

A Capital-Based Assessment of the Livelihood Vulnerability of Syrian Refugees

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Abstract

This study assesses the livelihoods of Syrian refugees in Konak District, İzmir, exploring their livelihoods and their context based on a capital framework, and vulnerability dimensions determined by the Intergovernmental Panel on Climate Change (IPCC). It employs household surveys, the Livelihood Vulnerability Index (LVI), and qualitative analyses with Syrian refugees and non-governmental organisations. The research questions seek the most effective capitals and dimensions for the LVI and the LVI-IPCC, and strategies affecting capital distribution and reproduction in refugee-dense areas. The study reveals a high-level LVI for Syrian refugees, especially due to financial capital. The LVI-IPCC indicates moderate vulnerability, with exposure as the main contributing factor. Specific capitals are vulnerable to varying extents. Urban planning should develop supportive strategies to reproduce capital and regulate distribution.

Keywords: Vulnerable Syrian Population, Refugee Crisis, Livelihood Capital.

1. Introduction

The livelihoods of refugees have recently attracted attention, as they are increasingly affected by and related to major global transitions in climatic, economic and social systems. In particular, the examination of the livelihood vulnerability of refugees is necessitated by human-made disasters and mass migrations. The United Nations' 2030 Sustainable Development Goals adopt a livelihoods approach to emphasise capital assets that reflect people's adaptive capabilities and sensitivities. The ability to sustain a livelihood in a manner that is both sustainable and viable is predicated upon the maintenance of resources and the reproduction of capital assets, thus ensuring resilience in the face of adversity and stress. According to United Nations reports, the Syrian Civil War is one of the largest refugee crises in the world, causing the forced displacement of approximately 10 million people (İzmir Mülteci Çalışmaları Ağı, 2021). This migration from Syria defined by the Syrian Crisis by the United Nations High Commissioner for Refugees (UNHCR) due to its rapidity and scale. According to the United Nations High Commissioner for Refugees (UNHCR), Türkiye has approximately 3 million Syrian refugees, making it the world's largest host country for Syrian refugees (UNHCR, 2025). The scale and rapidity of the mass migration also defines a crisis for Türkiye, the host country. The consequence of such actions is an imbalance in the distribution and reproduction of livelihood capitals, as well as a deterioration in interrelationships between capitals. Consequently, threats to livelihood sustainability result in livelihood vulnerability.

This study contributes to the extant literature by addressing a gap in research on livelihood vulnerability assessments at the household level for Syrian refugees in Türkiye. This study adopts a livelihood capital approach to improve Syrian refugees' ability to adapt to hazards, increase risk awareness, and develop urban policies for both host communities and refugees. It draws attention on livelihood vulnerability rather than only social vulnerability, which includes a social capital dimension (Quandt, 2018), because a livelihood vulnerability analysis provides a more comprehensive assessment of all types of livelihood capital. The aim of this study is to assess the vulnerability of Syrian refugees' livelihoods based on a capital framework and vulnerability dimensions (exposure, vulnerability and adaptive capacity) determined by the Intergovernmental Panel on Climate Change (IPCC) definition of vulnerability. Syrian refugees have been identified as a particularly vulnerable group in light of the Syrian Civil War and the subsequent forced displacement of their population. The challenges faced by this group are numerous and significant. In this study, the variables specific to the vulnerable group will be identified according to the extant literature and preliminary interviews. The variables will then be analysed with a multi-dimensional approach by grouping them according to capital types and dimensions that contribute to vulnerability, and livelihood vulnerability will be evaluated by creating a Livelihood Vulnerability Index (LVI) to capture socio-economic problems, the presence or absence of diverse forms of capitals, and problems of organisation or balance among these capital types. For a comprehensive evaluation of the sensitivities and adaptive capacities of the Syrian refugees, interviews with both Syrian refugees and non-governmental organisations (NGOs) will be conducted, encompassing a wide range of perspectives on social, human, financial, physical, and natural capital

types. Thus, both place-specific and community-specific disadvantages, advantages, needs and potentials for sustainable development through a livelihood vulnerability assessment of Syrian refugees. This study seeks to answers these research questions are as following:

- What is the level of LVI of Syrian refugees, and what type of capitals make it more or less vulnerable?
- What dimension of vulnerability is more effective on vulnerability?
- How should planning strategies regulate the distribution and reproduction of capitals in refugee-dense areas?

2. Literature Review

Chambers and Conway (1992) define livelihood as the process of accumulating assets and resources, encompassing both material and social capital, in addition to capabilities. The Sustainable Livelihoods Approach is centred on five categories of household assets, referred to as "livelihood capitals," which encompass natural, social, financial, physical (infrastructural), and human capital assets (Chambers and Conway, 1992). Livelihood capital assets, as an essential component of the livelihood system, have the capacity to effect change in structures and processes that are subject to 'disturbances'. However, these assets may be constrained by structural transformation and social processes within the system (Quandt, 2018; Glavovic et al., 2003). The livelihood approach has been demonstrated to be particularly efficacious at the community level (Hahn et al., 2009; United Nations General Assembly, 1997). Scoones (1998) also defined natural, physical, financial, human and social capital as livelihood resources. It is hypothesised that maintaining a balance of these five capitals is essential for the sustainability of adaptive capacity and well-being (Quandt, 2018; Jacobs et al., 2015).

According to Bourdieu (1986), capital is defined as a self-sustaining force with the capacity to generate profit and the ability to reproduce itself. The structure of the distribution of capital into different types reflects the social world at a given time, revealing constraints, opportunities and the success of practices (Bourdieu, 1986). As Gkartzios et al. (2022) emphasised, the interaction between the forms of planning and forms of capital is of paramount importance. Planning has been demonstrated to play a pivotal role in both the reproduction and the deterioration of capital. In accordance with the aforementioned framework, capitals are to be classified into different categories. However, the forms of capital do not explicitly differentiate between these categories, as they are interrelated. Gkartzios et al. (2022) further draw upon the concept of spatial energy, which is predicated on the interaction of capitals.

Human Capital

Human capital refers to conditions such as good health, good nutritional conditions, ability to work, knowledge and skills. It is similar to Bourdieu's definition of cultural capital. Due to insufficient income in crowded families, the division of parental attention with children, and too many responsibilities, household size and the age of the head of the household, who is the decision-maker, are determinant in the development of human capital of generations (Rahman et al., 2018). Zhang and Fang (2020) used occupational diversity to assess human capital as formal or informal skills provide diversity in livelihood capital assets. It also has a strong relationship with economic capital by expressing the socio-economic status of individuals.

Physical Capital

Physical capital relates to the conditions of built-up areas and urban infrastructures. This type of capital refers to the proportion of built-up area, safe shelter and buildings, affordable housing and transport, energy access to information, distance to areas offering education, health and market opportunities (Rahman et al., 2018). Gkartzios et al. (2022) considered physical capital as built capital. Rahman et al. (2018) used the term manufactured to refer to physical capital.

Financial Capital

Financial capital includes savings, loans, remittances, wages, pensions, salaries, other government transfers, subsidies and monthly expenditures (Rahman et al., 2018). Economically, it refers to livelihood goals, assets and regular income (Zhang and Fang, 2020).

Natural Capital

Natural capital includes natural resources such as land services, water, soil quality, crop diversity and air. Although natural capital was not defined by Bourdieu, Gkartzios et al. (2022) used the term land-based capital to refer to stocks of natural resources. Natural capital refers to the extraction of social and economic value from natural resources and the effects of natural capital on social structure. Urban areas suffer from a lack of natural ventilation and intensive industrial activities (Aygün Oğur, 2023). This shows that land uses and their location choices, which are physical capital, can have detrimental effects on natural capital.

Social Capital

Social capital is the resources derived from institutionalised or non-institutionalised networks of relationships, connections, group memberships such as family, class, workplace or neighbourhood (Bourdieu, 1986). These connections, trust and exchange in relationships can be used to facilitate access to resources and increase resources, support and opportunities (Bourdieu, 1986). The volume of social capital depends on the size of the social network. It represents solidarity and collective action. It is the establishment of communication paths and social relations that facilitate the acquisition of power and access to capital.

As a result, there are trade-offs between types of livelihood capitals (Quandt, 2018; Obrist et al., 2010). Moreover, the trade-off between capital assets has been demonstrated to generate income, enhance capacity and promote adaptability (Rahman et al., 2018; Chambers, 1989; Scoones, 1998). The capital-based approach facilitates the incorporation of context-specific and community-specific variables associated with Syrian refugees, in addition to variables commonly utilised in vulnerability assessments.

Urban planning is concerned with the field as a social space in which people interact and compete for capital. In both theoretical and practical contexts, the concepts of planning and capital are mutually reinforcing. In circumstances where capital is distributed unequally across a given field, said field becomes a source of specific capital-related effects. The aforementioned effects include power and profit as dominant forces within the field, with the result that laws are imposed which regulate the most effective mechanisms for the reproduction of capital (Bourdieu, 1986). This statement underscores the significance of not only the presence or absence of capital, but also the equilibrium between distinct forms of capital, in determining the reproduction of capital. Planning develops convenient practices and strategies to reproduce capital and regulate its distribution. However, in doing so, planning also functions as a transformative factor by supporting the spatial energy arising from the relations between types of capital (Gkartzios et al., 2022). It is also observed that different types of capitals frequently function in coordination with one another. It is therefore vital to understand the balance or relationship between these capitals in order to develop effective planning strategies (Gkartzios et al., 2022).

Dimensions of Vulnerability

Vulnerability is a concept which can be conceptualised as comprising three dimensions or contributing factors. These are exposure, adaptive capacity, and sensitivity. These are determined by the Intergovernmental Panel on Climate Change (IPCC).

Exposure results from environmental, social and economic uncertainties or rapid changes. It is also based on governmental causes, such as civil conflicts and extreme economic fluctuations. Geographical location poses risks but reflects population density and types of habitat in an area. Duration and degree of hazards and disasters refer to climate variations including high temperatures and precipitation (Lottering et al., 2021, Feyissa et al., 2018). Human density and conflict can also result in exposure to hazards.

Sensitivity is a risk factor. It is the responsiveness of a system to changes in social, economic and climate change. It is more closely related to inadequacy and lack of resources. Groups vulnerable to change are highly sensitive or responsive to rapid changes. Sensitivity and adaptive capacity vary according to circumstances including country, society and time (Aygün and Baycan, 2018).

Adaptive capacity is the ability of a system to deal with sudden social and economic changes and the impacts of natural changes, like climate change. It depends on access to resources. Literature on climate adaptation highlights the adaptive role of capital assets (Rahman et al., 2018). A system with more adaptive capacity is less

vulnerable. Reduced adaptive capacity due to poverty, education, social norms, health-economic policies and governance can cause increased sensitivity and exposure.

Roles of Non-Governmental Organisations and Intergovernmental Agencies in Livelihood Vulnerability Reduction

In consideration of the increasing number of refugees, the role of NGOs and intergovernmental agencies in fostering bridging social capital through inter-community activities is of crucial importance. It is asserted that these activities have the potential to foster social cohesion and facilitate refugees' integration into the national system and relations with the host community (Zihnioğlu and Dalkıran, 2022). The establishment of social ties within each particular community is imperative in order to decrease livelihood vulnerability and improve social capital (Zhang and Fang, 2020). The establishment of contact is of paramount importance in the process of deconstructing prejudices and fostering a culture of coexistence. According to United Nations statistics from previous refugee crises, the perception of foreignness or otherness should be eliminated in the integration of refugees (İzmirde Suriyeli Mültecilerle Dayanışma Derneği, 2020). The social concept of inclusion is proposed in lieu of integration (İzmirde Suriyeli Mültecilerle Dayanışma Derneği, 2020). The underlying rationale for this approach is to underscore the reciprocal relationship between the host nation's citizens and the refugee population. However, significant constraints exist with regard to the integration and sustainability of relationships between refugees and host communities, including language barriers (Zihnioğlu and Dalkıran, 2022).

A bottom-up approach is imperative in advocating for the rights of vulnerable groups, including refugees, children and women. A concerted effort by local governments, academics, non-governmental organisations, and private sectors is necessary to develop strategies and policies to reduce the vulnerability of refugees (İzmirde Suriyeli Mültecilerle Dayanışma Derneği, 2020). The government, as the primary policy maker, has a significant influence in reducing the vulnerability experienced by refugees. The government is responsible for the equitable distribution of aid to both the host and refugee communities. However, the collaboration between the government and non-governmental organisations is also crucial in order to achieve this objective.

All NGOs and official intergovernmental agencies, such as the UN, play vital roles in supporting populations worldwide. They work in many areas, including development, population planning, access to human rights, poverty reduction, health, education and crisis response, to address the refugee crisis and reduce the vulnerability of vulnerable groups. In particular this study, the UNHCR states that the Konak district of Izmir works with 10 implementing partners and 10 supporting agencies for Syrian refugees.

3. Based on Community and Context Scope of the Study

3.1. Vulnerable Group

This study aims to evaluate the effects of the refugee crisis based on livelihoods of Syrian refugees in the Konak district. Since 2011, Türkiye has hosted around 7 million Syrians, including returnees and those settled in third countries (UNHCR, 2024). According to data from the General Directorate of Migration Management (n.d.), with the end of the Syrian civil war and the start of returns, the number of Syrians under temporary protection is approximately 2.8 million in Türkiye and 111,374 in Izmir as of 10 April 2025. Izmir is the ninth city in Türkiye with the largest Syrian population and is defined as an ancient city of migration, having been a transit or destination city for migrants throughout history (Kurtarır et al., 2023). In this study, Syrians will be referred to as refugees due to their mass forced displacement and social circumstances. Historically, civil wars and tensions following the Second World War led to a refugee crisis in Europe.

Subsequently, Türkiye signed the 1951 Geneva Convention, the first international legal instrument to define refugee status and the obligations of states. However, Türkiye only granted refugee status to those coming from Europe (Al Munajed and Ekren, 2020; Chatty, 2016). Syrians do not fit the geographical definition of refugee. Therefore, they are granted temporary protection status. This status is a practical, complementary solution developed to provide urgent responses to mass migration events. It is applied within the framework of states' obligations to prevent individuals from being returned to situations of risk, thereby avoiding delays to the individual assessment of their international protection status (General Directorate of Migration Management, n.d.). Although Syrians in Türkiye are not legally recognised as refugees, they experience the social conditions associated with refugee status without being subject to geographical restrictions. However, since social recognition does not

include legal recognition, they do not have the same legal rights as refugees (Yükseker, Kurtuluş, Tekin and Kaya Erdoğan, 2023). Syrian refugees are a powerless group due to their lack of capital. They develop spatial strategies to increase their capital and maintain their presence in the city. Consequently, the role of immigrant communities in producing space, and the way they express the social logic of space, are important factors in spatial development.

3.2. Study Area

The geographical area selected for the study is the most commonly known as Basmane, Agora and Kadifekale neighbourhoods of Konak District, which is one of the districts with the highest refugee density in Izmir (Figure 1). Actually, the study area covers 22 neighbourhoods in Basmane Region in Konak: Alireis, Süvari, Faikpaşa, Yeni, Tuzcu, Ülkü, Altay, Kadifekale, Etiler, Ballıkuyu, Akarcalı, Kocakapı, Mirali, Kubilay, Pazaryeri, Sakarya, Kurtuluş, Altınordu, Yenigün, Hurşidiye, Akıncı and Namazgah. With the exception of Tuzcu, Ülkü, Ballıkuyu, Kurtuluş, Yenigün, Hurşidiye and Akıncı, all other neighbourhoods in the study area are closed to foreigners under temporary protection or international protection due to the high proportion of foreigners (Presidency of Migration Management, 2022). Due to its geographical location, the study area functions as a transit city or a destination city for numerous refugees, beyond those fleeing Syria. However, the fact that Izmir is a transit point to Europe for many refugees is one of the important factors for them to come here. In this study, spatial analyses will be conducted throughout Konak district, while qualitative analyses will focus on Basmane district, where a high concentration of Syrian refugees has been recorded. Konak district has an ageing population, with a persistent decline in population and an increase in the average age. It is important to note that, whilst all other districts in Izmir have experienced population growth, Konak district has undergone a decline. This highlights the need for a review.

According to the Avcan study (2024), the biggest population loss in the period 2009-2023 is -40.75% in the region called Kadifekale and -36.80% in the region called Basmane. These regions include neighbourhoods covered by the study. It is also emphasised that these neighbourhoods are the most socio-economically undeveloped and have a high population of migrants, refugees and asylum seekers.

The Basmane district is one of the most deprived areas in the city centre, characterised by poor physical conditions, inadequate infrastructure and social insecurity. Consequently, it provides affordable housing and facilitates access for a significant number of economically disadvantaged migrants and refugees, thereby enabling them to establish themselves in the community and cultivate social networks. In addition to the aforementioned points, it is important to note that employment opportunities are also available in and around Basmane in a variety of sectors. These sectors include, but are not limited to, the textile industry, the wedding and fashion industries, and the leather industry. The Kemeraltı Historical Bazaar, archaeological sites such as Agora and Kadifekale, hotels, restaurants and other shopping venues also serve tourism, bringing vitality and mobility to the study area (Oner et al., 2020).

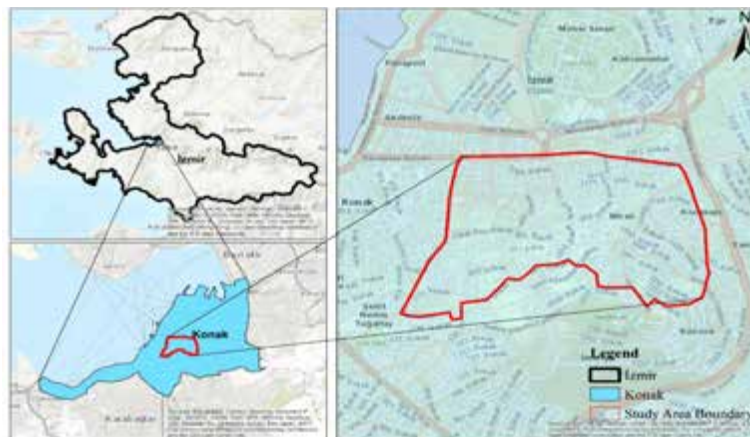


Figure 1: Study Area

4. Data and Method

A mixed method was employed by including both qualitative and quantitative analyses to maximise the reliability of the research. The capital-based livelihood approach is based on five types of capital: human, social, financial, physical and natural. Syrian refugees were selected as a vulnerable group due to the difficulties they face as a result of the Syrian Civil War and forced displacement. The literature review, field visits, discussions with vulnerable Syrian refugees, and in-depth interviews with non-governmental organisations, and household surveys were employed in order to grasp their needs, perspectives, and experiences. The study primarily relied on data derived from household surveys exploring or gaining a more nuanced understanding of complex issues related to livelihood vulnerability.

The employment of a mixed-method approach in the present study will facilitate a more nuanced interpretation of the quantitative and qualitative analyses, thereby enhancing the study's validity and its ability to discern similarities and differences in terms of the vulnerability of livelihood capitals. The determination of vulnerability variables was informed by a comprehensive literature review and insights from civil society organisations engaged in work with Syrian refugees.

First of all, based on previous studies of vulnerability indices such as refugee vulnerability, social vulnerability, and livelihood vulnerability, seventeen indicators and seventy-two variables have been selected. The seventeen indicators, which include the following variables, are: family structure; age; gender; education; employment; occupation; socio-economic status; housing tenure (ownership); livelihood strategies; minority/language; health; food; settlement/infrastructure; social safety; population growth; climatic variability; and hazards (natural and human). The table below shows the indicators and relevant variables used, how these variables affect vulnerability, and the relevant references (Table 1).

Table 1: Selection and Rationales for LVI Indicators of Syrian Refugees for Basmane Region

Indicators	Variables	Effect on Vulnerability	Justification
Family Structure	percentage of large families (more than 6 members)	increases	Arab Water Council and World Food Programme (2022), Mukherjee and Siddique (2020), Rahman et al. (2018), Frigerio et al. (2018)
	percentage of single parent households	increases	Arab Water Council and World Food Programme (2022), Lottering et al. (2021), Berchouxa and Hutton (2019)
	percentage of households with orphans	increases	Hahn et al. (2009)
	percentage of households with positive change in women's role/position in family after arrival in Türkiye	decreases	developed within the scope of research
Age	percentage of age 65+ in a household percentage of age ≤ 5 in a household number of children in a household	increases	Gerçek and Güven (2023), Mitra and Kumar Mandal (2023), Arab Water Council and World Food Programme (2022), Lottering et al. (2021), Fucile-Sanchez and Davlasheridze (2020), Zhang and Fang (2020), Frigerio et al. (2018), Duman Yuksel (2014)
	percentage of age of household head < 18 or > 65	increases	Arab Water Council and World Food Programme (2022), Rahman et al. (2018)

Gender	percentage of women in a household	increases	Gerçek and Güven (2023), Mitra and Kumar Mandal (2023), Fucile-Sanchez and Davlasheridze (2020)
	percentage of female-headed households	increases	Gerçek and Güven (2023), Mitra and Kumar Mandal (2023), Arab Water Council and World Food Programme (2022), Lottering et al. (2021), Fucile-Sanchez and Davlasheridze (2020), Mukherjee and Siddique (2020), Hahn et al. (2009)
Education	percentage of households with less than high school education	increases	Mitra and Kumar Mandal (2023), Arab Water Council and World Food Programme (2022), Lottering et al. (2021), Fucile-Sanchez and Davlasheridze (2020), Zhang and Fang (2020), Quandt (2018), Frigerio et al. (2018)
	percentage of households who participate in vocational training	decreases	Zhang and Fang (2020)
	percentage of households who can not afford education expenses	increases	developed within the scope of research
Employment	percentage of unemployed family members	increases	Arab Water Council and World Food Programme (2022), Fucile-Sanchez and Davlasheridze (2020), Frigerio et al. (2018)
	percentage of employed women	decreases	Berchouxa and Hutton (2019), Frigerio et al. (2018)
	percentage of employed children (age < 15)	increases	developed within the scope of research
	percentage of households who have a work permit	decreases	developed within the scope of research
Occupation	percentage of households with weather-exposed workers (agriculture, forestry, fishing, and hunting; mining; construction; manufacturing; and transportation and utilities)	increases	EPA (2021), Graff Ziven and Neidell (2014)
Socio-economic Status	percentage of households where members had any formal or informal skill	high decreases; low increases	Mitra and Kumar Mandal (2023), Arab Water Council and World Food Programme (2022)
	per household income monthly	high decreases; low increases	Arab Water Council and World Food Programme (2022), Rahman et al. (2018)
	percentage of households owning private or permanent land in any location that is usually used as a dwelling	decreases	Rahman et al. (2018)
	percentage of households with no vehicle	increases	Fucile-Sanchez and Davlasheridze (2020)
	percentage of households using technological devices (fridge, electric heater, fan, washing machine, computer)	decreases	developed within the scope of research
	housing quality (comfortable living conditions (e.g. indoor plumbing, and hot showers) (scale of good to bad)	good decreases; bad increases	Zhang and Fang (2020)
Housing Tenure (ownership)	percentage of renter households	increases	Arab Water Council and World Food Programme (2022), Fucile-Sanchez and Davlasheridze (2020), Quandt (2018)

Livelihood Strategies	percentage of earning member in a household	high decreases; low increases	developed within the scope of research
	percentage of households with members working for the government	decreases	Zhang and Fang (2020)
	percentage of households who took loan in the past 5 years	increases	Mitra and Kumar Mandal (2023), Zhang and Fang (2020)
	percentage of households that reported at least one family member worked outside the community to earn a wage	decreases	Mitra and Kumar Mandal (2023), Mukherjee and Siddique (2020), Hahn et al. (2009)
Minority/Language	language proficiency	good decreases; bad increases	developed within the scope of research
	percentage of households who participate in language course	decreases	developed within the scope of research
	percentage of households who have language problems with their children	increases	developed within the scope of research
	years when refugees are in Türkiye	high decreases; low increases	developed within the scope of research
	percentage of households who have a residence permit	decreases	developed within the scope of research
Health	percentage of households registered another province (in this case, they do not benefit from health services)	increases	developed within the scope of research
	percentage of households with chronically health difficulties	increases	Mitra and Kumar Mandal (2023), Mukherjee and Siddique (2020), Hahn et al. (2009)
	percentage of households with disabled people	increases	Mitra and Kumar Mandal (2023)
	percentage of households who not visiting doctors during illness	increases	Mukherjee and Siddique (2020)
	percentage of households who cannot afford medical expenses	increases	Zhang and Fang (2020)
Food	average number of months households struggle to obtain food for their family	increases	Mitra and Kumar Mandal (2023), Hahn et al. (2009)
	distance to market	high increases; low decreases	Zhang and Fang (2020)

Settlement/ Infrastructure	access to evacuation routes and/or assembly areas	decreases	Gerçek and Güven (2023)
	normal and rainy season road conditions (scale of good to bad)	good decreases; bad increases	Quandt (2018)
	percentage of households using the Internet	decreases	Mukherjee and Siddique (2020)
	percentage of households using unsafe water for drinking, cooking, bathing and washing	increases	Zhang and Fang (2020), Mukherjee and Siddique (2020)
	percentage of households who do not have toilet facilities	increases	Mitra and Kumar Mandal (2023), Mukherjee and Siddique (2020)
	distance to medical establishments and services	high increases; low decreases	Mitra and Kumar Mandal (2023), Arab Water Council and World Food Programme (2022), Mukherjee and Siddique (2020), Quandt (2018), Hahn et al. (2009)
	distance to schools	high increases; low decreases	Quandt (2018)
	percentage of households who cannot afford transportation expenses	increases	developed within the scope of research
	built-up area rate	increases	Frigerio et al. (2018)
	the amount of open and green areas per capita	decreases	Aygün and Baycan (2018)
Social Safety	percentage of households without access to information on health systems (getting disability report, appointment system, or language assistance)	increases	developed within the scope of research
	percentage of households who participate in adaptation events	decreases	Quandt (2018)
	percentage of households aware of vulnerabilities of the becoming refugee (e.g. social exclusion)	decreases	developed within the scope of research
	relationship with Turkish neighbours (scale of strength to weak)	strength decreases; weak increases	Quandt (2018)
	percentage of households with difficulty accessing daily information	increases	Zhang and Fang (2020)
	percentage of households who do not get awareness of hazards	increases	Mitra and Kumar Mandal (2023), Mukherjee and Siddique (2020)
	percentage of households who have opportunities to work outside the community using personal networks	high decreases; low increases	Rahman et al. (2018)
	percentage of households who receive assistance from a social network and other sources (NGOs) in the last 5 years	decreases	Mitra and Kumar Mandal (2023), Zhang and Fang (2020), Mukherjee and Siddique (2020), Hahn et al. (2009)
	percentage of households who do not receive assistance from the Government in the last 5 years	increases	Mitra and Kumar Mandal (2023), Fucile-Sanchez and Davlasheridze (2020), Zhang and Fang (2020), Mukherjee and Siddique (2020), Hahn et al. (2009)
Population Growth	average annual growth rate of refugee population	high increases; low decreases	Arab Water Council and World Food Programme (2022), Duman Yuksel (2014)

Climatic Variability	percentage of households reporting changes in livelihood due to climate change	increases	Mitra and Kumar Mandal (2023)
	both summer and winter temperature change (%) in the last 10 years	increases	Mitra and Kumar Mandal (2023), Duman Yuksel (2014)
	both summer and winter precipitation change (%) in the last 10 years	increases	Mitra and Kumar Mandal (2023), Duman Yuksel (2014)
Hazards	percentage of households exposed to increased frequency and intensity of natural hazards (inland floods or heat waves) in the last 10 years	increases	Mitra and Kumar Mandal (2023), Mukherjee and Siddique (2020), Hahn et al. (2009)
	percentage of households who have members injured or died as a result from human-induced hazards in the last 10 years	increases	developed within the scope of research
	percentage of households who have members injured or died as a result from natural hazards in the last 10 years	increases	Zhang and Fang (2020), Mukherjee and Siddique (2020), Hahn et al. (2009)
	percentage of households that have experienced damage to their property	increases	Mukherjee and Siddique (2020)
	percentage of households that have experienced a loss of their property	increases	Zhang and Fang (2020), Mukherjee and Siddique (2020)
	percentage of households that did not receive a warning about the pending natural disasters	increases	Mitra and Kumar Mandal (2023), Lottering et al. (2021), Mukherjee and Siddique (2020) Hahn et al. (2009)
	percentage of households who know how to turn off the installations in your home after any disaster	decreases	Demirci (2021)
	average air quality values of PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ in the last 5 years	high increases; low decreases	Duman Yuksel (2014)

The following table illustrates the indicators according to the vulnerability dimensions (Table 2).

Table 2: Indicators by IPCC contributing factors to vulnerability

IPCC contributing factors to vulnerability	Indicators
Exposure	Occupation
	Population Growth
	Climatic Variability
	Hazards
Sensitivity	Family Structure
	Age
	Gender
	Health
	Food

Adaptive Capacity	Education
	Employment
	Socio-economic Status
	Housing Tenure (ownership)
	Livelihood Strategies
	Minority/Language
	Settlement/Infrastructure
	Social Safety

A livelihood assessment matrix was created by placing the relevant variables in the matrix with vulnerability dimensions on the horizontal and livelihood capitals on the vertical (Table 3). The variables were categorised under five types of livelihood capital (human, physical, financial, social, natural), and under three contributing factors to vulnerability.

Table 3: Variables by Livelihood Capitals and Vulnerability Dimension

Livelihood Capitals Dimensions of Vulnerability	Exposure	Sensitivity	Adaptive Capacity
Human Capital	12. percentage of households with weather-exposed workers (agriculture, forestry, fishing, and hunting; mining; construction; manufacturing; and transportation and utilities)	1. percentage of large families (more than 6 members)	10. percentage of households with less than high school education
	25. percentage of households who have members injured or died as a result from human-induced hazards in the last 10 years	2. percentage of age 65+ in a household	11. percentage of households where members had any formal or informal skill
	26. percentage of households who have members injured or died as a result from natural hazards in the last 10 years	3. percentage of age ≤ 5 in a household	13. percentage of unemployed family members
		4. number of children in a household	14. percentage of employed women
		5. percentage of women in a household	15. percentage of employed children (age < 15)
		6. percentage of female-headed households	16. percentage of households who have a work permit
		7. percentage of age of household head < 18 or > 65	17. language proficiency

Human Capital		8. percentage of single parent households	18. percentage of households who participate in language course
		9. percentage of households with orphans	19. percentage of households who participate in vocational training
		20. percentage of households registered another province (in this case, they do not benefit from health services)	24. percentage of households who do not get awareness of hazards
		21. percentage of households with chronically health difficulties	27. percentage of households who know how to turn off the installations in your home after any disaster
		22. percentage of households with disabled people	
		23. percentage of households who not visiting doctors during illness	
Physical Capital	4. housing quality (comfortable living conditions (e.g. indoor plumbing, and hot showers) (scale of good to bad)	2. percentage of households using unsafe water for drinking, cooking, bathing and washing	1. percentage of households using the Internet
	10. percentage of households that did not receive a warning about the pending natural disasters	3. percentage of households who do not have toilet facilities	5. distance to medical establishments and services
	11. built-up area rate	9. normal and rainy season road conditions (scale of good to bad)	6. distance to schools
			7. distance to market
			8. access to evacuation routes and/or assembly areas
Financial Capital	13. percentage of households reporting changes in livelihood due to climate change	2. per household income monthly	1. percentage of earning member in a household
	14. percentage of households that have experienced damage to their property	5. percentage of households who cannot afford medical expenses	3. percentage of households who took loan in the past 5 years
	15. percentage of households that have experienced a loss of their property	6. percentage of households who cannot afford education expenses	4. percentage of households that reported at least one family member worked outside the community to earn a wage
		7. percentage of households who cannot afford transportation expenses	8. percentage of renter households
		12. average number of months households struggle to obtain food for their family	9. percentage of households owning private or permanent land in any location that is usually used as a dwelling
			10. percentage of households with no vehicle
			11. percentage of households using technological devices (fridge, electric heater, fan, washing machine, computer)
			16. percentage of households who receive assistance from a social network and other sources (NGOs) in the last 5 years
			17. percentage of households who do not receive assistance from the Government in the last 5 years

Social Capital	12. average annual growth rate of refugee population		1. years when refugees are in Türkiye
			2. percentage of households with members working for the government
			3. percentage of households who have opportunities to work outside the community using personal networks
			4. percentage of households who have language problems with their children
			5. percentage of households who participate in adaptation events
			6. percentage of households who have a residence permit
			7. percentage of households without access to information on health systems (getting disability report, appointment system, or language assistance)
			8. percentage of households aware of vulnerabilities of the becoming refugee (e.g. social exclusion)
			9. percentage of households with positive change in women's role/position in family after arrival in Türkiye
			10. relationship with Turkish neighbours (scale of strength to weak)
			11. percentage of households with difficulty accessing daily information
Natural Capital	1. percentage of households exposed to increased frequency and intensity of natural hazards (inland floods or heat waves) in the last 10 years		5. the amount of open and green areas per capita
	2. both summer and winter temperature change (%) in the last 10 years		
	3. both summer and winter precipitation change (%) in the last 10 years		
	4. average air quality values of PM ₁₀ , PM _{2.5} , SO ₂ , NO ₂ in the last 5 years		

Household survey comprising 63 questions used to obtain primary data on Syrian refugees. The survey was conducted in Turkish and Arabic with 250 Syrian household representatives. Snowball method was used to identify participant households. In some regions, a household survey was conducted through random selection and then continued with the snowballing technique.

Secondly, in the qualitative method, livelihood vulnerability was explored through in-depth interviews with both Syrian refugees and NGOs. In the collection of data from Syrian interviewees, snowball method was used to facilitate the identification of the interviewees. The interviews averaged about 10-20 minutes in length. In order to explore the role of NGOs and intergovernmental organisations in reducing livelihood vulnerability, in-depth interviews were conducted with relevant parties. A series of semi-structured in-depth interviews were conducted with eight representatives or managers of organisations or associations related to refugees.

The interviews, comprising a total of 14 questions, were conducted in the workplace of non-governmental organisations. The duration of each interview was between 20 and 50 minutes. The fact that the majority of these organisations working with refugees are in close contact with refugees, as most of them are located in the field of work, provides direction to the study. The interviewed NGOs provided information about their activities and

their perspectives on the problems, needs and potential of refugees. The assessment of why Syrians choose the Basmane, Kadifekale, Agora and around and their social and economic relations, which will inform the spatial structure, is based on the results of interviews with Syrian refugees. Representatives or leaders of associations and networks on refugees were interviewed to assess social inclusion and integration policies from the perspective of the host country and refugee beneficiaries.

4.1. Creating Livelihood Vulnerability Index

The maximum and minimum values for these variables, based on community characteristics, were determined using the dataset resulting from a survey of 250 households. The normalisation of values measured on different scales is necessary to resolve incompatibility and imbalanced weighing (Gerçek and Güven, 2023). The min-max method was employed for data normalisation of all values, which provides dimensionless range between 0 and 1 (Ajtai et al., 2023) (please see Table A1). The normalization is conducted using Equation (1) for variables positively related to vulnerability, and Equation (2) for variables negatively related to vulnerability.

$$\text{index } V_{(\text{positively})} = \frac{v - v_{\min}}{v_{\max} - v_{\min}} \quad (1)$$

$$\text{index } V_{(\text{negatively})} = \frac{v_{\max} - v}{v_{\max} - v_{\min}} \quad (2)$$

where V is the normalized value of the variable, v is the original (raw) value of the variable, $v_{\min}$ and $v_{\max}$ are the minimum and maximum values, respectively, for each variable, and $V \in [0, 1]$.

The related variables were averaged using Equation (3) in order to calculate the value of each indicator (please see Table A2).

$$\text{Indicator} = \frac{\sum_{i=1}^n \text{index } V_i}{n} \quad (3)$$

The calculation of livelihood capital specific vulnerability value will be adapted above formula with capital related variables. The same process was followed to calculate the capital-based values (4).

$$\text{Livelihood Capital} = \frac{\sum_{i=1}^n \text{index } V_i}{n} \quad (4)$$

Equation (5) demonstrates overall LVI calculation. The weights are included that all variables contribute equally to the overall LVI (Hahn et al., 2009; Sullivan et al., 2002). In this study, LVI is scaled from 0 (least vulnerable) to 0.60 (most vulnerable).

$$\text{LVI} = \frac{\sum_{i=1}^5 w_{\text{livelihoodcapital } i} \text{Livelihoodcapital}_i}{\sum_{i=1}^5 w_{\text{livelihoodcapital } i}} \quad (5)$$

To find LVI-IPCC, firstly values are calculated through Equation (6) for each vulnerability dimension or contribution factor to vulnerability. Then, Equation (7) presents LVI-IPCC.

$$\text{CF} = \frac{\sum_{i=1}^n w_{\text{livelihoodcapital } i} \text{Livelihoodcapital}_i}{\sum_{i=1}^n w_{\text{livelihoodcapital } i}} \quad (6)$$

where CF is an IPCC-defined contributing factor to vulnerability (exposure, sensitivity, or adaptive capacity), L_i are the five types of the livelihood capital indexed by i , w_i are the weights of each livelihood capital, and n is the number of livelihood capitals in each contributing factor.

$$LVI - IPCC = (e - a) * s \quad (7)$$

where LVI-IPCC represents LVI based on IPCC vulnerability framework, e represents computed score of exposure, a represents computed score of adaptive capacity, and s represents computed score of sensitivity. The LVI-IPCC scale varies between -1 (least vulnerable) to 1 (most vulnerable) (Table 4).

Table 4: Levels of Livelihood Vulnerability for This Study arranged from (Islam and Ghosh, 2024) based on the IPCC (2007) and Hahn et al. (2009)

LVI	Range	LVI-IPCC	Range
Not vulnerable	0 - 0.20	Very less	(-1) - (-0.61)
Vulnerable	0.21 - 0.40	Less	(-0.60) - (-0.20)
Highly vulnerable	0.41 - 0.60	Moderate	(-0.19) - 0.20
		High	0.21 - 0.60
		Very high	0.61 - 1

5. Results

A total of 250 household surveys were carried out. The resulting data set comprised 1,373 Syrian refugees, with an average stay of 10 years in Türkiye. 49% of Syrian refugees are women. The average family size is 5.5, with the largest family consisting of 15 individuals. Family size refers to the number of people who sleep and eat in a household. 51% of Syrian refugees are under 18, while the family with the most children has 9 children. Language is a barrier for Syrian refugees, which is assessed by language proficiency. While 30% of Syrian refugees stated that their language proficiency is good, 60% chose intermediate proficiency. Among those who chose this level, some cited the presence of Turkish and non-Turkish speakers. Another variable is Syrian refugees' occupations or the sectors they work in. According to the household survey, the top 5 occupations (Figure) are textile manufacturer (33%), construction worker (19%), recycling employee (10%), tailor (5%) and repairman (5%), respectively. It is clear that Syrian refugees work most in textiles. 4% of the Syrian households stated that they were not registered in Izmir, although they had difficulty answering due to their hesitation.

As illustrated in Table 5, the table demonstrated the contribution value of each indicator to livelihood vulnerability. The indicator indices range from 0, representing no contribution to vulnerability, to 1, representing the maximum contribution to vulnerability. In the exposure factor, the highest value is attributed to both occupation and hazards.

In relation to sensitivity dimension of vulnerability, it has been demonstrated that food is the principal factor in the enhancement of livelihood vulnerability.

It is evident that the factor of adaptive capacity, which is a contributing element to vulnerability, is a highly effective measure in the context of livelihood vulnerability.

Table 5: Indices of IPCC contributing factors to vulnerability

IPCC contributing factors to vulnerability	Indicators	Indices of Indicators
Exposure	Occupation	0.47
	Hazards	0.47
	Climatic Variability	0.41
	Population Growth	0.23
Sensitivity	Food	0.54
	Gender	0.33
	Family Structure	0.32
	Health	0.28
	Age	0.15
Adaptive Capacity	Housing Tenure (ownership)	1.00
	Education	0.78
	Livelihood Strategies	0.68
	Socio-economic Status	0.59
	Minority/Language	0.58
	Settlement/Infrastructure	0.51
	Social Safety	0.49
	Employment	0.46

Human Capital of Syrian Refugees

The present study examines human capital through indicators of gender, age, family structure, health, education, socio-economic status, minority/language, occupation, employment, and awareness of hazards, losses related to hazards, and social safety. The importance of human capital lies in its role in the reproduction of social and financial capital, as well as the acquisition of advantages. This highlights that Syrian household have a large family and increasing demands for livelihoods, children are forced to work and are falling behind in their education. Also, Association of Konak Refugee - Konak Refugee Centre said that:

"Most Syrians have completed primary school and there is a problem with enrolment in education. There are working children."

Furthermore, the lower socioeconomic status that characteristically typifies single-parent households renders them particularly susceptible to disaster. This is due to the fact that the responsibility for daily care and education of children is shouldered exclusively by the parent. In response to the question regarding the most vulnerable demographic, a Syrian woman whose husband had emigrated abroad provided the following answer:

"People without a spouse, fatherless children and disabled people are in dire need."

Human capital has 0.44 exposure value, whereas 0.21 sensitivity value. Adaptive capacity with value of 0.41 helps to decrease livelihood vulnerability.

Physical Capital of Syrian Refugees

Physical capital refers to tangible infrastructure and urban services. The Syrian refugee

Considering the physical structure of the Basmane Region where Syrian refugees live, the study area has a high rate of built-up area, poor infrastructure, a lack of open and green spaces, which may allow to residents' physical, psychological and social amenities to the residents, and in some places, an excessive distance to school. These are interpreted as a lack of human and social capital due to capital relations, indicating that the study area is facing the challenge of being a deprived place that lacks the means and capacity to cope with economic struggles.

An Anonymous Nongovernmental Organization in Basmane District explained circumstances of the study area as follow:

"There are many people of both Syrian and African nationalities. The number of roads that can be accessed by vehicle is fewer, surveillance and control are limited and low, and they can hide easily. There are many irregular migrants in this area. There are illegal workers, sex workers and laboured children. **The vulnerability caused makes them more vulnerable.** For example, it is difficult for a disabled Syrian living in there..."

Association for Monitoring Equal Rights expressed their insights about municipal services in the study area:

"If there is a building stock in a region, it should be within the framework of the municipal services, there should be planning including transport, playgrounds, public spaces should be for women and children. The municipality withdraws itself to avoid being close to the Syrians. The growing hatred towards them has led to the withdrawal of the services provided by the municipality."

Lack of physical capital increases their exposure level to disasters. Therefore, natural hazards can cause disaster for people due to lack of physical capital. Syrian respondents mentioned the most common disasters they have experienced in the household survey. These include flooding, leaking toilets, water leaking from the roof and no electricity. This is due to building conditions and infrastructure deficiencies in the Basmane Region. Most Syrian households live in poor physical conditions. Many share a single dwelling, which may adversely affect the progress and consequences of a possible disaster.

According to index results, the exposure, sensitivity and adaptive capacity values of physical capital are 0.65, 0.32 and 0.48, respectively.

Financial Capital of Syrian Refugees

Households in Syria have suffered financial losses as a result of the ongoing conflict. During the course of the household survey, 73% of respondents indicated that they had been dispossessed of their houses, workplaces and vehicles. The provision of financial assistance to refugees is typically facilitated by government entities or family members. Syrian households have reported the provision of material and social support from relatives, neighbours and NGOs.

Additionally, they receive assistance from non-governmental organisations in the form of rights, such as education and healthcare. Moreover, access to employment opportunities is facilitated through language and vocational courses provided by NGOs. The Konak Refugee Centre has asserted that the absence of financial capital exacerbates the vulnerability of Syrian refugees, as articulated in the following statements:

"Economic conditions are the most decisive factor, the most influential factor on everything. If there is a regular flow of money, you will feel comfortable both psychologically and in terms of access to your needs."

In the context of the dimensions under consideration, the value of exposure is identified as the highest, with a value of 0.58. It is evident that the value of adaptive capacity is 0.39, which has the effect of reducing livelihood vulnerability.

The variable pertaining to the percentage of households that have experienced damage to their property has a value of 0.77. The variables that contributed most significantly to enhancing adaptive capacity were as follows: the percentage of households that had previously taken out a loan within the last five years, and the percentage

of households that used technological devices. The value of the contribution was 0.95.

Social Capital of Syrian Refugees

Social capital is defined as connections with both internal and external parties at local and global levels. Furthermore, it was related to the social environment, which shapes the cognitive capacities of communities.

The subject, a 25-year-old female, articulated her experiences and challenges in her social environment and in her daily life as follows:

"Sometimes I'm afraid for my children. I want to go out. If I were Turkish, I would not have to go through this. The salary is not enough. My landlord behaves very badly. I cannot answer. I keep quiet so that my children will not be harmed. The thing I want most is to get out of this house."

Moreover, Association of Konak Refugee - Konak Refugee Centre stated power of thinking of Syrian refugees in this way:

"Their power of thinking is shaped by social environment. In the process, they spontaneously learn culture and education. In addition, the social environment has a great influence on behaviour. For example, tensions between both foreigner and domestic people in need rise when the person in need cannot get what they need."

Besides to social challenges, Syrian refugees have strong relationship with Turkish neighbours, and (Man, 18) stated this as follows:

"I have no problem with the Turks. I am sincere with my Turkish customers, there is no discrimination."

(Man, 60) emphasised a different dimension for the relations between refugees and host communities:

"Solidarity among Syrians may hinder their integration with Turks."

The percentage of households with positive change in women's role/position in family after arrival in Türkiye measures human agency and the power of thinking of Syrian refugees. This reveals the consequences of their habitus. Association of Solidarity with Syrian Refugees in Izmir highlighted the positive change in roles or position of Syrian women in the family after coming to Türkiye.

"There has been a notable shift in their understanding, thoughts, attitudes, and roles. Women have changed in a positive way; they do not stay closed. Especially, 80 % of women in Halep do not go out of the house. Women can now go out alone because of the difficulties and needs of life. They help their families by carrying out tasks such as shopping, paying bills and going to hospital."

In addition to above statement, Syrian interviewee (Woman, 29) expressed the changing and developing structure of thought in terms of women after coming to Türkiye as follows:

"Women in Syria are very limited. We cannot even go to the shops because of the shame. Former Syrians are very restrictive. We get married at a very young age. But you need to go to school, you need to learn a profession, I learned these things in Türkiye."

In the Basmane region, Çorakkapı Mosque, Hatuniye Mosque and Hatuniye Square, Anafartalar Street and Agora Park are areas where Syrian refugees socialise and engage with members of the local community. These spaces offer them the opportunity to rest, meet and shop, and communicate with the host community, but this contact is limited due to the density of refugees.

The exposure level is low with a value of 0.23 and the adaptive capacity of social capital is high with a value of 0.51.

Natural Capital of Syrian Refugees

Natural and physical capital affect each other. The study area, in Konak District of Izmir, is one of the oldest settle-

ments in the region. It is characterised by a high concentration of built-up area and urban infrastructure that is both old and poor-maintained. The primary challenges faced by the district include high population density, the presence of an unregistered population resulting in an uncertain demographic profile, and a severe lack of green and open spaces. High population density triggers human-induced air pollution. These issues have a detrimental effect on air quality. Furthermore, The findings indicate that the extent of open and green space per capita exerts an increasing influence on vulnerability, as evidenced by its negligible effect on the development of adaptive capacity, with a value of 0.22. The exposure level, as determined by 0.48 in terms of natural capital, is influenced by increased frequency and intensity of natural disasters, temperature and precipitation variation, and air quality values. Lastly, 47% of Syrian households have workers exposed to the weather, with temperature and precipitation variation having a significant impact. 32% of households have experienced increased natural hazards in the last 10 years. During surveys, respondents provided information on disaster experiences.

Finally, as demonstrated in Table 6, exposure is the most significant contributing factor to livelihood vulnerability, with a value of 0.50. Conversely, sensitivity is the least significant contributing factor, with a value of 0.31. Nevertheless, it is crucial to acknowledge the sensitivity multiplier effect on LVI-IPCC identification, as this value has the potential to exacerbate livelihood vulnerability. The Syrian refugee population has been found to demonstrate an adaptive capacity of 0.44. Moreover, findings indicate that physical, financial and natural capitals are the most effective in increasing livelihood vulnerability. Conversely, the possession of social capital has been demonstrated to contribute to the reduction of livelihood vulnerability through the enhancement of adaptive capacity. The study emphasised that Syrian refugees demonstrated notable social resilience and adaptability to change.

Table 6: Capital Specific and Overall Values of Vulnerability Dimensions

Livelihood Capitals	Exposure	Sensitivity	Adaptive Capacity
Human Capital	0.44	0.21	0.41
Physical Capital	0.65	0.32	0.48
Financial Capital	0.58	0.55	0.39
Social Capital	0.23		0.51
Natural Capital	0.48		0.22
Overall	0.50	0.31	0.44

The table compares LVI and LVI-IPCC values of each capital (Table 7). Human capital is found to be in a vulnerable position, whereas other capitals have high vulnerability level of livelihood vulnerability.

LVI is 0.48, indicating high livelihood vulnerability. Social capital is less vulnerable, while human, physical and financial capitals are moderately vulnerable, and natural capital is highly vulnerable. Overall LVI-IPCC is 0.02, indicating moderate livelihood vulnerability.

Table 7: Comparing Capital Specific and Overall Values of LVI and LVI-IPCC

Livelihood Capitals	LVI-Capital based*	LVI-IPCC
Human Capital	0.39	0.01
Physical Capital	0.50	0.06
Financial Capital	0.59	0.10
Social Capital	0.46	-0.29
Natural Capital	0.51	0.26
Overall	0.48	0.02
Reference range*	0 < LVI < 0.60	
Reference range	-1 < LVI-IPCC < 1	

6. Discussion

The concept of livelihood capitals encompasses the physical, natural, social, human and financial dimensions of communities. It introduces strategies and policies that address the absence, deficiencies and assets of these capitals within the context of urban planning. Despite the existence of numerous international literature studies on LVI, no studies have been found in Türkiye. The present study draws chiefly upon the research conducted by Pandey et al. (2017) and Zhang and Fang (2020) with regard to capital-based implementation. In this study, the assessment of livelihood vulnerability was conducted through the utilisation of a multifaceted approach, encompassing five distinct types of capital. An investigation was conducted into each type of capital, with particular reference to exposure, sensitivity and adaptive capacity. In addition to calculating overall livelihood vulnerability values, this study calculates both capital-specific LVI and LVI-IPCC based on capital-specific vulnerability dimensions. This approach facilitates the formulation of strategies and policies that are tailored to the specific livelihood vulnerabilities of each capital and each dimension of vulnerability. This study is therefore useful in reducing the increasing divergence in favour of vulnerability in dimensions of vulnerability, such as high levels of exposure or sensitivity and low adaptive capacity, and imbalances among types of capital and the distribution and reproduction of capital assets. In a similar vein, Rahman et al. (2018) employed varied methodologies for the organisation and combination of livelihood capital assets. This study uses more indicators (17) and variables (72) than other LVI studies. Also, compared to both similar and different studies in terms of different contexts, vulnerable groups and disasters, the study's level of livelihood vulnerability is higher than others.

Furthermore, if variables in adaptive capacity increase vulnerability, these should be inversely normalised to calculate the LVI-IPCC, since the value of adaptive capacity is included in the LVI-IPCC calculation. This causes errors in the LVI and LVI-IPCC calculations. This study used a different approach to calculate adaptive capacity to get more accurate LVI-IPCC results. Other studies have ignored this. Some studies use different methods for adaptive capacity (Pandey et al., 2017; Zhang and Fang, 2020).

Zihnioğlu and Dalkıran (2022) highlighted gaps in the literature regarding refugee-related topics such as NGOs, integration and human rights, and the lack of empirical studies with NGOs. NGOs, intergovernmental agencies and the media may help to reduce discrimination and hate towards refugees. This study is different from previous research because it includes in-depth interviews with relevant NGOs, including refugee-led organisations working with Syrians, foreigners, citizens and people with other statuses. Interviewed NGOs have provided information

about their activities and their perspectives on the problems, needs and potential of refugees.

7. Conclusion

The mass displacement of Syrians due to man-made disasters is the largest displacement on record and shows how shocked Syrians and host communities are about the loss and alienation of livelihoods, the reproduction and distribution of livelihood capital, and protracted displacement. This study focuses on the livelihood vulnerability of Syrian refugees in the Konak District's Basmane and around region of Izmir. Izmir is a transit point to Europe, which is an important incentive for many refugees. The Basmane region is one of Izmir's neglected areas, characterised by poor physical conditions and inadequate infrastructure and social insecurity, but providing cheap housing and easy access to many poor migrants or refugees, allowing them to settle and develop social networks. Syrian refugees face many challenges, including forced displacement, and lack of access to human and labour rights.

Syrian refugees are highly vulnerable in terms of physical, financial, social and natural capitals, and moderately vulnerable in terms of human, physical and financial capital, but less vulnerable in terms of social capital. Syrian refugees are the most exposed in terms of physical capital with a value of 0.65, financial capital is the most sensitive with a value of 0.55 and natural capital has the lowest adaptive capacity with a value of 0.22. Syrian refugees have the highest adaptive capacity value in social capital with 0.51.

NGOs contact refugees one to one and they have chance to observe due to their locations. The most effective capitals on livelihood vulnerability are financial and social capital according to NGOs. Syrian refugees believe that orphaned children, women and people with disabilities are the most vulnerable groups besides the refugees themselves. NGOs also state that social capital has a positive effect on the development of Syrian refugees' capacity and ability. Poverty is a common factor affecting both parties, host community and refugees. This commonality unites them. Examining the dynamics of the local economy, economic circulation and diversity of livelihoods in the study area through the income-earning activities of Syrian refugees can develop and sustain their livelihoods.

Livelihood vulnerability in areas heavily populated by refugees can be reduced and/or eliminated through a sustainable livelihoods approach. This study allows for the identification of capital-specific, context-specific and vulnerability dimension-specific problems, revealing the potential and making planning decisions to reduce livelihood vulnerability of both the vulnerable group and the host community to stressors and hazards. It provides sustainable livelihood opportunities for future generations.

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Appendices

Table A1: Raw Values of Variables and Data Ranges

Indicators	Types of Livelihood Capitals	Variables	Units	Raw Values	Max Values	Min Values
Family Structure	HC	1. percentage of large families (more than 6 members)	Percent	23	100	0
	HC	8. percentage of single parent households	Percent	22	100	0
	HC	9. percentage of households with orphans	Percent	6	100	0
	SC	9. percentage of households with positive change in women's role/position in family after arrival in Türkiye	Percent	24	100	0
Age	HC	2. percentage of age 65+ in a household	Percent	0.01	0.5	0
	HC	3. percentage of age ≤ 5 in a household	Percent	0.14	0.6	0
	HC	4. number of children in a household	Percent	2.82	9	0
	HC	7. percentage of age of household head < 18 or > 65	Percent	2	100	0
Gender	HC	5. percentage of women in a household	Percent	0.48	1	0
	HC	6. percentage of female-headed households	Percent	19	100	0
Education	HC	10. percentage of households with less than high school education	Percent	78	100	0
	HC	19. percentage of households who participate in vocational training	Percent	9	100	0
	FC	6. percentage of households who can not afford education expenses	Percent	66	100	0
Employment	HC	13. percentage of unemployed family members	Percent	2	100	0
	HC	14. percentage of employed women	Percent	4	100	0
	HC	15. percentage of employed children (age < 15)	Percent	1	100	0
	HC	16. percentage of households who have a work permit	Percent	15	100	0
Occupation	HC	12. percentage of households with weather-exposed workers (agriculture, forestry, fishing, and hunting; mining; construction; manufacturing; and transportation and utilities)	Percent	47	100	0

Socio-economic Status	HC	11. percentage of households where members had any formal or informal skill	Percent	58	100	0
	FC	2. per household income monthly	Turkish Lira (thousand)	20.81	120	0
	FC	9. percentage of households owning private or permanent land in any location that is usually used as a dwelling	Percent	49	100	0
	FC	10. percentage of households with no vehicle	Percent	89	100	0
	FC	11. percentage of households using technological devices (fridge, electric heater, fan, washing machine, computer)	Percent	95	100	0
	PC	4. housing quality (comfortable living conditions (e.g. indoor plumbing, and hot showers) (scale of good to bad)	Percent	17	100	0
Housing Tenure (ownership)	FC	8. percentage of renter households	Percent	100	100	0
Livelihood Strategies	FC	1. percentage of earning member in a household	Percent	0.25	1	0
	SC	2. percentage of households with members working for the government	Percent	1	100	0
	FC	3. percentage of households who took loan in the past 5 years	Percent	5	100	0
	FC	4. percentage of households that reported at least one family member worked outside the community to earn a wage	Percent	7	100	0
Minority/Language	HC	17. language proficiency	Percent	30	100	0
	HC	18. percentage of households who participate in language course	Percent	20	100	0
	SC	4. percentage of households who have language problems with their children	Percent	16	100	0
	SC	1. years when refugees are in Türkiye	Years	9.55	15	1
	SC	6. percentage of households who have a residence permit	Percent	15	100	0

Health	HC	20. percentage of households registered another province (in this case, they do not benefit from health services)	Percent	4	100	0
	HC	21. percentage of households with chronically health difficulties	Percent	37	100	0
	HC	22. percentage of households with disabled people	Percent	23	100	0
	HC	23. percentage of households who not visiting doctors during illness	Percent	32	100	0
	FC	5. percentage of households who cannot afford medical expenses	Percent	44	100	0
Food	FC	12. average number of months households struggle to obtain food for their family	Months	4.16	12	0
	PC	7. distance to market	Minutes	7.60	10	1
Settlement/ Infrastruc- ture	PC	8. access to evacuation routes and/or assembly areas	Percent	11	100	0
	PC	9. normal and rainy season road conditions (scale of good to bad)	Percent	13	100	0
	PC	1. percentage of households using the Internet	Percent	89	100	0
	PC	2. percentage of households using unsafe water for drinking, cooking, bathing and washing	Percent	5	100	0
	PC	3. percentage of households who do not have toilet facilities	Percent	5	100	0
	PC	5. distance to medical establishments and services	Minutes	18.76	31.25	3
	PC	6. distance to schools	Minutes	11.34	31.25	2
	FC	7. percentage of households who cannot afford transportation expenses	Percent	50	100	0
	PC	11. built-up area rate	Percent	100	100	0
	NC	5. the amount of open and green areas per capita	m ² /popu- lation	3.44	12.63	0.86

Social Safety	SC	7. percentage of households without access to information on health systems (getting disability report, appointment system, or language assistance)	Percent	41	100	0
	SC	5. percentage of households who participate in adaptation events	Percent	37	100	0
	SC	8. percentage of households aware of vulnerabilities of the becoming refugee (e.g. social exclusion)	Percent	98	100	0
	SC	10. relationship with Turkish neighbours (scale of strength to weak)	Percent	85	100	0
	SC	11. percentage of households with difficulty accessing daily information	Percent	30	100	0
	HC	24. percentage of households who do not get awareness of hazards	Percent	90	100	0
	SC	3. percentage of households who have opportunities to work outside the community using personal networks	Percent	32	100	0
	FC	16. percentage of households who receive assistance from a social network and other sources (NGOs) in the last 5 years	Percent	61	100	0
	FC	17. percentage of households who do not receive assistance from the Government in the last 5 years	Percent	92	100	0
Population Growth	SC	12. average annual growth rate of refugee population	Percent	2	43	-10
Climatic Variability	FC	13. percentage of households reporting changes in livelihood due to climate change	Percent	23	100	0
	NC	2. both summer and winter mean temperature change (%) in the last 10 years (years: 2013-2023) (reference years: 1981-2010) Summer	Percent	0.04	6.09	1.32
		Winter	Percent	0.15	51.26	-18.16
	NC	3. both summer and winter total precipitation change (%) in the last 10 years (years: 2013-2023) (reference years: 1981-2010) Summer	Percent	1.62	405.01	33.21
		Winter	Percent	-0.03	54.38	-70.19

Hazards	NC	1. percentage of households exposed to increased frequency and intensity of natural hazards (inland floods or heat waves) in the last 10 years	Percent	32	100	0
	HC	25. percentage of households who have members injured or died as a result from human-induced hazards in the last 10 years	Percent	65	100	0
	HC	26. percentage of households who have members injured or died as a result from natural hazards in the last 10 years	Percent	20	100	0
	FC	14. percentage of households that have experienced damage to their property	Percent	77	100	0
	FC	15. percentage of households that have experienced a loss of their property	Percent	73	100	0
	PC	10. percentage of households that did not receive a warning about the pending natural disasters	Percent	12	100	0
	HC	27. percentage of households who know how to turn off the installations in your home after any disaster	Percent	82	100	0
	NC	4. average air quality values in the last 5 years (years: 2019-2024) PM ₁₀	Mikro-gram/m ³	44.49	50	1.25
		PM _{2.5}	Mikro-gram/m ³	22.45	25	0.08
		SO ₂	Mikro-gram/m ³	7.92	20	3.19
		NO ₂	Mikro-gram/m ³	9.09	40	6.03

Table A2: Indexed Values of Each Variable and Overall Value of Indicators

Types of Livelihood Capitals	Variables	In-indexed Values	Indicators	Overall
HC	1. percentage of large families (more than 6 members)	0.23	Family Structure	0.32
HC	8. percentage of single parent households	0.22		
HC	9. percentage of households with orphans	0.06		
SC	9. percentage of households with positive change in women's role/position in family after arrival in Türkiye	0.76		
HC	2. percentage of age 65+ in a household	0.03	Age	0.15
HC	3. percentage of age ≤ 5 in a household	0.24		
HC	4. number of children in a household	0.31		
HC	7. percentage of age of household head < 18 or > 65	0.02		
HC	5. percentage of women in a household	0.48	Gender	0.33
HC	6. percentage of female-headed households	0.19		
HC	10. percentage of households with less than high school education	0.78	Education	0.78
HC	19. percentage of households who participate in vocational training	0.91		
FC	6. percentage of households who can not afford education expenses	0.66		
HC	13. percentage of unemployed family members	0.02	Employment	0.46
HC	14. percentage of employed women	0.96		
HC	15. percentage of employed children (age < 15)	0.01		
HC	16. percentage of households who have a work permit	0.85		
HC	12. percentage of households with weather-exposed workers (agriculture, forestry, fishing, and hunting; mining; construction; manufacturing; and transportation and utilities)	0.47	Occupation	0.47
HC	11. percentage of households where members had any formal or informal skill	0.42	Socio-economic Status	0.59
FC	2. per household income monthly	0.83		
FC	9. percentage of households owning private or permanent land in any location that is usually used as a dwelling	0.51		
FC	10. percentage of households with no vehicle	0.89		
FC	11. percentage of households using technological devices (fridge, electric heater, fan, washing machine, computer)	0.05		
PC	4. housing quality (comfortable living conditions (e.g. indoor plumbing, and hot showers) (scale of good to bad)	0.83		

FC	8. percentage of renter households	1	Housing Tenure (ownership)	1.00
FC	1. percentage of earning member in a household	0.75	Livelihood Strategies	0.68
SC	2. percentage of households with members working for the government	0.99		
FC	3. percentage of households who took loan in the past 5 years	0.05		
FC	4. percentage of households that reported at least one family member worked outside the community to earn a wage	0.93		
HC	17. language proficiency	0.70	Minority/Language	0.58
HC	18. percentage of households who participate in language course	0.80		
SC	4. percentage of households who have language problems with their children	0.16		
SC	1. years when refugees are in Türkiye	0.39		
SC	6. percentage of households who have a residence permit	0.85		
HC	20. percentage of households registered another province (in this case, they do not benefit from health services)	0.04	Health	0.28
HC	21. percentage of households with chronically health difficulties	0.37		
HC	22. percentage of households with disabled people	0.23		
HC	23. percentage of households who not visiting doctors during illness	0.32		
FC	5. percentage of households who can not afford medical expenses	0.44		
FC	12. average number of months households struggle to obtain food for their family	0.35	Food	0.54
PC	7. distance to market	0.73		

PC	8. access to evacuation routes and/or assembly areas	0.89	Settlement/Infrastructure	0.51
PC	9. normal and rainy season road conditions (scale of good to bad)	0.87		
PC	1. percentage of households using the Internet	0.11		
PC	2. percentage of households using unsafe water for drinking, cooking, bathing and washing	0.05		
PC	3. percentage of households who do not have toilet facilities	0.05		
PC	5. distance to medical establishments and services	0.56		
PC	6. distance to schools	0.32		
FC	7. percentage of households who can not afford transportation expenses	0.50		
PC	11. built-up area rate	1		
NC	5. the amount of open and green areas per capita	0.78		
SC	7. percentage of households without access to information on health systems (getting disability report, appointment system, or language assistance)	0.41	Social Safety	0.49
SC	5. percentage of households who participate in adaptation events	0.63		
SC	8. percentage of households aware of vulnerabilities of the becoming refugee (e.g. social exclusion)	0.02		
SC	10. relationship with Turkish neighbours (scale of strength to weak)	0.15		
SC	11. percentage of households with difficulty accessing daily information	0.30		
HC	24. percentage of households who do not get awareness of hazards	0.90		
SC	3. percentage of households who have opportunities to work outside the community using personal networks	0.68		
FC	16. percentage of households who receive assistance from a social network and other sources (NGOs) in the last 5 years	0.39		
FC	17. percentage of households who do not receive assistance from the Government in the last 5 years	0.92		
SC	12. average annual growth rate of refugee population	0.23	Population Growth	0.23

FC	13. percentage of households reporting changes in livelihood due to climate change	0.23	Climatic Variability	0.41
NC	2. both summer and winter mean temperature change (%) in the last 10 years (years: 2013-2023) (reference years: 1981-2010) Summer	0.46		
	Winter	0.48		
NC	3. both summer and winter total precipitation change (%) in the last 10 years (years: 2013-2023) (reference years: 1981-2010) Summer	0.35		
	Winter	0.54		
NC	1. percentage of households exposed to increased frequency and intensity of natural hazards (inland floods or heat waves) in the last 10 years	0.32	Hazards	0.47
HC	25. percentage of households who have members injured or died as a result from human-induced hazards in the last 10 years	0.65		
HC	26. percentage of households who have members injured or died as a result from natural hazards in the last 10 years	0.20		
FC	14. percentage of households that have experienced damage to their property	0.77		
FC	15. percentage of households that have experienced a loss of their property	0.73		
PC	10. percentage of households that did not receive a warning about the pending natural disasters	0.12		
HC	27. percentage of households who know how to turn off the installations in your home after any disaster	0.18		
NC	4. average air quality values in the last 5 years (years: 2019-2024) PM ₁₀	0.89		
	PM _{2.5}	0.90		
	SO ₂	0.28		
	NO ₂	0.09		