, sidewalks, and narrow alleyways (See **Figure 19** and **Figure 20**) these provide photographic documentation of the Sabra neighbourhood. These figures are also included in **Paper V** as Illustrations 3 and 4).

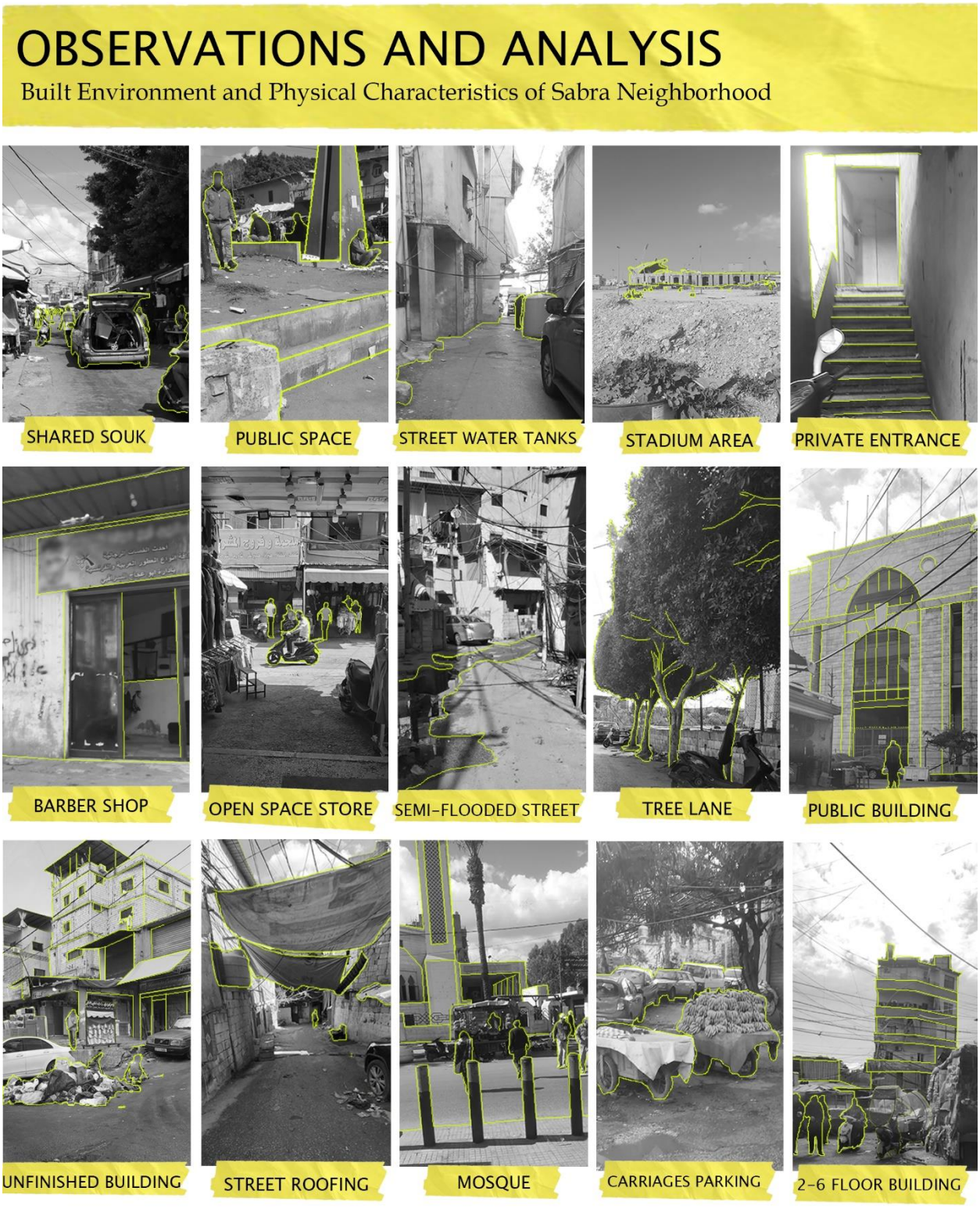

***Figure 19**. Photographs showing some of the physical characteristics of the Sabra neighbourhood. Source: Author.*

***Figure 20**. Capturing the Human Scale: Daily Practices and Social Interactions in Sabra neighbourhood. Source: Author.*

The observation study was further used to facilitate the identification, classification, and quantification of space and space utilisation. The identification, classification, and selection of spaces for detailed observation study is facilitated by several criteria. These criteria included the configuration of the spaces, the unique relationship between users and spaces, the role of these spaces in shaping local knowledge and practices, the diversity of activities, the behaviour of users (individual and group), and the overall impression of the intensity of activities. Commensurate with these criteria, different spaces in the three case studies were selected for this study, such as alleys, commercial streets (souks), areas of administrative and religious buildings, cemeteries, and monuments. Observation of the use of spaces involves determining the type of users and behaviour over different periods. Also to identify and classify users of spaces, the nationality, gender, and age of the users are taken into account. Both mobile and stationary activities were recorded through photographs. Mobile activities include walking individually or in groups, running, walking and standing, walking and selling, and moving through carriages and motorcycles. Stationary activities include sitting, sitting and selling items, sitting and eating, sitting and drinking, sitting and talking, standing, standing and talking.

3.3. Interviews

Interviews are widely considered a valuable resource for researchers and practitioners interested in qualitative research methods. Different types of interviews exist, often differentiated by their degree of structure. Structured interviews follow a fixed set of pre-determined questions in a specific order, while unstructured interviews are more flexible and open-ended. Semi-structured interviews fall in between, offering a balance of quidded inquiry and conversational freedom. In this research, unstructured interviews were conducted with individuals residing in the selected three case studies areas. This method, rooted in the disciplines of anthropology and sociology, was developed to elicit social facts through open and fluid conversations. Kvale (1996), suggests that interviews are more useful in qualitative research. He argues that interview methodology has the strength of capturing a multitude of subjective views that underlie the quality of quantitative research. Punch (1998), described unstructured interviews as a way to understand the complex behaviour of people without imposing any a priori categorisation, which might limit the field of inquiry. In addition, Patton (2002), described unstructured interviews as a natural extension of participant observation because they often occur as part of ongoing participant observation fieldwork. Just because unstructured interviews do not use predetermined questions does not mean they are random and unstructured. Unstructured interviews require thorough preparation and a deep understanding of the subject matter to yield meaningful insights into people's lives. They can serve as a primary data collection method and are often integrated into studies that primarily rely on participant observation.

The interview method was conducted over other data collection methods such as surveying the future applicability of architecture and urban design solutions because this study aimed to explore variations in views of residents and their expressions of their neighbourhoods. The interview method offered an opportunity to record dwellers' daily experiences and visions including an evaluation of their built environment. Approximately 80 people volunteered to be interviewed, and a minority were well-versed in the subject of physical development and transformation processes. The conducted interviewees are diverse, belonging to different age groups, genders, types of job, and nationalities. Their decision to volunteer was based on the belief that they would receive clarity or assistance during the interview process. As a result, most of them referred to personal experiences or those of close family members. Some were reflected in the experience of close community members and neighbours. They provided a detailed perspective on the issues, factors, challenges, and visons. To maintain dwellers' privacy during data collection and analysis. The names of the interviewees some times are not mentioned at their request, although age, gender, nationality, and type of job are permitted to be reported (see **Figure 21** and **Figure 22**).

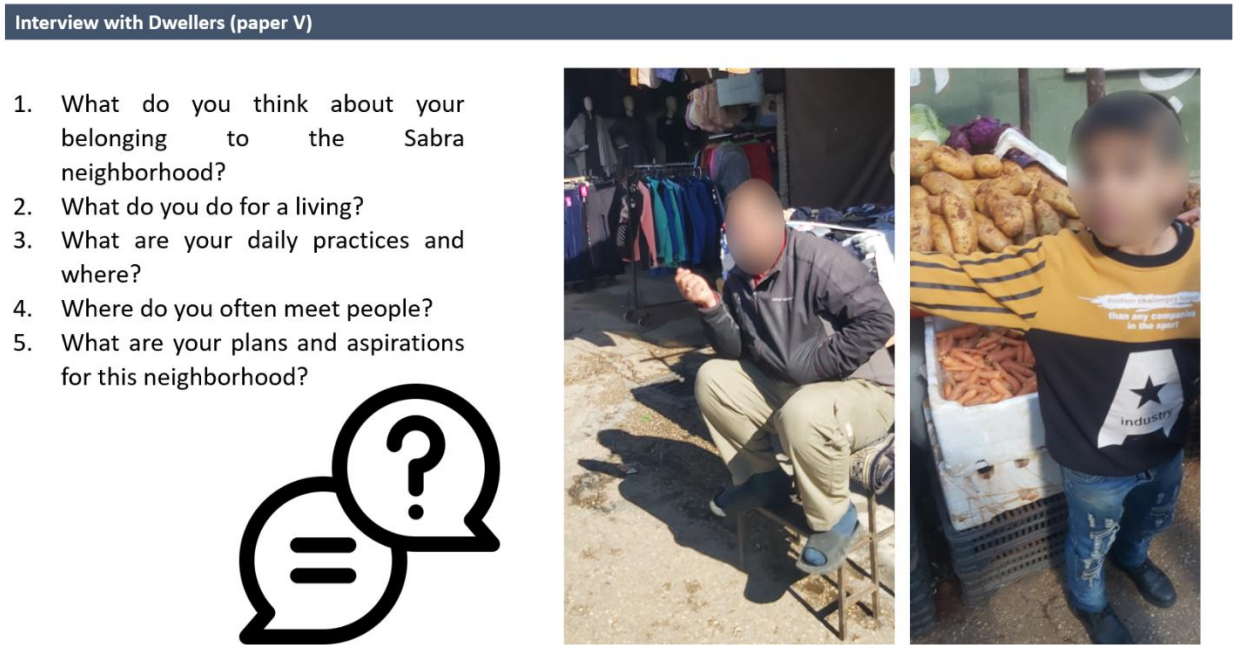

***Figure 21**. Questions asked in the interviews alongside two photos to the left (anonymised volunteers). More details can be found in Paper V, Subsection 3.3, p 60. Source: Author*

Interviews

Women hajji: "I live in this neighborhood with my family, and I spend most of my time in my boutique. If I get tired, I switch shifts with my daughter. We sell all kinds of clothes in this shop and for all ages! The quality of the fabric is good. It's not like you buy at Cucci and Zara but people come from everywhere to shop especially on holidays because it is affordable and aesthetically pleasing. I aspire to have several boutiques in different parts of the neighborhood under my management."

Mousa, 13 years old: *"I sell vegetables and fruits all day long with Haji Ahmed, he is an old man and needs help, he pays me $3 a week, I know it's very little but I haven't found better options. We spent the whole day here under this wooden cart. Our schedule depends on customers' purchases When the cart is empty, we go home, and then again, the other day I have one rest day a week which I spend outside with friends my age near the stadium or between buildings, I would wish to go to school and be a lawyer one day."*

Ali ,16-year-old: *"I am from Syria. I was very young when my family fled to Lebanon, given the difficult living conditions here now. I find myself forced to work to support myself and my family. I spent my whole day here, I've been working here in this garage mechanic service for almost a year, I get paid very little money, but I sacrifice my time and energy to learn this*

Restaurant owner: "I've been selling falafel and Shawarma at this corner for over 5 years, and it's my only source of livelihood. This profession is my way of life, people have known me since I started and they love my sandwiches because they are cheap and delicious. Those days, I have fewer clients due to the economic crises we are facing and high prices. In my free day spend the full day with my family and relatives here in the neighborhood."

Ibrahim, 26 years old: *"I have been selling CDs and electronics for 10 years here, I spend most of my time in the areas, everything is available and cheaper than in other places in the city. Sometimes my cousin replaces me. I am looking for a better job and life quality."*

Interviews

Ethiopian women: *from Ethiopia! I moved here after working as a maid for a wealthy family in Beirut! I have a lot of friends, it's cheap to live here and I feel safe, many Ethiopians have moved here too, we learned Arabic, and our accent is still funny and recognizable. I do different kinds of jobs inside and outside the neighborhood and I have a fair income despite the economic challenges at present, which allows me to survive and help my family in Ethiopia. I am looking for better quality of life, mainly a clean and big apartment"*

Street vendor: *selling seasonal fruits. I am living in Shatila. Currently selling oranges and bananas! To adjust the prices, all the street vendors in the area discuss daily, as the value of the dollar is not stable. The price we set for each product is done informally - between each other. We set a unified price per kilogram to avoid clashes and competition, and we also plan the distance from one seller to another approximately 200 to 300 meters along the street. The price we set is proportional to the purchasing power of the average customer. For example, today's prices are set like this, with 1 dollar equaling 80,000. So, 1 kilogram of oranges equals 15,000 Lebanese Lira ($0.18) oranges and 1 kilogram of bananas equals 20,000 Lebanese Lira ($0.25)."*

Resident in the mid-40s: *"I came to Sabra as a teenager. I worked in different sectors, and now I drive a taxi, what always amazed me is the density of people and the traffic here is crazy; people move around mostly on foot and motorbikes. This is the situation every day, regardless of the weather, It seems that we are moving like ants from corner to corner*

Man, hajj senior: *had the same routine since the day I moved here! I go to the mosque, then I do groceries from the souk, and the rest of the day I spend time around the neighborhood with seniors like me. I look forward to holidays like Eid al-Fitr and Eid al-Adha to gather and celebrate with family. During this time of Ramadan, I enjoy the neighborhood It's quiet because people are fasting and don't have much energy, and they spend most of the day indoors."*

Figure 22. *Some of the most relevant responses provided by volunteers, identifying them by name, religion, gender, age, nationality, and occupation, based on what interviewees agreed to share. This approach ensures that personal information is handled ethically while maintaining data integrity. (more information in paper V, Table 1, p 61). Source: Author.*

3.4. Analysing and Assessing Reference Projects

In this research, transforming disadvantaged neighbourhoods through physical improvement actions is the core of this study. To assist in building this capacity, interventions and programs, particularly those that test new innovative approaches such as co-creation of solutions, community engagement and participatory planning, affordable housing and basic services, livelihood support, and economic opportunities, sustainability and resilience, capacity building and empowerment are a valuable potential source of learning. These initiatives are the closest available real-world tests for identifying and evaluating concepts in disadvantaged neighbourhood transformation. A major challenge here is to learn from wisdom lessons of successful interventions at both global and local levels and adapt them to future professional work to achieve the ultimate purpose of this study, ensuring that these settlements evolve into more sustainable, resilient, and high-quality built environments. As highlighted in the literature review, particularly in reports and articles, the selected completed projects were chosen based on their proximate similarities to the challenges and characteristics of those in Beirut. The elaborated architecture and urban design solutions in these projects serve as valuable references, having demonstrated success in transforming degraded built environments and generating positive social, economic, and environmental impacts. The author analysed these interventions by examining the actions taken, techniques employed, outcomes achieved, and key contributing factors. The results were categorised into three groups: housing outcomes, neighbourhood outcomes, and individual outcomes. Each category focuses on specific metrics related to physical transformation, its effects on residents, and their relationship with the city aligning with the core objectives of this research (you can find the detailed analysis in Paper I, Table 2, Paper III, Table 1 and 2, Paper IV, Table 1)

One of the primary considerations emphasised by the author is that the physical actions introduced in the chosen projects respond to specific needs and challenges stemming from unique environments and cultures. However, this uniqueness does not hinder learning and exchanging. On the contrary, it presents an ideal opportunity to avoid falling into routine practices, fashion trends, and imitators. Instead, it encourages exploration of each unique context and task as a chance for cooperation and exchange. Accordingly, certain solutions and initiatives must be approached carefully to be adapted and accepted in the Beirut context. Hence, professionals such as architects' planners, and engineers must analyse the built environment carefully to identify and exploit opportunities and investigate threats that prevent transformation projects from achieving their goals.

3.5. Survey

Two sets of paper-based questionnaires were conducted during field visits as part of this research. These questionnaires were based on self-administered questionnaires, originally written in Arabic and then translated into English. Online surveys were excluded here due to limited digital access and literacy among the residents, particularly middle-aged and elderly individuals, within Beirut's disadvantaged neighbourhoods. In addition to low digital engagement, the high cost of internet services and limited access to electronic devices further justified the choice of a paper-based approach. The surveys were distributed by the author and later collected by key informants embedded within the target communities.

The surveys are intended to aid the findings of other methods applied in this research. It was revealed through field visits and interviews that residents are aware of the challenges and conditions of their neighbourhoods, accompanied by their clear vision of the nature, form, and function of the spaces they need. In this sense, key themes were extrapolated from these processes to guide the content and design of the survey questionnaire. This was done by collecting and analysing data simultaneously. During this process, survey questions were developed from these themes as they emerged.

The first survey was carried out in early May 2024, in 15 focal points in Sabra and Shatila neighbourhood (latitude: 33°51'45"N). These areas were selected within the neighbourhood, concentrating on the most relevant spaces to serve as a representative sample of the neighbourhood-built environment. These spaces include the souk/commercial street market, open spaces, residential units, public buildings, alleys, and paths. Over the following period of four weeks, 135 completed questionnaires both fully and partially filled, were collected at various stages of the fieldwork (see **Figure 23**). Questionnaires that were incomplete or invalid were excluded from the analysis. The survey generated evidence revealing how spatial conditions in Sabra and Shatila affect residents' emotions, perceptions, and overall quality of life. Providing important insights for informed design interventions and policy development. Further details regarding the survey design, analysis methodology, response rates, and selected indicators are presented in Paper IV, Section 5, and in the appendices.

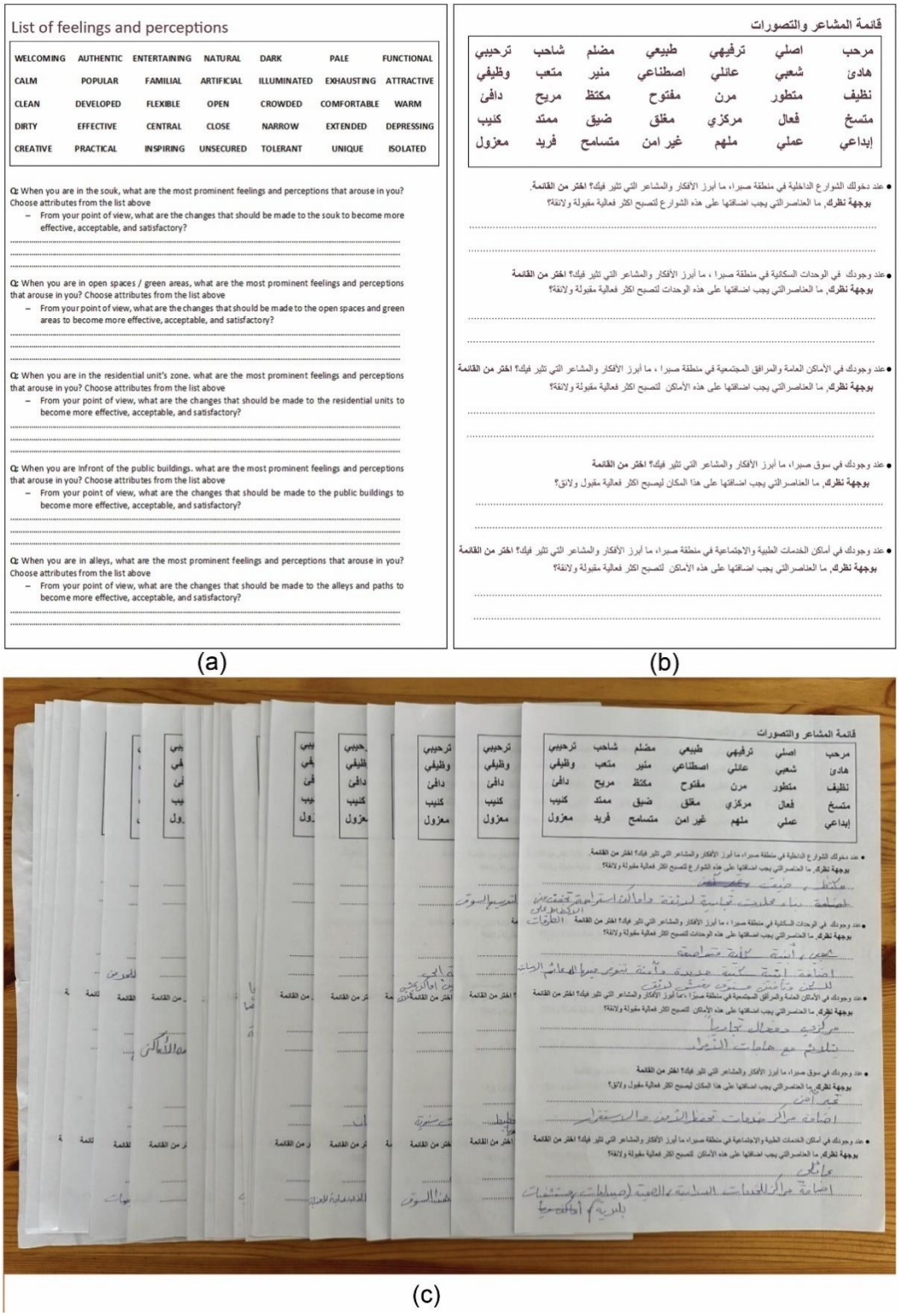

***Figure 23**. Survey template and results example conducted in Sabra and Shatila neighbourhoods to assess how spatial conditions affect residents' emotions, perceptions, and overall quality of life. Providing important insights for informed design interventions and policy development. (On the right side, English Vision, on the left side, Arabic version). Source: Author.*

The second survey was conducted during the same period (early May 2024), in different areas of the Sabra region (latitude: 33°51'45"N). 270 questionnaires were distributed; 140 were collected four weeks later. The remaining incomplete questionnaires were discarded. The form is designed to understand users' perceptions and perspectives on the future spatial development of their neighbourhood. The context of the form focuses on the development of the physical structure and sustainable management of the settlement (streets, buildings, public spaces, administrative buildings, religious buildings, sports facilities, services, markets, housing units, and interior spaces). The form is divided into three levels at different scales (Architecture —Building Envelope/Interior, Urban Design/Urban Layout, and Eco-Friendly Design) to achieve an integrated transformation approach. Each section presents a series of design solutions and strategies. The respondents chose the appropriate and required strategy for future development in their opinion based on 8 criteria (the survey design, criteria, methodology of analysing the survey results and the results can be found in **Paper V**, Subsection, **3.4. Survey** – Access the Acceptance of the Proposed PSIs at Three Levels).

It is worth noting that the number of survey participants compared to the total population size of the target area is too low to achieve scientific validity and accuracy. This is primarily due to insufficient trust, communication, and reassurance with local authorities and academia. Such challenges appear to be prevalent in the majority of disadvantaged neighbourhoods across Lebanon. However, this approach can be considered as a starting point and reference for future surveys. The results of both surveys can serve as a guide to inform professionals (architects, planners, designers, and engineers), political actors, and beneficiaries' perceptions. In this case, the future transformation and management brief will be able to effectively respond to users' needs and visions, while also classifying and measuring physical improvement activities and their dimensions to better understand and assess their relationship to the prosperity of the built environment in disadvantaged neighbourhoods.

3.6. Summary of Study Issues and Methods Used

This Subsection presents the key research issues explored in the study alongside the methods used to investigate them. A mixed-methods approach was adopted to address these challenges, with each method supporting specific research objectives and complementing others (see **Table 3**). For instance, the historical development of informal settlements and slums, as well as the emergence of disadvantaged neighbourhoods in Beirut, were primarily explored through an extensive literature review and mapping activities. Interviews with residents added further depth and contextual understanding. The classification of urban types and mapping of disadvantaged areas were investigated using a combination of literature review, mapping tools, interviews, and on-site observations. Photographic documentation supported the visual identification of spatial characteristics. Demographic information was gathered through mapping, interviews, field observations, and surveys, enabling a better understanding of the socio-economic makeup of the

study areas. In parallel, the analysis of housing typologies and plot characteristics relied on literature review, mapping, and on-site investigation. The material composition and construction methods were examined through detailed field observations and photographic documentation. The use of space and availability of services were analysed using interviews, photographic evidence, and assessment of existing projects, offering insights into everyday practices and urban functionality. In-depth understanding of the household structure was achieved through a combination of literature review, field observations, and surveys. The analysis of urban interventions involved a review of reference projects, on-site assessment, and community surveys. To assess the well-being of residents, qualitative methods such as interviews and observations were employed, supported by photographic evidence and surveys. Finally, the cultural character of the neighbourhoods was explored through interviews and photographic documentation, which revealed how cultural identity is maintained and expressed in the built environment.

Table 3. Summary of the study issues and methods used. Source: Author.

Research issue	Literature Review	Mapping	Interviews	Observation	Photographs documentations	Projects assessment	Survey
Historical development of informal settlements and slums / issues and problems	x	x	Y				
Historical development of Beirut city and appearance of disadvantaged neighbourhoods	x	x	Y				
Classification of urban types	x	x	Y	Y	Y		
Mapping of Disadvantaged areas	Y	x	Y	Y			
Demography	Y	Y	Y	Y			
Housing typology	Y	Y		x	x		
Material				x	Y		
Plot dimension and characteristic		Y		Y	x		
Space use and services		x	Y	x	x		Y
Household	x		x	Y			Y
Interventions	x				Y	x	Y
Well-being state	x		x	Y		Y	x
Cultural character	x		x	Y		Y	x

x	Signifies that the method was necessary to implement.
Y	Signifies that the method was used to support other methods

3.7. Research Strategy

This research design and methodology were carefully planned, considering the context's nature and sensitivity to ensure ethical, accurate, and effective results. A set of criteria were taken into consideration and a tactical approach was adapted to achieve the results, which are presented as follows:

1. Considering the potential political, legal, and bureaucratic barriers that exist in the three studied neighbourhood.
2. Position the study in a neutral position concerning the entire community. Avoid taking sides in local conflicts or being too closely aligned with one group.
3. Check if residents have access to smartphones, computers, and reliable internet connections (survey).
4. Find a flexible way to collect data that allows flexibility in determining time and location for data collection (survey). In addition to using personal video cameras and smartphones to take pictures or audio recordings and adapting data collection to changes in the environment in real-time.
5. Preplanning the visit to the area to capture the most dynamic times of space use, taking into account lighting, weather conditions, and community activities (cultural and religious).
6. Conducting study tours, required initial preparation visits; focus on the practices and behaviours of residents before approaching them.
7. Implement non-intrusive monitoring techniques, such as direct observation, where you can minimise interaction to avoid influencing behaviour.
8. Determine where the interview might take place, as not all places are safe and the type of people varies from place to place.
9. Determine who could be the informants, as not everyone has the information and knowledge to serve as a guide.
10. Trying to establish a harmonious relationship with the candidate. This approach is crucial to the success of the unstructured interviews conducted.
11. Prepare a clear explanation of the interview's purpose and obtain informed consent from participants, ensuring that they understand the purpose of the interview and how their information will be used.
12. Respect the right of the interviewees to withdraw at any time.
13. Train my memory skills in the technique of capturing data during the natural flow of the conversation.
14. Use straightforward language that is easy to understand and avoid technical terms or complex sentences.
15. Prepare a list of open-ended questions to guide the conversation and be prepared to adapt questions based on the flow of the conversation and the responses provided.

3.8. Methodological Implementation to Ensure Reliability and Internal Validity.

Reliability in research ensures that comparable results emerge if data collection is repeated under similar conditions. Internal validity, on the other hand, seeks to establish causal relationships by demonstrating that specific conditions lead to certain outcomes. To minimise threats to internal validity, several complementary strategies were adopted to enhance the credibility and consistency of the findings. A multi-source data collection approach was used, integrating diverse datasets, cross-referencing information, and drawing on multiple case studies to rule out competing explanations. However, given the exploratory and descriptive nature of this research, it was not always possible to verify the findings with alternative sources. For example, the challenge was to determine the geographical boundaries of the neighbourhoods studied, as no official maps or documents accurately depicted their extent or spatial distribution. To address this, Google Maps and satellite imagery were used to analyse spatial patterns and estimate settlement boundaries. These initial assessments were then verified through field observations and study tours, allowing for a more accurate delineation of the extent of the neighbourhood. In cases where boundary definitions remained uncertain, key informants, including local residents and municipal representatives, were consulted to confirm and refine physical delineations. To ensure the reliability of the findings, three main strategies were implemented: **First, data were systematically documented and standardised, with an organised database created for each case study area, ensuring the systematic organisation of all data collected.** The results were subsequently published across multiple research papers (II, III, V), enhancing the rigor of the academic study. The first phase of data collection focused on standardising the data collection framework across all case studies. Key variables, such as urban infrastructure, building types, street patterns, building materials, and open spaces, were analysed consistently across all clusters. This standardised approach enabled comparisons across cases, enhancing the study's internal reliability and validity. **Second, through triangulation through visual and qualitative data, photo documentation played a crucial role in capturing the characteristics of the urban structure, highlighting key spatial challenges, and visually substantiating field observations.** These images served as empirical evidence and were compared with other data sources, ensuring robust analysis. Fieldwork was complemented by interviews conducted in deliberately selected areas within the case study neighbourhoods. These interviews provided deeper insights into local conditions and served as an additional layer of verification of observed spatial characteristics. All qualitative data from the interviews were carefully documented, systematically organised and integrated into a structured database, ensuring consistency and traceability. **Third, community perception and impact assessment Surveys. To assess the acceptability and feasibility of the proposed spatial improvements, a survey was conducted to assess community perceptions, preferences and potential resistance to the interventions.** This provided crucial insights into

the social sustainability of the proposed urban modifications. Responses were analysed to understand both the tangible benefits and challenges of the spatial interventions, as well as their broader impact on the quality of life of residents. In addition, a second survey was conducted to gather residents' views on existing challenges within their settlements and their vision for the future. These findings contributed to a deeper understanding of local needs and aspirations, ensuring that the proposed interventions were grounded in community realities. Ensuring the quality and accuracy of the data, experienced local experts and informants were involved in the data collection process (in some cases). Their knowledge and experience contributed to the accuracy of the information recorded and facilitated the validation of the findings. This methodological rigor, coupled with multiple validation techniques and cross-referencing across different data sources, enhanced the internal validity of the research. By incorporating a structured and multi-faceted data collection strategy, this study ensures that the findings are reliable and robust, forming a strong basis for evidence-based analysis and recommendations.

3.9. Generalisation and Sampling

One of the most important challenges facing case study research is how to generalise the findings from a particular case to a broader context. This issue has been discussed by several researchers, such as Yin (2018) , who emphasised that generalisation in case study research often concerns transferring ideas to contexts with similar characteristics, rather than statistical generalisation. Further, (Merriam (1988) emphasises that case studies can contribute to theory building and understanding of specific phenomena, but the transferability of results requires careful comparison of contextual conditions. In addition to these two scholars contribution, Eisenhardt (1989) examines how case studies can lead to theoretical propositions, which may have wider application but remain intrinsically linked to their context. There seems to be a growing consensus that case study findings cannot be generalised in the same way as statistical samples. Findings from a case study can be linked to another context provided that the circumstances in that context are substantially similar. An important criterion for assessing the feasibility of a case study is the relevance and applicability of the details to practitioners working in a similar context, allowing them to link their decisions to those described in the case study. In this context, the relatability of a case study is more important than the generalisability of its findings. This is true for the Beirut case, as practitioners in similar contexts outside Beirut can use the findings of this study to reflect on how they might apply them to their own settings. In this study, the findings of the case studies were not used as a direct representation of other cases outside Beirut, but rather the aim was to use these findings as a basis for understanding specific contexts that have similar circumstances to those in Beirut. Given the lack of statistically representative samples, the findings from this study are context-specific and cannot be directly generalised to other cases. The basic idea here is that the analyses from Beirut can be linked to other cases with similar circumstances to those prevailing in Beirut, opening the way for practical use of these findings in similar contexts.

4 Summary of the Appended Papers

This section provides a summary of the appended papers, including the research questions, methods used, and findings for each paper (present in **Subsection 4.1**, **4.2**, **4.3**, **4.4**, and **4.5**). The first paper speculates on the best design strategies through a holistic approach to redesigning informal settlements in Beirut, with a focus on the interplay between physical improvements and their positive effects on socio-economic and environmental development. The second and third papers address context-sensitive design solutions that address the social, economic, and environmental dimensions of sustainability, with a particular focus on eco-development. This focus stems from the pressing challenges facing disadvantaged urban core and coastal neighbourhoods in the selected context, where vulnerabilities to climate change and environmental degradation require targeted and adaptive interventions. The fourth and fifth papers focus on culture and well-being, primarily addressing the social dimension of sustainability, guided by the unique context of the case study neighbourhoods. These neighbourhoods are defined by their deep-rooted cultural identities, vulnerable social structures, and a pressing need to enhance community well-being. While the primary emphasis is on the social aspect, the research also intersects with the economic and environmental dimensions, exploring how these factors influence and are influenced by the built environment and interventions (see ***Table 4***).

Table 4*. Summary of papers (I-V) main focus, key themes and statement summarise the findings. Source: Author.*

PAPER	RESEARCH FOCUS	KEY THEMES	FINDINGS
PAPER I	Holistic design strategies for informal settlement redevelopment in Beirut	Physical improvements, socio-economic impact, environmental development	Identifies design strategies that integrate physical, social, and environmental aspects to enhance sustainability in informal settlements
PAPER II &III	Context-sensitive design solutions for eco-development	Social, economic, and environmental sustainability, climate adaptation	Proposes adaptive interventions and visons for urban core and coastal neighbourhoods facing climate vulnerabilities
PAPER IV	Well-being in disadvantaged neighbourhoods	Social sustainability, community well-being, built environment impact	Examines how the built environment influences well-being, highlighting the role of spatial organisation, service access, and community cohesion
PAPER V	Culture and identity in disadvantaged neighbourhoods - Synthesis of findings from Papers 1–4, focusing on integrated sustainability strategies	Social sustainability, cultural heritage, spatial practices	Explores how cultural identity shapes neighbourhood dynamics, emphasising the need for context-sensitive interventions that reinforce social resilience

4.1. Paper I - Redesigning Informal Beirut: Shaping the Sustainable Transformation Strategies.

Authors (listed according to their contribution): Bahaa Bou Kalfouni, Dorota Wojtowicz-Jankowska, Piotr loners. Published in *Urban Planning* Journal, February 2022.

This paper explores the complexities of informal urbanism and urban development, with a specific focus on Beirut as a city shaped by the interplay between planned and informal interventions. It investigates the origins of modern urban planning for Beirut, tracing the historical and socio-political factors that contributed to the rise of informal settlements and emphasising the pressing need for intervention in these underserved areas. The study examines the origins, typologies, and definitions of informal settlements in Greater Beirut, analysing their demographic characteristics, urban form, and spatial location. Furthermore, the paper reviews significant urban transformations through reference projects at the domestic level, including upgrading activities for Palestinian refugee camps in Lebanon, such as the initiatives undertaken by the UN Relief and Works Agency (UNRWA), the reconstruction of the Nahr El-Bared refugee camp, and the rehabilitation of the old Saida residential neighbourhood and Haddadine in Tripoli. By analysing these examples, the research highlights the challenges and opportunities for sustainable transformation through architectural and urban design approaches, offering valuable insights for future interventions in informal settlements.

Research questions:

1. What are the origins and conditions of Beirut's current informal settlements, and how have they been shaped by historical, social, and political factors?
2. What are the typologies of informal settlements in Beirut?
3. What are the key challenges facing informal settlements in Greater Beirut, including spatial organisation, socio-economic conditions, and environmental concerns?
4. What design strategies can be drawn from local interventions in Lebanon to improve the urban quality of Beirut's informal settlements?
5. How can physical improvements in informal settlements contribute to broader social, economic, and environmental development while reimagining Beirut's urban fabric?
6. To what extent is informality in Lebanon shaped by political parties, and how do these parties use informal settlements to strengthen their influence through clientelism and patronage?
7. How should urban design practices address the interplay between informal urban growth, clientelism, and the state's inability to provide adequate services to vulnerable communities?

Methods

The methodology used in this paper combines a review of key phenomena in this thesis as informal urbanism and urban development case study mapping and analysis, contextual adaptation, and strategic speculation to propose solutions tailored to Beirut's informal settlements. The article includes an examination of three local interventions in Lebanon, based on published reports. These interventions involve rehabilitation and reconstruction activities in different cities and are analysed for their relevance to the context of Beirut. The selected examples are evaluated for their potential to be applied to Beirut, considering the city's specific conditions and diverse contexts. In addition to the speculative approach about the best possible strategies to improve the urban quality of informal settlements, addressing their unplanned development and underused potential. The methodology incorporates an exploration of physical improvements in the settlements as a way to drive socioeconomic and environmental development, while also rethinking Beirut's urban structure.

Answers to the research questions:

1. Beirut's informal settlements emerged due to rapid urbanisation, internal and external migration, and political instability, including the Lebanese Civil War. Socio-economic inequality and neglect by formal governance systems exacerbated their unplanned growth. Today, these areas are overcrowded, lack basic services, and remain vulnerable due to recent crises like the COVID-19 pandemic and the Beirut Port blast.
2. The informal housing complexes in the Beirut metropolitan area may be classified into three different groups: International refugee camps/low-income housing areas for refugees, Housing areas for rural-urban migrants, and Squatter settlements, developed during the civil war. Also, they may be determined according to their typography and location, which includes waterfronts, escarpments, and easements.
3. Design strategies to enhance the urban quality of Beirut's informal settlements are built on successful local interventions in Lebanon, emphasising physical improvements that promote both liveability and sustainability. These strategies involve upgrading, reconstruction, and rehabilitation efforts by applying effective architecture and urban design principles. This includes integrating mixed-use developments, enhancing connectivity within and across neighbourhoods, and utilising architectural approaches to create better indoor and outdoor environments.
4. Key challenges include poor spatial organisation with chaotic layouts, high unemployment and poverty levels, and environmental issues such as pollution and inadequate waste management. These challenges are compounded by weak governance and insufficient investment in infrastructure.

5. Physical upgrades can foster social cohesion, stimulate local economies, and address environmental concerns through sustainable practices. These improvements can integrate informal settlements into the broader urban framework, promoting an inclusive and resilient urban identity.
6. Informality in Lebanon is closely tied to political parties, which use informal settlements as tools to expand their influence. These parties provide benefits and services, such as hospitals and isolation centres during the Covid-19 pandemic, in exchange for political support, reinforcing patronage networks and territorial control. Informal settlements serve as a source of pressure for these parties to impose their influence on the state.
7. Urban design practices should critically engage with the concepts of clientelism and informal urban growth, understanding their political and social dynamics. Addressing the state's weaknesses in service provision is essential, and further research is needed to explore how political parties shape and benefit from informality. Urban design must aim to mitigate the negative impacts of patronage systems while promoting equitable and sustainable development.

4.2. Paper II - Revitalization Project of Slum Transformation: A Case Study Hay- Al Tanak, Beirut, Lebanon

Authors (listed according to their contribution): Bahaa Bou Kalfouni, Dorota Wojtowicz-Jankowska, Published in *Przestrzeń i Forma (Space & Form)* Journal, 2020.

This paper explores the revitalization of the Hay-Al Tanak project, one of the poorest slum areas in Beirut, located in the urban core (author's MA thesis). It provides a brief overview of the five largest and most notorious slums in the world, highlighting their historical origins, size, and key challenges. It examines the typology of slums in Beirut, with a particular emphasis on Hay-Al Tanak, which emerged as housing for rural-urban migrants and developed into a squatter settlement. The study highlights key aspects of intervention and revitalisation, considering the existing materials and structures, climate factors in Beirut, and the metaphor and thinking strategies that shape the sense of space. A design solution is proposed, structured in two phases. The first phase involves an analytic study, addressing urban planning adjustments and socio-economic development to lay the groundwork for sustainable transformation. The second phase focuses on design implementation, including adjustments to existing structures (first layer), rehabilitation of remaining buildings (first layer), and an extension concept (second layer) to enhance functionality and resilience. The paper concludes by summarising the findings and emphasising the importance of an integrated, phased approach to slum upgrading in Beirut.

Research questions:

1. What are the design measurements taken in the project at the architectural and urban design level?
2. How the physical improvements can effectively improve living conditions and promote sustainable development in poor urban areas?

Methods:

This study conducts a multi-level literature review to examine slums globally and locally. Reports and publications are reviewed to identify key trends and innovative strategies. For the local context, the study focuses on slums located in Beirut, analysing specific challenges and opportunities. Additionally, innovative projects addressing slum issues are explored as references for potential solutions. A site visit was conducted to analyse the urban characteristics of the slum through observations and photographic documentation method, complemented by an unstructured interview with dwellers to understand existing problems and needs.

Answers to the research questions:

1. **Architectural design improvements** focus on enhancing ventilation and natural light by increasing the number of windows. Staircases are rebuilt to improve accessibility. Building functionality is improved by assessing the use of the buildings (residential or commercial) and determining whether to rebuild or demolish them based on structural conditions. Apartments are reconfigured into rooms to improve circulation, and block sizes and roof heights are modified to create flat surfaces for potential public s. Physical and aesthetic improvements include the use of durable materials such as plaster coating on facades and the integration of existing materials such as tin and wood and bright colours to preserve the cultural identity of the place. In addition, technical infrastructure is being upgraded to address issues such as illegal electrical networks, waste management, and water supply, ensuring a healthier and more sustainable living environment.

At the urban design level, the project focuses on widening narrow streets and paths to improve pedestrian and emergency services access, while transforming neglected green areas into parks or agricultural spaces to promote a healthier environment. Public spaces are also being improved, and playgrounds are being created to provide more social and recreational opportunities, especially for children. Street allocations are being redefined to improve functionality, accessibility, and aesthetics, and to better integrate streets into the urban fabric. Some blocks are being connected and separated to improve urban circulation and public functions. Sustainability is also a key focus, with efforts being made to reuse green areas, promote sustainable agricultural practices, and

implement programs that address waste management and infrastructure deficiencies, ultimately improving living conditions.

2. Focusing on both architectural and urban design strategies, such as enhancing accessibility, upgrading infrastructure, and optimising building functionality, these interventions address critical issues of health, safety, and efficiency. Transforming neglected spaces into parks or agricultural areas not only improves the environment but also fosters community engagement through recreational and social opportunities. Furthermore, the integration of sustainable practices, including better waste management and resource utilisation, ensures long-term environmental sustainability. These combined efforts can significantly improve the quality of life in poor urban areas, transforming them into more liveable, resilient, and sustainable communities.

4.3. Paper III - Vision of Sustainable Design Concepts for Upgrading Vulnerable Coastal Areas in Light of Climate Change Impacts: A Case Study from Beirut, Lebanon

Authors (listed according to their contribution): Bahaa Bou Kalfouni, Dorota Wojtowicz-Jankowska, Published in *MDPI, Sustainability*, March 2022.

This paper examines the challenges posed by rapid urbanisation and the growth of informal settlements, focusing on the intersection of environmental, social, and urban dynamics. It provides a background on informal settlements and development, with particular emphasis on the climate change risks affecting urban and coastal areas, and reviews relevant policies and strategies to address these challenges. The study explores the aspects of sustainability within the context of coastal informal settlements and analyses selected interventions at both the international and domestic levels. These interventions include those focused on landscape design and techniques as well as spatial developments within informal settlements, aiming to provide innovative and context-sensitive solutions. The analysis incorporates key findings from a SWOT analysis of the study area, cantered on the Al-Ouzai/Jnah settlement as a case study. It delves into the historical background and transformation of the settlement, presenting the results of the study and proposing strategies and speculative visions for upgrading actions. These include detailed landscape, architectural, and urban design speculative visions, which collectively aim to create a sustainable and resilient framework for transforming the Al-Ouzai/Jnah settlement. The scope of the study ranges from microscale improvement to providing usable and accessible city-wide ecological urban settings and sustainable spaces with new standards for coastal informal settlements as a potential backbone.

Research questions:

1. How does rapid urbanisation combined with climate change increase the vulnerability of coastal informal settlements, particularly in Beirut's southern suburbs?
2. What are the specific socio-economic and environmental challenges faced by informal settlements in coastal areas, and how do these impact their structural and infrastructural resilience?
3. What sustainable design solutions and development strategies can be adapted to address the unique vulnerabilities of coastal informal settlements to climate change?
4. How can urban, architectural, and landscape design interventions be applied to improve the quality and resilience of coastal informal settlements in the context of Beirut?
5. How can microscale improvements be scaled up to city-wide ecological urban solutions for sustainable coastal informal settlements in Beirut?

Methods:

Two main methods are adopted in this paper. The first method is based on a literature review of publications, official documents, and plans. The materials were selected based on their content highlighting general slum and informal settlements issues concerning the impacts of climate change and aspects of sustainability on coastal areas that further the purpose of this study. This approach also enabled a thorough selection and analysis of six implemented projects using document analysis from published reports and articles. These are selected based on the possible similar nature of the case study. Th specific nature was identified and explored and refers to the second method used. The second method involves a site visit where photographs were taken, and unstructured interviews were conducted. The respondents were informed about the purpose of the interview (open interview) that took place in different open spaces. These two actions led to the formulation of a SWOT analysis (phenomenological study). The combination of the analysis of the selected intervention from the first method and the SWOT analysis contributes to a speculative visions approach. These speculative sustainable development concepts are going to be a challenge, so visioning is a valuable way to test these ideas in a place where action would be challenging.

Answers to the research questions:

1. Rapid urbanisation leads to the expansion of informal settlements in coastal areas, often without proper planning or infrastructure. This unplanned growth results in poor quality structure and inadequate infrastructure, making these communities particularly susceptible to natural hazards exacerbated by climate change, such as sea-level rise and storm surges. In Beirut's southern suburbs, these factors converge, heightening the vulnerability of informal settlements to climate-induced risks.

2. Informal settlements in coastal areas contend with socio-economic challenges, including poverty, limited access to services, and social marginalisation. Environmentally, they face threats from climate change, such as rising sea levels and increased frequency of extreme weather events. The combination of socio-economic disadvantages and environmental hazards compromises the structural integrity of buildings and overwhelms existing infrastructure, reducing the resilience of these communities to natural disasters.
3. Sustainable design solutions to improve coastal informal settlements focus on resilience, inclusion and environmental performance. These include implementing green infrastructure, such as planted storm surge barriers and building elevated structures to mitigate flood risks. Enhancing public spaces by making them more inclusive and accessible enhances social interaction and promotes community cohesion. Encouraging the use of sustainable materials and construction techniques improves the durability and environmental performance of buildings. Developing efficient and accessible transport systems connects informal settlements to the wider urban fabric, facilitating access to jobs, education and basic services. Incorporating renewable energy solutions, such as solar panels and windmills, reduces reliance on non-renewable energy sources and lowers greenhouse gas emissions. In addition, engaging local communities through participatory planning ensures that interventions are culturally sensitive and effectively address the specific needs of residents.
4. Urban interventions may focus on improving connectivity and access to services, while architectural designs can prioritise durable, climate-resilient materials and construction methods. Landscape design can incorporate natural barriers, such as mangroves or dunes, to protect against coastal erosion and flooding. In Beirut, tailoring these interventions to the local context involves considering the specific environmental conditions and socio-economic dynamics of the city's coastal informal settlements.
5. Microscale improvements can serve as pilot projects demonstrating the benefits of sustainable practices. Scaling these initiatives city-wide requires integrating them into broader urban planning frameworks, securing funding, and fostering collaboration among stakeholders, including government agencies, non-profits, and community groups. This approach ensures that localised successes contribute to ecological urban solutions across Beirut's coastal informal settlements.

4.4. Paper IV - Design for well-being: From Disadvantaged to Satisfactory Built Environment, Building Places for Vulnerable Communities.

Author: Bahaa Bou Kalfouni, Published in OHI (open house internation), Published in *emerald PUBLISHING, Open House International: Sustainable & Smart Architecture and Urban Studies (ohi)* Journal, April 2025.

This paper highlights the increasing awareness among architects and planners of the profound impact of built environment conditions on human well-being. It addresses how the past five crises in Lebanon have exacerbated the challenges for vulnerable communities, particularly those in disadvantaged neighbourhoods. It explores the relationship between the nature of built environments and well-being, emphasising how experiencing spaces can significantly impact psychological and biological health. Using the Sabra and Shatila neighbourhood as a case study, it examines the built environment's characteristics, alongside the living habits and social behaviour norms of its residents. The research incorporates a survey designed in both English and Arabic, with 135 responses collected out of 300 distributed questionnaires, and employs a structured methodology for analysing the survey results. The study highlights examples of low-cost interventions at both global and local levels. The paper concludes by presenting tested and appropriate -context design solutions that address the built environment's impact on well-being, offering actionable insights into creating spaces that promote psychological and biological health, followed by a broader discussion and conclusions on the findings.

Research questions:

1. How do built environment conditions affect human well-being, particularly in disadvantaged neighbourhoods?
2. How do built environment characteristics, living habits, and social behavioural norms in Sabra and Shatila affect residents' well-being?
3. How does the built environment in Sabra and Shatila influence residents' perceptions, needs, and aspirations, according to the survey results??
4. What conclusions can be drawn from the analysis of the selected project regarding the success of the projects in creating built environments that meet the needs of the target communities and positively impact their well-being?
5. What context-specific design solutions could improve psychological and biological health within deprived neighbourhoods?

Methods:

This study employs a multi-method approach to data collection and analysis, including spatial and contextual analysis, field observation, ethnography, and surveys. Six study tours were conducted between March and April 2024, using photography, mapping, and field notes to document spatial characteristics and social behaviour A total of 300 survey questionnaires were distributed across five distinct types of spaces, aiming to explore residents' perceptions of their built environment and its influence on their overall well-being. The study also gathered insights into residents' aspirations for future spatial transformations, contributing to a participatory design framework. In parallel, five exemplary low-cost interventions were examined through four key dimensions: project objectives and procedures, design solutions, built environment outcomes, and the spaces' impact on psychological and biological well-being. Well-being was evaluated through subjective indicators such as reported life satisfaction, happiness, and sense of purpose, offering qualitative insights into the effectiveness of these spatial interventions.

Answers to the research questions:

1. The built environment plays a pivotal role in shaping human well-being by influencing physical and mental health. In disadvantaged neighbourhoods, poor housing conditions, deteriorating infrastructure, disconnection from nature, lack of natural light, and issues such as noise pollution, poor air quality, and overcrowding contribute to increased susceptibility to mental illness and chronic disease. Furthermore, poorly designed spaces that lack community cohesion or social interaction can lead to social isolation and poor mental health.
2. In Sabra and Shatila, the unplanned spatial arrangement of compact residential buildings separated by narrow streets, coupled with limited access to green spaces, poor sanitation, noise, and lack of privacy, pose significant challenges to the physical health and mental well-being of residents. As for living habits, they reflect resilience, with residents relying on informal social networks. Social norms in the area, including community solidarity and collective coping mechanisms, can counterbalance some of the negative impacts of the built environment.
3. The survey conducted in Sabra and Shatila revealed that residents are strongly influenced by the surrounding built environment. It provides valuable data that captures residents' feelings, perceptions and visions for the future. The specific characteristics of the selected spaces play a key role in understanding the community's challenges, needs and aspirations, underscoring the importance of incorporating residents' perspectives into the planning and design process.

4. The projects (low-cost interventions) succeeded in creating satisfactory built environments characterised by functional, aesthetic, flexible, and sustainable spaces. Furthermore, these environments address the specific needs of the target communities, encourage creative thinking, and facilitate a smooth transition to engaging with the designed spaces component through unconventional design solutions. These solutions have positively impacted individuals' psychological and biological well-being, as demonstrated by subjective measures such as personal perceptions and self-evaluations. The design solutions in these projects address specific needs and challenges rooted in unique environments and cultures.
5. Context-specific design solutions should take into account the cultural and environmental characteristics of the neighbourhood. In Sabra and Shatila, the following solutions can improve well-being:
    - Creating green spaces for recreation and social interaction can provide much-needed relief from environmental stresses. These spaces can be specifically designed to suit the local climate and cultural preferences, ensuring that they are functional and relevant to the needs of the community.
    - The use of natural materials and energy-efficient designs reflects local resource availability and adapts to the environmental context of the area.
    - Involving residents in the design process ensures that spaces meet their unique cultural, social, and economic needs. This participatory approach empowers the community and fosters a sense of ownership, which can enhance well-being by making people feel more connected to their environment.
    - Noise reduction design through landscape and architectural solutions that fit the specific urban layout can effectively mitigate the psychological impact of noise in densely built environments.
    - Creating pedestrian paths and social spaces that encourage physical activity and interaction can address issues such as social isolation and inactivity. These solutions can be adapted based on local preferences, cultural norms, and the specific physical characteristics of the area, making them highly context-sensitive.
    - Designing spaces that optimise access to natural light and cross-ventilation can enhance physical health by reducing the risk of respiratory problems and improving mood.
    - Providing healthcare and support facilities Including accessible health clinics, mental health services, and social support spaces within neighbourhoods can directly improve residents' well-being.

4.5. Paper V - Rethinking Design Priorities: Towards Human Scale and Sustaining Culture in Disadvantage Neighbourhoods. A Case Study from Beirut

Authors (listed according to their contribution): Bahaa Bou Kalfouni, Karolina Krośnicka, Piotr Lorens, Published in *ŚRODOWISKO MIESZKANIOWE / HOUSING ENVIRONMENT* Journal, June 2025.

This paper aims to depict disadvantaged neighbourhoods as hubs of enterprise, innovation, sustainability, and creativity. It delves into the cultural essence and development in disadvantaged neighbourhoods, focusing on Beirut's Sabra neighbourhood. It examines the geographic boundaries of the area, identifying its distinct zones and unique character, and provides an in-depth analysis of the urban structure and cultural essence of Sabra. The study highlights key characteristics, such as the human scale, use of spaces, and dwellers' behaviour, which collectively shape the neighbourhood's identity. The research incorporates a survey to assess the acceptance of proposed possible spatial improvements (PSIs) across three levels: architecture (building envelope/interior), urban design (urban layout), and eco-friendly design. Each level is accompanied by a summary of findings, detailing how these interventions could address the challenges faced by the community while preserving its cultural essence. The proposed improvements focus on enhancing functionality, sustainability, and quality of life, ensuring they align with the neighbourhood's socio-cultural fabric. The paper concludes with a discussion and conclusion, emphasising the importance of integrating cultural considerations into urban interventions to foster meaningful and sustainable development in disadvantaged areas.

Research questions:

1. What are the geographic boundaries, distinct zones, and unique characteristics of Beirut's Sabra neighbourhood?
2. What is the cultural essence of Sabra, and how does it influence the neighbourhood's development?
3. What are the proposed spatial improvements (PSIs) at the architectural, urban design, and eco-friendly design levels, and how can they contribute to community identity, social cohesion, and sustainability in Sabra?
4. How do residents perceive and accept possible spatial improvements (PSIs) at three levels: architecture (building envelope/interior), urban design (urban layout), and eco-friendly design?

Methods:

The study employs a multi-method approach to visualise, analyse, and address the spatial and cultural characteristics of the Sabra neighbourhood. Collaborative mapping is the first method used, involving engagement with the Ghoubeiry municipality to create maps defining the neighbourhood's geographical boundaries and area names. This process incorporates local knowledge through discussions, audio recordings, and initial hand-drawn maps. To understand the urban structure and cultural values, field and ethnographic observations are combined with unstructured one-to-one interviews. This phenomenological approach captures visual data, photographs, and field notes while engaging with residents during on-site observations. Building on prior research the study identifies three groups of design solutions, termed Possible Spatial Improvements (PSIs), at architectural, urban, and eco-friendly levels. These solutions are informed by the lead author's earlier publications (**Paper I, II, III, IV**). The PSIs aim to achieve sustainability and improve housing environments and public spaces. Finally, a participatory decision-making process is implemented using a paper survey to assess community acceptance of the proposed PSIs.

Answers to the research questions:

1. The geographic boundaries of Sabra neighbourhood are defined by several prominent landmarks and roads. To the northwest, it is bordered by the Daouk-Ghawash complex and the Camille Chamoun Sports City Stadium. The northeast is marked by Horsh Beirut and the Shatila area, which includes key sites such as the Palestinian refugee cemetery, the Islamic martyr's cemetery, and Al Khashekji Mosque and Cemetery. To the east, the neighbourhood borders the Farhat neighbourhood, and to the southeast, it is bordered by Horsh al-Qateel (The Dead Grove). The neighbourhood is surrounded by three major roads: El Emam Mousa al Sader Road to the south, Jamal Abdul Nasser Road to the west, and Hafez al-Assad Road to the east. These roads are named after significant political and historical figures from Lebanon, Egypt, and Syria (detailed map in il 2). The cultural essence in the Sabra neighbourhood appears to be the product of migration, conflicts, massacres, diversity, and the ability of dwellers to move on and adapt. In addition, this culture is nurtured by civilised diversity and ethnic groups (different nationalities and religions), such as the Palestinians, Syrians, Iraqis, Egyptians, Ethiopians, and Armenians, where they are mainly divided between Muslims, Sunnis, and Shiites. Sabra's neighbourhood is shaped by communal interactions, economic activities, Informal trade, small-scale businesses, and communal support networks. This can significantly influence the future development by shaping community-driven, context-sensitive planning approaches.

2. The proposed spatial improvements at the architectural, urban design and eco-friendly design levels aim to enhance community identity, social cohesion, and sustainability in Sabra.
   - **At the architectural and interior level**, rebuilding and expanding degraded structures while incorporating local styles, colours, and textures creates a built environment that reflects the neighbourhood's character and reinforces community identity. Improved building entrances and the addition of rooftop greenery serve as communal gathering areas that symbolise hospitality, offering shared spaces that further support community bonds and cultivate a more connected neighbourhood.
   - **At the urban design level**, adding green elements, sports facilities, and public parks in Sabra enhances community interaction and provides spaces for social events, cultural activities, and family gatherings. Expanding pedestrian links allows people to easily connect and interact. Creating a cultural hub enhances community ties. Urban agriculture and community gardens connect residents to traditional agricultural practices, promote self-sufficiency, and preserve cultural knowledge. Offering new green spaces provides quiet areas for gatherings and relaxation, reflecting the community atmosphere that is deeply valued in Sabra culture. Schools support cultural preservation by educating children about their heritage.
   - **At the eco-friendly design level**, harvesting rainwater and waste reduction align with traditional resource management and promote sustainability, resilience, and Sabra pride. Integrating landscapes and planting local plants and trees strengthens links with cultural heritage and the local environment. Improving waste management and accessibility supports community pride, social bonds, and shared responsibility. At the same time, energy cooperatives promote economic self-reliance and collective ownership, reflecting values of mutual support and respect for the environment.
3. The survey results indicate a generally positive perception and acceptance of the proposed spatial improvements (PSIs) across the three levels. Most PSIs fall within the Perfectly **Acceptable (PA), Acceptable (A), Slightly Acceptable (SA)**, and **Neutral (N)** categories. Notably, there were only a few PSI in the Slightly Unacceptable (SUA) category and none in the **Unacceptable (U)** category, reflecting a high level of openness to these improvements. The architecture level showed acceptance with scores ranging from 30 to 136, urban design from 35 to 136, and eco-friendly design from 20 to 135. Across all levels,
4. PA, A, and SA categories dominated, confirming that these improvements align well with residents' needs.

5 Discussion and Verification of the Hypothesis

This section links the research findings to the broader conclusions. It interprets the findings of the overall research problem and explains their significance and implications. In addition, it places the findings in the context of the existing literature, either to enhance previous studies or to make new contributions to the field. Any limitations or unexpected findings are addressed and linked back to the research framework to assess their impact on the overall study.

5.1. Urban Transformation: Sustainability, Community Well-being, and Cultural Preservation in Disadvantaged Neighbourhoods

The findings of this research provide an understanding of the intersection between physical improvements, sustainability, community well-being, and cultural preservation in the context of transforming disadvantaged neighbourhoods in Beirut. Through the analysis of five research papers, this study addresses the key challenges and opportunities within the nature of built environments. Appropriate architectural and urban design metrics are explored and their effectiveness and impact on residents are evaluated. In addition, the residents' perspective is considered (Surveys and interviewees): the thesis's self-assessment of the specific built environment conditions, and responses regarding prioritised design actions and strategies regarding physical improvements. The findings presented in the accompanying papers can be used to raise important key points regarding the design requirements for transformation processes. While each paper discusses the findings within a narrower scope, this section takes a step back to critically discuss aspects of architectural and urban design metrics based on the combined findings of all the accompanying papers. The discussion below links these findings to the research questions, demonstrating their broader relevance in shaping sustainable, healthy, and culturally integrated urban interventions that respond to the overall reach problem.

The findings underscore the importance of using multidimensional assessment frameworks to analyse built conditions, liveability, accessibility, and environmental impact. Spatial analyses, field studies, and participatory mapping reveal the need for design interventions tailored to the local context to enhance social and economic resilience while achieving environmental sustainability. Architectural and urban design metrics highlight the direct role of spatial organisation and management in improving the quality of life, underscoring the importance of design in building more resilient communities and an interconnected city beyond spatial boundaries social equality, and any other binaries (Q1, Q2). In response to the challenges of climate change and urban transformation, this study identifies adaptive design strategies that balance environmental resilience with social and economic inclusion.

Urban core (inner-city slums) and waterfront neighbourhoods: Hay–Al Tanak and Al-Ouzai/Jnah as case studies, face increasing vulnerabilities due to urban heat islands, air pollution, flooding, water stress and uncontrolled expansion. To confront these risks, the research draws lessons to address these risks by analysing successful interventions to help identify scalable design strategies that can be adapted to similar urban contexts. The findings provide insights at the architectural, urban design, and landscape levels as potential solutions including the development green infrastructure, the creation flood-resistant public spaces, the use sustainable building materials, the implementation of rainwater harvesting systems, the promotion of integrated water management, beach nourishment, restorative dune techniques, the adoption of high-density mixed-use developments, support for community planning, and the advancement of sustainable mobility systems. These potential solutions aim to transform precarious urban environments into climate-resilient and socially inclusive ones. The findings highlight the urgent need to integrate environmental considerations into urban planning processes to ensure long-term resilience and sustainability in disadvantaged neighbourhoods answering the research questions: Q3, Q4, and Q5 are addressed specifically in papers II and III.

In addition to environmental factors, the research identifies pivotal design strategies that enhance community well-being and preserve cultural identity. These two aspects are explored in the Sabra and Shatila case study (Papers IV and V). By analysing the relationship between physical improvement and well-being, the research demonstrates that cost-effective architectural and urban design strategies can provide environments that support the mental, physical, and social health of residents. Initiatives such as adaptive reuse, renovation, and expansion, which focus on technical, functional, and aesthetic aspects, can enhance accessibility by developing inclusive buildings, facilities, streets, and public spaces that foster a sense of equality and belonging. Implementing safety measures, such as good street lighting, clear signage, and safe entrances, reduces stress and anxiety, enhancing feelings of comfort and security. Furthermore, carefully designed public spaces can strictly contribute to enhancing social interaction and building strong community support networks.

The integration of natural elements, such as natural light, ventilation, and sound insulation, contributes to improving the quality of the built environment, while carefully designed environments, using local materials and reflecting cultural identity, enhance residents' sense of pride and belonging. Flexible and adaptable spaces support the changing needs of the community, empowering individuals and enhancing long-term satisfaction with the built environment. The introduction of green spaces, indoor plants, and local materials also contributes to improving mental health by reducing stress and enhancing cognitive functions. These findings are derived from lessons and aligned with community and needs and visons answer the questions Q1 and Q7 and addressed in paper IV. Furthermore, the research emphasises that cultural identity is a key element in sustainable urban development. In this context, residents' perspectives were directly

considered through the second survey conducted, with results showing that interventions that are compatible with local traditions, historical narratives, and community practices are more acceptable and sustainable in the long term. The research covers this relationship at three main levels: At the architectural level, restoring deteriorating structures, while incorporating traditional architectural styles, contributes to enhancing neighbourhood identity. Spaces such as building entrances and rooftops also provide community gathering points that promote social interaction and hospitality.

At the urban level: The addition of green spaces, sports facilities, and public parks supports community engagement and provides spaces for social and cultural activities. Expanding pedestrian networks enhance mobility, while cultural centres strengthen local connections. Urban agriculture initiatives reconnect residents with traditional agricultural practices, promoting self-sufficiency and preserving cultural heritage. These green spaces provide a serene environment for social interaction and reflection, reflecting deep community values. At ecofriendly level: The integration of rainwater harvesting techniques, waste reduction, and sustainable landscape strategies aligns with traditional resource management practices, promoting environmental sustainability and ensuring a balance between urban development and natural resource conservation. Ultimately, these efforts must align with the cultural and historical context to ensure long-term community engagement and success, which respond to questions Q1, Q2, and Q6, addressed in paper V.

5.2. Academic and Practical Debates on Developing Disadvantaged Neighbourhoods and Urban Informality in the context of Beirut

This research aligns with key academic discussions and policy debates on urban transformation, particularly concerning the development of poor urban areas (informal settlements and slums). To compare the research results with existing literature, highlighting new contributions or confirming prior studies an expanded analysis situates the findings within four broader thematic frameworks:

- *Sustainability in poor urban areas: beyond physical upgrading*
- *Urban resilience: adapting cities to social and climate challenges*
- *Urban development: The role of well-being and cultural identity*
- *Urban informality: Engaging local histories and city dynamic in development*

While the first three themes are often discussed from a global perspective, the case of Lebanon remains underexplored. This neglect stems from several factors: the diminished role of the state, the dominance of sectarian-based political control over development, and the rise of neoliberal

policies that favour market-driven approaches and private-sector leadership over state-led planning. The fourth theme, in particular, is examined through the lens of Lebanese scholarly work, which provides essential foundations for a more nuanced understanding of the socio-political and historical contexts shaping urban development in Lebanon.

Sustainability in poor urban areas: beyond physical upgrading*,* In academic discourse, UN-Habitat (2020) and scholars as Dovey and King (2011) argue that sustainability in poor urban areas must go beyond basic infrastructure improvements and incorporate social equity, governance, and economic opportunities. Moreover, Jabareen (2008) suggests that sustainable urban transformation should integrate physical, environmental, and socio-cultural dimensions, an approach that strongly resonates with the findings of this thesis. This study supports the argument that sustainability cannot be a one-size-fits-all approach; rather, solutions must be adaptable and context-sensitive to the cultural, economic, and environmental conditions of each settlement. From the practical implications, many government-led slum upgrading programs fail because they focus solely on housing, neglecting livelihood opportunities, social infrastructure, and the broader socio-economic fabric of communities. Additionally, many initiatives are driven by "Big Ticket" policies (as discussed in the introduction of this thesis), which often prioritise large-scale interventions without addressing localised needs (Bah et al., 2018). While these programs have led to some improvements, their overall impact has been limited due to rigid, top-down approaches and a lack of integration across disciplines. This research reinforces the necessity of a holistic approach that combines physical improvements at different scales with community-led solutions. Successful grass-roots initiatives, such as participatory urban planning models in Medellín, Colombia, and Brazil's favelas, and Surabaya's inclusive approach to Indonesia's informal settlements demonstrate that co-designing interventions with dwellers enhances long-term effectiveness (Hart & King, 2019). This principle is strongly reflected in the research findings, underscoring the importance of inclusive, context-sensitive strategies in creating resilient and equitable urban transformations.

Urban resilience: adapting cities to social and climate challenges**.** Meerow et al. (2016) propose that cities must be able to absorb, adapt, and transform in response to social and environmental shocks. They define urban resilience as the ability of an urban system and all its constituent social, ecological, and socio-technical networks across time and space to rapidly maintain or return to desired functions in the face of disruption, adapt to change, and rapidly transform systems that limit current or future adaptive capacity. Furthermore, Pelling (2010) argues for the need for institutional resilience, community-led decision-making, and climate-responsive urban design to enhance resilience in urban areas, especially those that are socially and economically vulnerable. They argue that empowering communities to participate in decision-making processes and implementing adaptive urban designs are critical strategies for building resilience to climate-related challenges. This approach was supported through the conducted surveys and interviews and particularly in the last paper (Paper V).

This thesis contributes to the discussions on "transformative resilience" by Friend and Moench (2013) which demonstrate how architectural and urban design measures can be leveraged not only for adaptation but also for social empowerment and economic self-sufficiency. This study supports a shift from disaster response strategies to proactive climate adaptation, particularly in coastal and flood-prone neighbourhoods. The proposed physical improvements to coastal areas are consistent with existing literature indicating the vulnerability of coastal settlements to climate change, which has been extensively discussed by Kelman (2011) and IPCC (the Intergovernmental Panel on Climate Change) (2023), particularly in the Middle East, where rising sea levels and rapid urban expansion pose significant risks to degraded coastal communities, underscoring the urgent need for climate-responsive urban planning and resilient infrastructure development to protect vulnerable coastal communities. The past study by French et al. (2021) confirms the design implications of the research by demonstrating how architectural and urban design measures can be leveraged not only for adaptation but also for social empowerment and economic self-sufficiency. This study aligned with these discoveries and supports a shift from disaster response strategies to proactive climate adaptation, especially in coastal and flood-prone neighbourhoods (Paper II).

Unlike the previous studies, which focuses on macro-level climate adaptation policies, this study provides micro-scale, context-specific solutions including locally driven spatial interventions tailored to Beirut's socio-economic and environmental realities. Also, it introduces new discussions on how adaptive urban design and architecture can simultaneously address both climate vulnerabilities and socio-economic resilience, positioning Beirut's disadvantaged neighbourhoods as potential models for integrated urban resilience strategies. In practice: as of 2025, no significant interventions addressing this issue have been implemented in the Beirut metropolitan area. At the international level, however, there are notable examples of successful initiatives. The Metro Manila project and Jakarta's Kampung Improvement Program demonstrate the importance of integrating green infrastructure, flood management, and community resilience-building as effective strategies for mitigating urban vulnerabilities. These cases highlight the potential for context-sensitive approaches to improve the living conditions of informal settlements.

Urban development: The role of well-being and cultural identity: The relationship between built environment, nature, and well-being has been extensively explored across the fields of architecture, urban planning, public health, and environmental psychology. Speck (2012) argues that the spaces we interact with daily profoundly impact our lives, opportunities, happiness, identity, and sense of belonging, for better or worse. This research contributes to this perspective by demonstrating how the physical and social conditions of impoverished spaces in disadvantaged neighbourhoods negatively affect residents' well-being, sense of stability, and behaviour. Scholars like Evans et al. (2003) and WHO (World Health Organisation) (2018) organisation highlight that housing quality, access to green spaces, and urban service provision directly impact mental and physical health outcomes. This thesis builds on these findings by examining how developing housing condition, integrating green spaces and improving services in disadvantaged

neighbourhoods can rigorously contribute to reducing health inequalities and alleviating environmental stresses. Through the case of the Sabra and Shatila neighbourhood, the research work demonstrates that access to a mature and healthy built environment through well-designed infrastructure and housing and public spaces, can lead to significant improvements in mental and physical health outcomes. In line with this, Marmot (2010) argues that low-income and vulnerable communities often suffer from inadequate housing, poor air quality, and limited access to public amenities, all of which negatively impact physical and mental health. The findings of the survey conducted in paper IV confirm that the environmental stressors in disadvantaged areas such as lack of natural ventilation, overcrowding, and limited access to green spaces contribute to higher levels of stress, anxiety, and physical illness.

Furthermore, Carmona and De Magalhães (2009) established acceptable standards; defining twelve measurable elements of environmental quality: clean and tidy, accessible, attractive, comfortable, inclusive, vital and viable, functional, distinctive, safe and secure, robust, green and unpolluted, and fulfilling. Each of these elements, in turn, represent a complex amalgam of issues that is experienced relatively, in the sense that the experience of it can be either positive or negative. Building on this framework, this research applies these measurable elements to the development of spaces in disadvantaged neighbourhoods, demonstrating how they can be adapted to improve physical and social well-being. This framework becomes a key component of proposed design strategies that aim to improve the quality of life for vulnerable communities.

Similarly, Barton and Grant (2006) extend this understanding with a model that illustrate the role of urban design and architecture in promoting social interaction, walkability, and environmental quality to foster psychological resilience and social cohesion. This research builds on these findings while making a novel contribution by providing a more detailed analysis of low-cost, context-sensitive design solutions to address health and social disparities in disadvantaged neighbourhoods, with a particular focus on the most vulnerable communities. By explicitly linking well-being, spatial organisation and community engagement, this study advances the discourse on urban resilience. It also demonstrates that affordable, locally adapted design interventions can play a critical role in promoting well-being by directly responding to the specific needs and constraints of communities.

Referring to the discourse on preserving the cultural essence of disadvantaged neighbourhoods within development initiatives. Bayat (2012) theory of "urban informality" emphasises that vulnerable communities develop unique socio-spatial practices that must be recognised and preserved in urban transformation efforts. Furthermore, Scholars such as Amin et al. (2017) argue that public spaces and cultural hubs are critical to fostering social resilience in cities and emphasise that place identity is crucial for community resilience and that built environments shape social interactions. Studies on poor urban areas in the Global South (Roy, 2009) recognise that bottom-up, context-sensitive interventions are more effective than top-down urban renewal projects

Preserving cultural identity. The thesis supports the findings of these studies highlight that transformation of disadvantaged neighbourhoods must not erase local identity and the valuable cultural essence that exists in these settlements, revealing the cultural essence and practices in Sabra neighbourhood and connected to spatial development, this approach aligning with UNESCO's Historic Urban Landscape (HUL) approach (UNESCO, 2013). From practical standpoint, slum redevelopment projects in India (Kathputli Colony) and Morocco (Fez Medina) illustrate that integrating cultural heritage into urban renewal processes fosters community ownership and long-term sustainability (El Harrouni, 2024). This aligned with the findings of this study, which suggest that community-driven cultural interventions such as souks, cultural centres, and the preservation of vernacular architecture can serve as mechanisms for both social and economic revitalization.

Urban informality: Engaging local histories and city dynamic in development: Despite the persistent marginalization of informal settlements in mainstream urban discourse, several scholas such as, Mona Fawaz, Isabelle Peillen, Mona Harb, Lara Deeb, and Howayda Al-Harithy, have provided in-depth analyses of urban informality, housing policies, urban governance, and political clientelism. Their work critically examines how planning regulations and policies shape the development of informal neighbourhoods. Fawaz and Peillen (2003) produced a foundational report on slums in Beirut, offering a detailed assessment of their socio-economic conditions, spatial distribution, and typologies. Later, Fawaz et al. (2012) expanded this line of inquiry by investigating the interplay between urban governance, informality, and social and political change in Beirut. Their research also sheds light on how security-driven urban measures shape everyday life. In the discussion section of the first paper, I build on Mona Harb's concept of "political clientelism," showing how deprived neighbourhoods in Beirut are often used by political parties as tools to reinforce their influence over state institutions. This dynamic was evident during the COVID-19 pandemic, when political parties played a crucial role in securing basic services. This analysis contributes to the broader discussion about the consequences of state weakness in service delivery to vulnerable communities, raising crucial questions about the interrelationship between clientelism and informal urban growth. Lara Deeb (2024) further explored the role of everyday life, social practices, and sectarian dynamic within Beirut's informal neighbourhoods. This thesis builds on these contributions by advancing the discussion through a detailed analysis of the three distinct settlements typologies, each shaped by different social, historical and political forces. Collectively, these studies form a valuable foundation for understanding the layered complexities of disadvantaged neighbourhoods in Beirut. they highlight the need for context-sensitive design guidelines that respond to physical, socio-economic, and environmental challenges. The work of these scholars underscores the importance of engaging local histories and city dynamics to develop sustainable interventions in disadvantaged neighbourhoods; an approach reflected in each paper included in this thesis. By situating the findings within these broader academic and policy debates, this research contributes to the growing understanding that sustainable urban transformation must integrate environmental resilience, socio-spatial inclusion, well-being and cultural sustainability.

6 Conclusions

This research examines the conditions of disadvantaged neighbourhoods in Greater Beirut, exploring the factors influencing their development as well as the socio-economic and environmental challenges they face. It also reveals the unique physical characteristics of these neighbourhoods and defines the geographical boundaries of the selected three case studies. The findings emphasis the need for physical transformation that relies on a combination of urban renewal and rehabilitation concepts that can be achieved through the completion of repair, renovation, extension, adaptation, and reintegration with a focus on technical, functional, and aesthetic aspects. Additionally, the research stresses the importance of applying context-sensitive architectural and urban design solutions that drive social, economic, and environmental improvements.

The study draws lessons from 18 successful interventions at the architecture and urban scale, which occurred on both the international and national level, as documented and presented in papers I, II, III, and IV. It can be concluded that the elaborated strategies followed in these interventions have succeeded in meeting both the needs of the residents and the built environment. The interventions brought a new perspective towards transforming poor urban areas that have similar challenges and approximate conditions to those in Beirut. Key actors, such as stakeholders, have succeeded in understanding the role of urban design and architecture tools in solving complex problems. Also, it appears that the physical improvement that resulted in the adoption of effective and low-cost urban design and architecture solutions has contributed to the creation of the mature character of these neighbourhoods. This has led to the creation of dynamic urban borders and a healthy environment. Furthermore, the study explores how physical improvements influence key aspects such as eco-friendly and sustainable development, enhancing residents' well-being from psychological and biological levels, and preserving cultural essence. It assesses how these factors contribute to creating liveable, equitable, and resilient settlements.

Focusing on disadvantaged neighbourhoods, particularly the urban core and coastal settlements of Hay Al-Tanak and Al-Ouzai/Jnah, this study draws attentions to the urgent need to address their complex and site-specific challenges. It provides a deeper understanding of local issues while advocating for the development of new urban and architectural solutions that foster dynamic transformation and reshape the image of these neighbourhoods. This research also puts forward visionary strategies that combine climate resilience, sustainable development, and innovative design thinking to create adaptable spaces that respond to both environmental pressure and social needs. These insights could support municipalities and local stakeholders in planning and implementing inclusive urban interventions. The study presents a detailed exploration of how physical improvement can enhance residents' well-being from psychological and biological levels. It underlines the critical role of design elements such as geometric forms, materials, natural light,

and greenery, in stimulating mental creativity and supporting physical health. When carefully integrated in the design process these components contribute to healthier, more vibrant environments. Additionally, the study draws attention to how the degraded built environments affects daily activities, behaviour, and social interactions, providing valuable data on residents' perceptions and aspirations, the findings support a community-driven approach to transforming neighbourhoods in a way that reflects local needs and values.

The study identifies low-cost, effective design tools that improve residents' psychological, biological, and social well-being. Stress on the concept of "think globally, act locally" is crucial, suggesting that while these solutions can inspire, they must be adapted to the unique context of each neighbourhood to ensure cultural sensitivity and practical effectiveness, ultimately improving residents' quality of life.

In reference to how physical improvements can help preserve the cultural essence of deprived neighbourhoods, the broadcast emphasised the need to integrate cultural aspects into the development process. It also highlights the role of culture in making places more liveable, promoting social inclusion, and facilitating dialogue between diverse communities. Through the Sabra case study, the research presented a human-centred design approach that preserves the unique identity of the neighbourhood. This approach incorporates adaptable, efficient, and context-sensitive architectural, urban, and sustainable design solutions that are compatible with the distinct social and cultural fabric of the area, ensuring meaningful and lasting improvements.

The research explored a range of Possible Spatial Improvements (PSI) at the level of architecture, urban design, and eco-friendly solutions. These physical improvements can serve as a design guideline for positive change, transforming disadvantaged neighbourhoods into liveable, equitable, resilient, and healthy built environments.

The main conclusions drawn from each paper play an important role in addressing the core issue by summarising the main findings, substantiating the hypotheses, and providing evidence-based insights that contribute to resolving the identified challenges. Collectively, these conclusions build a solid understanding of the topic, linking the study findings to broader theoretical frameworks and practical applications. This accumulated knowledge not only informs policy and practice but also suggests actionable interventions that can guide future research and decision-making in this area.

The statements below present at the core conclusions drawn separately from each paper (I-V):

- *The competence of the appropriate architecture and urban design tools in transforming disadvantaged neighbourhoods is a force for positive change that contributes to the creation potential at the social, economic, and environmental levels.* ***(Paper I)***
- *Improving the physical and social context of inner-city slums through sustainable design interventions and programs that draw on architecture and urban design measurements makes the city of Beirut and its communities inclusive and resilient.* ***(Paper II).***
- *Sustainable design solutions and development strategies through urban, architectural, and landscape design successfully address the challenges of climate change and create an attractive and equitable urban environment in disadvantaged waterfront neighbourhoods* ***(Paper III)***
- *Architecture and urban design tools play a crucial role in transforming disadvantaged neighbourhoods that suffer from unsatisfactory built environments, significantly enhancing residents' well-being both psychologically and biologically.* ***(paper IV)***
- *Culture is key for making places liveable, and focusing on cultural activities promotes social inclusion and dialogue between diverse communities Transforming disadvantaged neighbourhoods require integrating the cultural aspects of communities into the development process.* ***(Paper V)***

Recommendations

Within this thesis the authors have suggested specific aspects that should be taken into account for future interventions in dealing with the settlements presented in Beirut and its suburbs. These recommendations are summarised in a different form:

Envisioning a new urban future requires reevaluating the way we view poor urban areas. Future interventions should be based on well-defined and specific objectives that integrate economic priorities, environmental needs, and social aspects to create sustainable and integrated urban solutions. A properly designed program should minimise unintended trade-offs and negative side effects, and ensure that interventions lead to long-term improvements rather than short-term fixes. Effective multi-level collaboration is a key priority, with local authorities, private sector actors, and community representatives working together to implement meaningful changes. This requires strengthening technical capacities and financial incentives, and ensuring that urban development initiatives are supported by adequate expertise, resources, and funding. In addition, new financing models should be introduced to effectively respond to the challenges and risks faced by poor urban communities, and enable sustainable infrastructure and service provision. Furthermore, horizontal collaboration and coordination should be enabled to ensure the smooth implementation of urban policies and interventions. Promoting better training and more efficient knowledge sharing will enhance organisational and technological capacities, and foster a workforce capable of effectively

addressing urban challenges. Strengthening administrative and technical initiatives is crucial to ensure that municipalities and institutions are equipped with the tools and resources to create high-quality urban environments. To ensure long-term impact, financial sustainability must be prioritised by enhancing and delivering services that meet local needs. In addition, developing humanitarian capacities would strengthen crisis response mechanisms and improve efficiency in planning and implementing urban development projects. Transparent governance and inclusive participation would help building strong relationships with stakeholders, fostering trust and collaboration in future urban projects. A critical aspect of this vision is to promote sustainable mobility and create healthier environments that support community well-being. Applying context-sensitive urban design solutions to informal settlements and taking into account socio-economic realities can lead to more resilient and adaptive communities. While these approaches hold great potential for Beirut, significant challenges remain in their implementation, requiring further research and adaptive policymaking to ensure their success.

The development of a given field and scientific discipline

This research contributes to the advancement of architecture and urban design as scientific disciplines by offering a structured, ethically grounded approach to improving the living conditions of disadvantaged urban communities. It supports the ongoing development of academic teaching while encouraging innovation that is methodologically rigorous and fully documented.

The findings of this work provide an updated synthesis of key concepts and strategies recognised and applied globally in the context of slum and informal settlement upgrading. Focusing on vulnerable communities in Greater Beirut, the research emphasises the transformative potential of architecture and urban design in creating decent, inclusive, and sustainable living environments. It highlights how well-designed physical interventions can contribute to social empowerment, environmental resilience, and improved quality of life.

The novelty of this research lies in its formulation of a thoughtful, context-sensitive scientific methodology. It establishes a foundation that enables other researchers and professionals to ethically address similar urban challenges, prioritising architectural and urban design dimensions as essential components of transformative change. These findings represent impactful recommendations for material improvements that directly address the complexities of life in urban poor neighbourhoods.

Furthermore, the research challenges the notion that architecture is a privilege reserved for the wealthy. It asserts that everyone has the right to live in a safe, healthy, and dignified built environment that supports well-being and productive daily life. It also highlights that interventions in poor urban areas are often shaped by political, institutional, and programmatic decisions. These factors significantly influence the technical nature and scope of solutions adopted.

Without a shift in professional mindset, this trend is likely to continue, with interventions remaining limited to technical solutions, temporary fixes, or limited-scale services. This research calls on both practitioners and academia to recognise the strategic value of architecture and urban design in addressing the root causes of urban inequality. By setting an evidence-based, visionary, transformative agenda, the study aims to influence public policy, mobilise political will, and raise professional standards.

At its core, the fundamental challenge may lie not only in government priorities or policy frameworks, but in what we, as experts, know, value, and choose to deliver. This work calls for a deeper and more proactive commitment from the architectural and urban design disciplines to contribute meaningfully to the future of disadvantaged urban communities.

7 Potential Limitations and Future Work

It would be naive to believe that the findings of this research can be applied straightforwardly in the short term, especially since we are dealing with already built-up areas within the city. Adopting the proposed spatial improvements in disadvantaged neighbourhoods requires navigating a complex web of social, economic, cultural, political, technical, logistical, and policy factors, in addition to the general attitudes of the population toward new approaches to physical transformation, management, organisation, and living. Therefore, these research explorations should be considered as general benchmarks towards positive transformation in addressing the issues arising from housing challenges, social, economic, and health marginalisation, refugees, governance gaps, and climate and environmental challenges that dominate metropolitan area of Beirut's current development reality. Furthermore, the situation in Beirut mirrors broader patterns of urban conflict seen across the region, underscoring the need for context-sensitive strategies that can inform responses to similar challenges both regionally and globally.

As noted by Fawaz (2009), in her examination the impact of neoliberal policies on urban development in Beirut's periphery, disadvantaged neighbourhoods and the marginalisation of low-income communities are primarily the result of market-driven and agency-led real estate development, rather than state-led planning. The main driver of high-land coverage development is profiting maximisation through rent, with land subdivision and resale dominating urban expansion patterns. This process limits the feasibility of implementing planned and sustainable urban transformations, as landowners and developers prioritise short-term financial returns over long-term urban resilience. Therefore, the willingness of the private sector to invest in alternative housing models remains uncertain, given the lack of formal land tenure and regulatory frameworks. Furthermore, economic trends and the housing market are linked to broader economic instability as political patronage influences service provision in these areas, making any intervention unreliable. For instance, political parties often use disadvantaged neighbourhoods as a tool of territorial lobbying, providing selective services to maintain influence, which can undermine formal planning initiatives. This is evident from the reconstruction initiative that followed the July-August 2006 war between Israel and Hezbollah in Lebanon, which shows how Hezbollah is providing social welfare and urban services after the 2007 war reconstruction in a way that blurs the lines between development and political mobilisation (Mac Ginty, 2007). Weak state governance and lack of political will result in fragmented and inconsistent urban policies. Challenges to integrating higher-density urban models into disadvantaged neighbourhoods arise due to planning regulations and inadequate infrastructure upgrades. Historically, the government's response to these settlements has been reactive rather than proactive, making planned interventions even more complex. Beyond market forces, political and week government system and lack of cooperation further constrain might appear the transformation processes: residents' perceptions and preferences play a crucial role in the success of new urban models.

For example, social practices and sectarian dynamics shape how communities interact and engage with urban spaces, meaning that any proposed transformation must be compatible with local cultural and social values to gain acceptance. A significant challenge in data collection was engaging the local community, especially when introducing technology-based approaches such as virtual reality and sensory wristbands to measure emotions and perceptions in different settings. Dwellers largely resisted the use of such devices and were reluctant to share information, primarily due to concerns about privacy, potential evictions, or law enforcement actions. This resistance limited the ability to incorporate advanced tools for spatial and behavioural analysis.

Based on what was discussed before in the libation part of this section, it can be concluded that an effective approach to transforming disadvantaged neighbourhoods requires solid academic foundation with active government involvement, including local authorities, but also the engagement of NGOs, community organisations, private sector actors, and international agencies. While political will and government-led urban policies are essential, multi-stakeholder collaboration is necessary to ensure sustainable and inclusive transformation. Future research should therefore focus on addressing the following related issues:

- It would be valuable to explore whether current urban policies adequately address the challenges of disadvantaged neighbourhoods, and how these policies can be improved. Future research should focus on policy gaps and how urban frameworks can be revised or expanded to support the sustainable transformation of these neighbourhoods, taking into account local realities and global best practices.
- It is important to identify and prioritise disadvantaged neighbourhoods for investment, and understanding their investment potential, is essential to formulating a land-sharing approach to upgrading that can provide the basis for sustainable transformation.
- It would be pertinent to examine whether disadvantaged neighbourhoods can be viewed as an acceptable and sustainable urban practice. This includes understanding how informal practices in land tenure, housing construction, and infrastructure provision affect neighbourhood development. It should also be explored what it means for informality to be accepted as a framework for intervention by policymakers and planners rather than viewed as a problem to be eliminated.
- It would be insightful to investigate the roles of different actors (government, private sector, NGOs, communities, political entities) in shaping disadvantaged neighbourhoods' development. It is important to understand how these actors interact, whether through cooperation or conflict, and how their divergent interests influence the design and implementation of urban interventions should be explored. Particular attention should be paid to the role of political patronage and civil society organisation in influencing urban change.

- It is important to view informality in its various forms as a mechanism for urban transformation rather than as something to be removed or formalised. Research should examine how informal systems and self-organised community actions can contribute to the creation of more resilient and adaptable urban spaces, and how these systems can be strengthened or formalised without losing their inherent benefits to the community.
- It is crucial to investigate how to increase community participation in the design and implementation of urban solutions in disadvantaged neighbourhoods. Research should focus on inclusive planning practices that ensure that the voices of vulnerable communities are heard in decision-making processes and how to promote community ownership and long-term engagement in urban transformations.
- It would be beneficial to explore how AI-driven spatial analysis, remote sensing, and Geographic Information Systems (GIS) can enhance disadvantaged neighbourhood mapping, planning, and transformation strategies. These technologies can provide real-time data on urban expansion and settlements' growth patterns, and environmental risks. Research can focus on how AI can improve predictive modelling for infrastructure needs, disaster resilience, and service provision while ensuring ethical data collection and community participation in decision-making.
- It would be worthwhile to investigate how emerging technologies can assess the emotions, perceptions, and lived experiences of dwellers to inform human-centred interventions. This includes using biometric sensors (EEG, ECG, GSR) and AI-powered emotion recognition to track stress, comfort, and engagement with space. Virtual and augmented reality (VR/AR) can facilitate participatory planning by capturing real-time emotional responses to proposed designs. Geospatial mapping and GPS tracking can visualise emotional hotspots, while sentiment analysis of social media and digital ethnography can reveal community concerns.

8 Summary

This thesis addresses a global phenomenon of disadvantaged neighbourhoods (slums and informal settlements), with a focus on Greater Beirut, where informal urbanism has resulted in significant socio-economic and environmental challenges. This study concentrates on the physical improvements of these neighbourhoods through the application of appropriate architectural and urban design tools. It explores how these tools can drive positive transformation enhancing sustainability, social inclusion, and well-being, while preserving cultural identity. The detailed investigation focuses on three major disadvantaged neighbourhoods: Hay Al-Tanak, Al-Ouzai/Jnah, and Sabra and Shatila, revealing their spatial, historical, and social dynamics.

This research is organised into five linked papers, each examining a distinct yet complementary aspect of spatial transformation within disadvantaged neighbourhoods. **Paper I** serves as an umbrella for the research, laying the groundwork for the other papers for detail explorations, and identifying the role of architecture and urban design in promoting positive change. **Paper II** highlights urban design intervention that aim at improve an inner-city slum and strengthen urban resilience (the case of Hay Al-Tanak). **Paper III** explores sustainable solutions for coastal settlements facing climate challenges (the case of, Al-Ouzai/Jnah). **Paper IV** examines how spatial improvements influence residents' well-being, considering psychological and biological aspects (the case of Sabra and Shatila). **Paper V** emphasises the role of cultural preservation in urban transformation, promoting social inclusion and reinforcing community identity (the case of Sabra).

Collectively, the findings of each paper yield detailed design guidelines for potential spatial improvements (PSI) at the architectural, urban and environmental levels (presented in Paper V). To ensure a democratic and inclusive approach, the research incorporates a survey to evaluate community acceptance of the explored PSIs. These insights provide a roadmap for urban policymakers and practitioners, calling for inclusive, community-led interventions that create liveable, resilient and equitable urban environments. By integrating global best practices with a context-sensitive approach, the research underscores the potential of architecture and urban design to address the challenges of disadvantaged neighbourhoods. Ultimately, the research calls for integrated urban policies that prioritise community-led and context-sensitive interventions through a multi-dimensional approach that links architecture, urban design, and environmental strategies that contribute to more sustainable and inclusive urban development to reinvent informal Beirut.

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