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# The Assessment of Turkey's Vulnerability to Disasters and Hazards with IDB Indicator System

Türkiye'nin Afet ve Tehlikelere Karşı Savunmasızlığının IDB Gösterge Sistemi ile Değerlendirilmesi

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## ABSTRACT

The aim of this study is to determine vulnerabilitiy and catascrophic indexes of the provinces of Turkey and to determine the current situation and deficiencies of these provinces against disasters and to guide the decision makers.

The study was prepared with a semi-numerical method and the scope of the study was all provinces of our country. The study covers the period 2015-2017 and it has been applied to all provinces of Turkey. Prevalent Vulnerability Index (PVI) consists of 24 sub-factors and the index value is between 0 and 1.

The first four provinces with the highest index average for 2015-2017 are Şanlıurfa, Şırnak, Mardin and Diyarbakır. The provinces with the lowest value were Giresun, Trabzon, Artvin and Rize. In addition, 40.74% of our provinces were in the high vulnerability category, while 59.26% were in the middle index category. There were no provinces in the low index category.

As a result, while it was seen that our country was not at the desired level in terms of vulnerability in the international arena, it was remarkable that in national context, the less developed regions or provinces of our country were in a worse position than the other provinces in terms of vulnerability.

**Keywords:** Disaster, Risk, Vulnerability, IDB.

## ÖZ

Bu çalışmanın amacı, Türkiye illerinin kırılganlık endekslerini belirlemek ve bu illerin afetlere karşı mevcut durumunu ve eksikliklerini tespit etmek ve karar vericilere rehberlik etmektir.

Çalışma yarı sayısal bir yöntemle hazırlanmış ve çalışmanın kapsamı ülkemizin tüm illerindendir. Çalışma 2015-2017 dönemini kapsamakta olup, Türkiye'nin tüm illerine uygulanmıştır. Yaygın Savunmasızlık Endeksi (YSE) 24 alt faktörden oluşmaktadır ve endeks değeri 0 ile 1 arasındadır.

2015-2017 yılları arasında endeks ortalaması en yüksek ilk dört il Şanlıurfa, Şırnak, Mardin ve Diyarbakır'dır. En düşük değere sahip iller Giresun, Trabzon, Artvin ve Rize'dir. Ayrıca illerimizin %40,74' ü yüksek savunmasızlık kategorisinde ve %59,26' sı orta endeks kategorisindedir. Düşük endeks kategorisinde herhangi bir il bulunmamaktadır.

Sonuç olarak, uluslararası arenada savunmasızlık açısından ülkemizin istenilen düzeyde olmadığı görülmekle birlikte, ulusal alanda, ülkemizin daha az gelişmiş bölgelerinin veya illerinin daha kötü bir konumda olduğu dikkat çekicidir.

**Anahtar Kelimeler:** Afet, Risk, Savunmasızlık, IDB.

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## INTRODUCTION

Vulnerability, as a word, means being unable to stand out against the effects of a dangerous environment.[1] On the other hand, vulnerability is the level of exposure of people, assets or the environment due to the effects of a danger of loss of life, injury and damage.[2] Vulnerability assesses the ability of a population to withstand a hazardous event and reduce its social, economic and personal impact.[3]

Another definition is a set of processes and conditions that result from economic, physical, environmental, and social factors that rise the sensitivity of a society affected by any hazard. Vulnerability in terms of disaster risk mitigation is defined not as a general fixed situation but as a result of certain hazards. Vulnerability situations; human vulnerability can be divided into structural or physical vulnerability.[4] Vulnerability types can be determined economically, socially, politically, physically and psychologically.[5] Most of the assets and systems exposed to the hazard exhibit more than one vulnerability dimension.[6]

Vulnerability is also recognized as an environmental hazard. On the other hand, it is considered a common product of vulnerability, fragility, exposure and resistance. This term has emerged as the product of a number of terms, often overlapping sensitivity, resistance, flexibility, marginality, fragility and vulnerability. In the context of disasters, the concept of vulnerability was first used by O'Keefe (1976) when investigating the key role played by socioeconomic factors that caused the effects of extreme geophysical events and weaknesses in rescue and intervention.[7]

### Vulnerability Analysis

Disasters have long been regarded as one-off events that have been addressed through humanitarian response and relief efforts. But, for several decades there has been a clear change of attitude towards strengthening preparations and a more effective and efficient response for disasters. In particular, an understanding emerged that the economy plays an important role and that a longer-term approach is needed to reduce disaster risk and increase resilience.[8] Vulnerability assessments identify who and what is exposed and susceptible to change. This helps to identify specific areas of interest and raise awareness among practitioners and other stakeholders (eg.: scoring methods can help identify hotspots).[9]

By definition, natural disasters are linked to human capacity to respond. In other words, the possible response in a fragile context with weakened state structures and social systems will not be sufficient to meet the needs of those affected.[10]

In this study, the concept of vulnerability has been used as a measure of the capacity of different regions with different economies to respond to disasters.

Besides, if people have a high degree of flexibility, they will not be so vulnerable. The concepts of vulnerability and resilience can be seen as two ends of a spectrum. A high vulnerability means low resilience, and vice versa. We can identify ways to reduce the vulnerability by increasing flexibility as follows. The rise and fall pattern of different fragility and resilience components can be determined by individuals, households, groups, communities, etc. will change.

The purpose of the vulnerability analysis is to identify appropriate activities that can reduce vulnerability before the damage from potential danger happens.[11] In addition, the need for regional vulnerability analysis, including natural vulnerability, economic vulnerability and social vulnerability, is noted in the scientific literature.[7,12-23]

### IDB (Index-Data-Base) Indicator System

This method was originally developed by Omar Dario CARDONA and his team at the National University of Colombia in 1990 for the Inter-American Development Bank (IDB). In addition, this method has been

accepted by the United Nations University as a risk analysis method against disasters.

The main purpose of the indicator program is explained according to the Institute of Environmental Studies.

The main objective of the "Indicators Program" was to establish an indicator or index system that identifies disaster risk in different countries in a comparative manner and allows the identification of key factors contributing to the risk structuring in each. The model is based on readily available and reasonably robust variables that allow for a coarse data analysis on an appropriate scale for national decision-making. However, other comparisons at other sub-national levels have been examined, such as country regions, city regions and towns. The resulting risk profile not only highlights comparative risk levels between disaster-prone regions or units, but also factors that need to be considered to reduce this risk.

The system of vulnerabilities and risk indicators is multi-sectoral and multi-focused, given the relative possibilities of a society's inability to absorb impact and recover from a range of hazardous events. Each index model is indicative and should not appear to be exhaustive or conclusive. The system of indicators is therefore useful for informing decision makers in priority areas.

There is a clear need for detailed risk assessments and profiles for action and resource allocation, but mainly for planning at national and sub-national levels.[24]

**Table 1. Components of the PVI**

| Exposure Susceptibility Indicators | | |
|---|---|---|
| **Rank** | **Indicator** | **Index Weights** |
| 1 | ES1. Population growth, average annual rate | 5 |
| 2 | ES2. Urban growth, average annual rate (%) | 12.4 |
| 3 | ES3. Population density (people/5 $km^2$) | 9 |
| 4 | ES4. Poverty, population living on less than US$1 per day PPP. | 25.4 |
| 5 | ES5. Capital stock in millions US dollar per thousand square kilometers. | 12.3 |
| 6 | ES6. Imports and exports of goods and services as a percent of GDP (%) | 11.7 |
| 7 | ES7. Gross domestic fixed investment as a percent of GDP (%) | 12.4 |
| 8 | ES8. Arable land and permanent crops as a percent of land area (%) | 11.8 |
| **Socio Economic Fragility Indicators** | | |
| **Rank** | **Indicator** | **Index Weights** |
| 1 | SF1. Human Poverty Index, HPI-1 | 20.9 |
| 2 | SF2. Dependents as a proportion of the working age population | 8.5 |
| 3 | SF3. Inequality as measured by the Gini coefficient | 16.4 |
| 4 | SF4. Unemployment as percent of the total labor force (%) | 12.5 |
| 5 | SF5. Annual increase in food prices (%) | 9.4 |
| 6 | SF6. Share of agriculture in total GDP growth (annual %). | 9.6 |

**Table 1. (Continued)**

| | | |
|---|---|---|
| 7 | SF7. Debt service burden as a percent of GDP (%) | 9.6 |
| 8 | SF8. Soil degradation resulting from human activities (GLASOD) (%) | 13 |
| **Lack of Resilience Indicators** | | |
| **Rank** | **Indicator** | **Index Weights** |
| 1 | LR1. Human Development Index, HDI [Inv] | 21.9 |
| 2 | LR2. Gender-related Development Index, GDI [Inv] | 10.5 |
| 3 | LR3. Social expenditures on pensions, health and education as a percent of GDP (%) [Inv] | 13.6 |
| 4 | LR4. Governance Index (Kaufmann) [Inv] | 15 |
| 5 | LR5. Infrastructure and housing insurance as a percent of GDP (%) [Inv] | 12.9 |
| 6 | LR6. Television sets per 1000 people [Inv] | 3.7 |
| 7 | LR7. Hospital beds per 1000 people [Inv] | 9.2 |
| 8 | LR8. Environmental Sustainability Index [Inv] | 13.2 |

Source[25]

**Note:** Lack of Resistance The 'Inv' sign for index factors indicates that the index values are reversed due to the effect direction. In other words, if the index value is calculated as 'E', this index value is taken as '1-E'.

## MATERIAL AND METHODS

The study is a semi-quantitative study, and the index calculation method is used by weighting from a series of sub-indicators. The aim of this study is to determine the vulnerabilities, risks and disasters indices of the provinces of our country and to determine the current status and deficiencies of these provinces against disasters. With the help of these indices, a detailed risk and vulnerability analysis of the provinces in general and the whole country will be performed. The resulting analysis and photography is important in terms of being detailed and broad in terms of guiding decision-makers in the fight against disasters.

Although the study covers 2015-2017 periods, it was applied to all provinces of our country. PVI consists of the average of ES (Exposure and Sensitivity), SF (Socio-Economic Fragility) and LR (Lack of Resilience) sub-indices and thus 24 sub-factors. The index value is between 0 and 1. Classification of index values according to international standards; Between 0-0.20 low, 0.20-0.40 medium, between 0.40-0.80 high and 0.80-1.00 is made in the form of very high.

### Aspect of Research Ethics

The study did not use any ethical data that required permission.

## RESULT AND DISCUSSION

**Table 2. Indicators of Prevalent Vulnerability Index for Provinces between 2015 and 2017**

| Provinces | 2015 | 2016 | 2017 | Mean | Provinces | 2015 | 2016 | 2017 | Mean |
|---|---|---|---|---|---|---|---|---|---|
| Adana | 0.44 | 0.51 | 0.50 | 0.48 | Konya | 0.41 | 0.38 | 0.44 | 0.41 |
| Adıyaman | 0.39 | 0.39 | 0.42 | 0.40 | Kütahya | 0.35 | 0.34 | 0.35 | 0.35 |
| Afyon | 0.37 | 0.36 | 0.38 | 0.37 | Malatya | 0.35 | 0.36 | 0.39 | 0.37 |
| Ağrı | 0.50 | 0.49 | 0.48 | 0.49 | Manisa | 0.38 | 0.37 | 0.38 | 0.38 |
| Amasya | 0.33 | 0.32 | 0.36 | 0.34 | Kahramanmaraş | 0.46 | 0.43 | 0.45 | 0.45 |
| Ankara | 0.37 | 0.36 | 0.37 | 0.37 | Mardin | 0.50 | 0.50 | 0.51 | 0.50 |
| Antalya | 0.38 | 0.38 | 0.39 | 0.38 | Muğla | 0.33 | 0.33 | 0.34 | 0.33 |
| Artvin | 0.28 | 0.31 | 0.31 | 0.30 | Muş | 0.39 | 0.48 | 0.53 | 0.47 |
| Aydın | 0.34 | 0.34 | 0.35 | 0.34 | Nevşehir | 0.35 | 0.41 | 0.40 | 0.39 |
| Balıkesir | 0.39 | 0.38 | 0.38 | 0.38 | Niğde | 0.36 | 0.41 | 0.40 | 0.39 |
| Bilecik | 0.36 | 0.35 | 0.38 | 0.37 | Ordu | 0.31 | 0.33 | 0.33 | 0.32 |
| Bingöl | 0.40 | 0.42 | 0.46 | 0.42 | Rize | 0.28 | 0.30 | 0.30 | 0.30 |
| Bitlis | 0.36 | 0.44 | 0.50 | 0.43 | Sakarya | 0.40 | 0.38 | 0.42 | 0.40 |
| Bolu | 0.31 | 0.30 | 0.32 | 0.31 | Samsun | 0.38 | 0.36 | 0.39 | 0.38 |
| Burdur | 0.40 | 0.39 | 0.41 | 0.40 | Siirt | 0.47 | 0.50 | 0.49 | 0.49 |
| Bursa | 0.38 | 0.37 | 0.37 | 0.37 | Sinop | 0.34 | 0.36 | 0.36 | 0.35 |
| Çanakkale | 0.37 | 0.36 | 0.36 | 0.37 | Sivas | 0.39 | 0.39 | 0.39 | 0.39 |
| Çankırı | 0.36 | 0.41 | 0.38 | 0.38 | Tekirdağ | 0.39 | 0.44 | 0.45 | 0.43 |
| Çorum | 0.33 | 0.32 | 0.35 | 0.33 | Tokat | 0.37 | 0.34 | 0.36 | 0.36 |
| Denizli | 0.36 | 0.35 | 0.36 | 0.36 | Trabzon | 0.28 | 0.31 | 0.31 | 0.30 |
| Diyarbakır | 0.52 | 0.48 | 0.50 | 0.50 | Tunceli | 0.34 | 0.35 | 0.36 | 0.35 |
| Edirne | 0.32 | 0.38 | 0.40 | 0.37 | Şanlıurfa | 0.57 | 0.53 | 0.53 | 0.55 |
| Elazığ | 0.35 | 0.37 | 0.38 | 0.37 | Uşak | 0.35 | 0.34 | 0.34 | 0.34 |
| Erzincan | 0.39 | 0.34 | 0.38 | 0.37 | Van | 0.38 | 0.46 | 0.50 | 0.45 |
| Erzurum | 0.37 | 0.36 | 0.38 | 0.37 | Yozgat | 0.42 | 0.42 | 0.43 | 0.42 |
| Eskişehir | 0.36 | 0.34 | 0.34 | 0.35 | Zonguldak | 0.33 | 0.34 | 0.36 | 0.34 |
| Gaziantep | 0.47 | 0.45 | 0.47 | 0.46 | Aksaray | 0.39 | 044 | 0.43 | 0.42 |
| Giresun | 0.29 | 0.31 | 0.31 | 0.31 | Bayburt | 0.38 | 0.33 | 0.33 | 0.35 |
| Gümüşhane | 0.36 | 0.35 | 0.38 | 0.36 | Karaman | 0.40 | 0.38 | 0.41 | 0.39 |
| Hakkâri | 0.40 | 0.49 | 0.57 | 0.49 | Kırıkkale | 0.33 | 0.38 | 0.38 | 0.36 |
| Hatay | 0.45 | 0.43 | 0.47 | 0.45 | Batman | 0.50 | 0.49 | 0.50 | 0.50 |
| Isparta | 0.40 | 0.38 | 0.39 | 0.39 | Şırnak | 0.54 | 0.54 | 0.56 | 0.54 |
| Mersin | 0.43 | 0.48 | 0.47 | 0.46 | Bartın | 0.32 | 0.35 | 0.34 | 0.33 |
| İstanbul | 0.49 | 0.48 | 0.50 | 0.49 | Ardahan | 0.41 | 0.42 | 0.42 | 0.41 |
| İzmir | 0.41 | 0.39 | 0.42 | 0.41 | Iğdır | 0.44 | 0.43 | 0.43 | 0.44 |
| Kars | 0.43 | 0.41 | 0.46 | 0.43 | Yalova | 0.40 | 0.35 | 0.38 | 0.38 |
| Kastamonu | 0.35 | 0.38 | 0.35 | 0.36 | Karabük | 0.32 | 0.33 | 0.34 | 0.33 |
| Kayseri | 0.43 | 0.45 | 0.45 | 0.44 | Kilis | 0.44 | 0.48 | 0.47 | 0.46 |
| Kırklareli | 0.34 | 0.40 | 0.40 | 0.38 | Osmaniye | 0.47 | 0.47 | 0.50 | 0.48 |
| Kırşehir | 0.33 | 0.38 | 0.40 | 0.37 | Düzce | 0.39 | 0.37 | 0.42 | 0.39 |
| Kocaeli | 0.41 | 0.38 | 0.42 | 0.40 | **General Mean** | **0.39** | **0.39** | **0.41** | **0.40** |

The findings of the study are presented in the form of tables, graphs, maps and interpretations.

According to Table 2, the Prevalent Vulnerability Index values for 2015-2017 it has been found out that in 2015 Şanlıurfa (0.57), Şırnak (0.54) and Diyarbakır (0.52) had the highest index values, for 2016 Şırnak (0.54), Şanlıurfa (0.53), Mardin (0.50) and Siirt (0.50), had the highest index values and for 2017 Hakkâri (0.57), Şırnak (0.56), Muş (0.53) and Şanlıurfa (0.53) had the highest index values.

Şanlıurfa and Şırnak provinces are among the most vulnerable provinces in every three years.

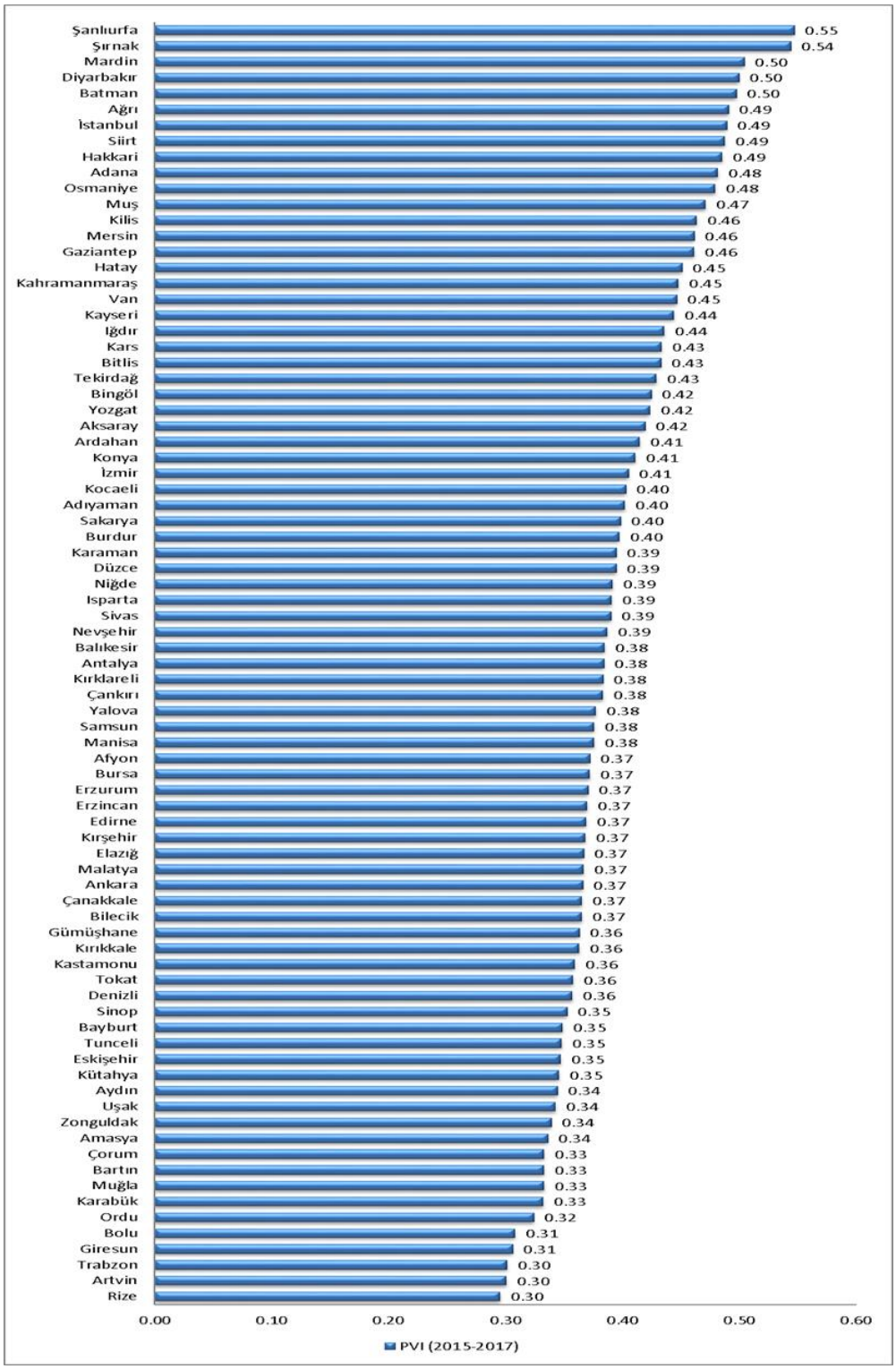


**Figure 1. Provinces Indicators of Prevalent Vulnerability Index for 2015-2017 Years**

When we look at the index averages for the 2015-2017 period, Şanlıurfa, Şırnak, Mardin and Diyarbakır were the first four provinces with the highest average. The provinces with the lowest value were Giresun, Trabzon, Artvin and Rize. According to the last period averages, all of our provinces were in high and medium level indices.

While 33 of our provinces were in the high category, others were in the middle index category. Accordingly, 40.74% of our provinces were in the high vulnerability category, while 59.26% were in the middle

index category. Therefore, we do not have any provinces in the low index category.

According to the graph, it is noteworthy that İstanbul ranks seventh among the highest indexed provinces. In addition to this, it was observed that high value provinces are generally Eastern and Southeastern provinces in terms of vulnerability, while low value provinces were generally located in the Black Sea Region (Figure 1).

**Table 3. Vulnerability Classification of Prevalent Vulnerability Index Averages of Provinces of Turkey for 2015-2017 Years**

| Prevalent Vulnerability Index | Provinces |
|---|---|
| ≤0.10 | - |
| 0.11-0.20 | - |
| 0.21-0.30 | Artvin (0.30), Rize (0.30), Trabzon (0.30) |
| 0.31-0.40 | Bolu (0.31), Giresun (0.31), Ordu (0.32), Muğla (0.33), Bartın (0.33), Karabük (0.33), Çorum (0.33), Amasya (0.34), Aydın (0.34), Uşak (0.34), Zonguldak (0.34),Eskişehir (0.35), Kütahya (0.35), Sinop (0.35), Tunceli (0.35), Bayburt (0.35), Denizli (0.36), Gümüşhane (0.36), Kastamonu (0.36), Tokat (0.36), Kırıkkale (0.36), Afyon (0.37), Ankara (0.37), Bilecik (0.37), Bursa (0.37), Çanakkale (0.37), Edirne (0.37), Elazığ (0.37), Erzincan (0.37), Erzurum (0.37), Kırşehir (0.37), Malatya (0.37), Antalya (0.38), Balıkesir (0.38), Çankırı (0.38), Kırklareli (0.38), Manisa (0.38), Samsun (0.38), Yalova (0.38), Isparta (0.39), Nevşehir (0.39), Niğde (0.39), Sivas (0.39), Karaman (0.39), Düzce (0.39), Adıyaman (0.40), Burdur (0.40), Kocaeli (0.40), Sakarya (0.40), |
| 0.41-0.49 | İzmir (0.41), Konya (0.41), Ardahan (0.41), Yozgat (0.42), Aksaray (0.42), Bingöl (0.42), Tekirdağ (0.43), Bitlis (0.43), Kars (0.43), Iğdır (0.44), Kayseri (0.44), Hatay (0.45), Kahramanmaraş (0.45), Van (0.45), Gaziantep (0.46), Mersin (0.46), Kilis (0.46), Muş (0.47), Adana (0.48), Osmaniye (0.48), Ağrı (0.49), İstanbul (0.49), Siirt (0.49), Hakkâri (0.49), |
| ≥0.50 | Diyarbakır (0.50), Mardin (0.50), Batman (0.50), Şırnak (0.54), Şanlıurfa (0.55) |

According to Table 3, 33 Turkish provinces had higher vulnerability level in the range from 0.40 to 0.80, the other 48 provinces vulnerability level was at mid range of 0.20 to 0.40. However, we do not have any province at the low vulnerability level between 0-0.20. Accordingly, Turkey's all provinces were at medium and high vulnerability level. This situation was remarkable in terms of risk.

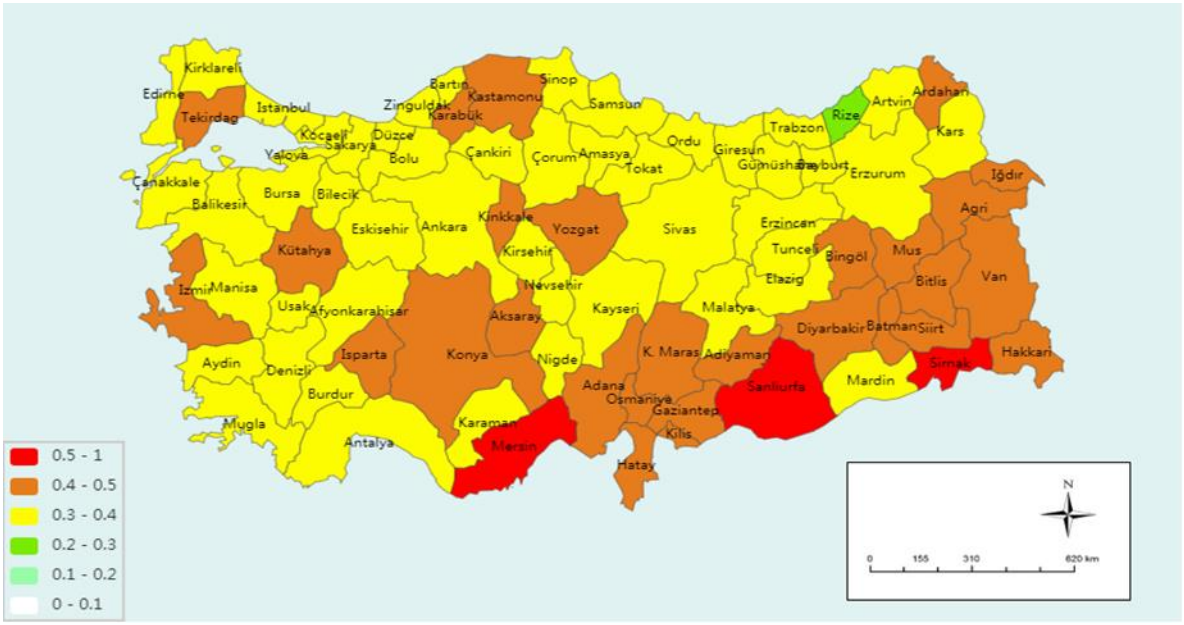


**Figure 2. Prevalent Vulnerability Index for 2015-2017 Period**

The Prevalent Vulnerability Index characterizes dominant vulnerability conditions reflected in the absence of exposure, socioeconomic vulnerability and social flexibility in prone areas. These are those that support the direct impact and the indirect and intangible impact when a hazard event occurs. In Figure 2, it is observed that the Eastern and Southern provinces are significantly darker (except Mardin). However, it draws attention that İzmir and Tekirdağ provinces in the West and Mersin in the Mediterranean, representing the higher category, are brown and red.

Countries with direction PVI showing a general vulnerability to disasters, the calculation made out of the 20 countries, Turkey was among the lowest 11 countries. Moreover, it was noteworthy that the index value of our country was below the average although it was very close compared to the general index averages of the other countries. According to these results, although Turkey's Prevalent Vulnerability Index value was at a moderate level compared with other countries, other countries' socio-economic status was higher. It is remarkable that our country's vulnerability is not at a desired level. In fact, our country's general PVI value of 0.40 is also in the high category in the index classification (Figure 3).

The Risk and Vulnerability Index System was first developed by Omar Darío Cardona and his team at the National University of Colombia for the Inter-American Development Bank (IDB). This system determines the level of risk and vulnerability to disasters in the countries or provinces in question and plays a guiding role in determining future policies and measures on this issue.

Omar Darío Cardona (2005) prepared a summary report on indicators for disaster risk and risk management for Latin America and the Caribbeans. Information on the content, benefits and development of the indicator system in disaster risk management is given here. In addition, technical and theoretical explanations and definitions related to Disaster Deficit Index, Local Disaster Index, Prevalent Vulnerability Index and Risk Management Index were included. In addition, interpretations were made on the index values of Mexico and provinces related to these index values.[26]

In 2012, a study of vulnerability assessment was prepared by Sven Fuchs, Jörn Birkmann and Thomas Glade. The study evaluated vulnerability and fragility analysis in the context of current approaches and future challenges. Accordingly, the term vulnerability is closely related to natural

hazards and has been conceptualized in various ways regarding hazard and disaster management. In other words, although the concepts of vulnerability and risk were related to the methods and theories of different disciplines, they seem to be more related in the areas of disaster and danger.[27]

In 2013, Hajar Nasiri and Shahram Shahmohammadi-Kalalagh evaluated flood and flood vulnerabilities on the urban scale, one of the most important parts of flood and flood management. In addition, the literature on the Flood Vulnerability Index has been examined.[28]

In 2013, Prince M. Etwire et al. conducted a study on the vulnerability index related to climate change. The study conducted an application of the Livelihood Vulnerability Index to assess the vulnerability of Northern Ghana to climate change and differentiation. Accordingly, the study has calculated the vulnerability index of the region in question through various parameters and indicators. As a result of the study, it was found that the exposure and vulnerability of Northern Ghana Region was very high. In addition, the deficiencies and problems seen according to the results were presented.[29]

In addition to the general studies carried out in national and international areas related to the index and indicator system in disasters, it was also available in the studies that calculate the index values at the provincial, regional and national level. These studies have been prepared by the Environmental, Rural Development and Disaster Risk Management Department of IDB (Inter-American Development Bank) in general and provide us the opportunity to compare countries among themselves.

According to the index study prepared for Argentina; PVI the overall average for the country in 2007 was 0.31. Turkey's overall average 0.40 seems to be higher. Since no index value was presented for the provinces or regions of Argentina, no comparison could be made on the basis of provinces or regions.[30]

According to the index study for Bahamas, a country in the Caribbeans; The PVI value for 2007 was 0.35 which was in the middle category. It was noteworthy that the value was lower than Turkey.[31]

According to the index study for Belize in 2011; it was seen that the overall PVI value of the country was calculated as 0.43. This value was higher than Turkey's PVI value (0.40) .[32]

An index study for Colombia was prepared in 2005 by Martha Liliana Carreño, Omar Darío Cardona and Alex H. Barbat. According to the study, in terms of LSE, the highest LSE value for the provinces of Colombia was 0.55 for Choco.

Likewise in Turkey the highest index value was at Şanlıurfa province (0.55). The province having the lowest YSE value for Colombia was Quindío with 0.28. On the other hand, in Turkey the provinces having the lowest PVI value was 0.30 for Rize, Artvin and Trabzon. Accordingly, Turkey's and Colombia's values were equal in terms of provinces having the highest index value. However, the value of the Colombian province with the lowest value, which was significantly lower than Turkey. Although there was not much difference. In addition, 45.83% of the Colombian provinces were in the high PVI category, while 54.17% were in the middle PVI category. 40.74% of the provinces of our country were in the high PVI category, while the remaining 59.26% were in the middle category. According to this, the high rate of provinces in our country was found to be lower than Colombia.

Looking at the average across the country Colombia's overall index value was 0.39, that was noteworthy higher than Turkey's general average (0.40).

The ESI sub-index of Colombia, which was one of the sub-indices, was calculated as 0.23, SFI sub-index as 0.49 and LRI sub-index as 0.43.

According to the SFI index value of Turkey (0.38), the index was higher than other aspects of ESI and LRI.[25]

## CONCLUSIONS AND RECOMMENDATIONS

When PVI values was taken into consideration, it was noteworthy that among the 10 provinces with the highest index values, our major cities such as Adana, İstanbul, Diyarbakır and Şanlıurfa were among the top 10 provinces. On the other hand, the 10 provinces with the lowest index value were at Black Sea Region such as Rize, Artvin, Trabzon, Giresun, Bolu, Ordu, Karabük and Bartın.

In our study, Prevalent Vulnerability Indices, which provide comparison opportunities for our country at national and international level, were calculated. Thus, a large and detailed photograph of our country was taken regarding the vulnerability to hazards and disasters. Accordingly, while it was seen that our country was not at the desired level in terms of vulnerability in the international arena, it was remarkable that in the national area, the less developed regions or provinces of our country were in a worse position in terms of vulnerability.

It is noteworthy that some health criteria such as the number of hospital beds, investments in the field of health, lack of basic health facilities and malnutrition below the age of 5 are inadequate in the Eastern and Southeastern regions. These factors are the most important factors determining the vulnerability against natural disasters, such as pandemics and biological threats, all over the world today. It is already considered as a kind of biological disaster in pandemics.

Therefore, the realization of the necessary investments and projects in these regions as soon as possible will help to eliminate or reduce the damages caused by hazards and disasters.

### Conflicts of Interest

The authors declare no conflicts of interest.

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