Ardahan Üniversitesi
İktisadi ve İdari Bilimler Fakültesi Dergisi
https://dergipark.org.tr/tr/pub/aruiibfdergisi

Analysis of the urbanization-socioeconomic development relationship with impulse-response functions: the case of Turkey

Şehirleşme-sosyoekonomik gelişme ilişkisinin etki-tepki fonksiyonları ile analizi: Türkiye örneği

İlknur Yeşim Dinçel[a], Gizem Dinçel[b]*

[a] *Arş. Gör., Harran Üniversitesi, İİBF, İktisat, Şanlıurfa, Türkiye, dincelyesim@harran.edu.tr, ORCID: 0000-0001-6367-7949*
[b] *Yüksek Lisans Öğrencisi, İstanbul Üniversitesi, SBE, Hastane ve Sağlık Kurumları Yönetimi, İstanbul, Türkiye, gizemdincel57@gmail.com, ORCID: 0000-0001-6663-6309*

ARTICLE INFO

Article history:
Received: 18 September 2021
Accepted: 3 October 2021

Keywords:
Urbanization,
Socioeconomic Development,
Access to Health Services,
Gross Domestic Product

Article type:
Research article

A B S T R A C T

Socio-economic development, which provides information about the welfare level of countries, and improvements in public health and urbanization are in interaction. In this study, the rate of urbanization, life expectancy at birth, gross domestic product and the number of people per doctor in Turkey between 1980 and 2019 were examined with VAR analysis and Granger causality. According to the findings, life expectancy at birth, gross domestic product, and the number of people per doctor come together to have a significant effect on the urbanization rate. In addition, a significant relationship was found between urbanization and gross domestic product. However, no significant relationship was found between other variables and the rate of urbanization. In addition, the effect of a shock in one variable on other variables is shown by means of impulse-response graphs.

MAKALE BİLGİSİ

Makale geçmişi:
Başvuru: 18 Eylül 2021
Kabul: 3 Ekim 2021

Anahtar kelimeler:
Şehirleşme,
Sosyoekonomik Gelişme,
Sağlık Hizmetlerine Erişim,
Gayrisafi Yurtiçi Hasıla

Makale türü:
Araştırma makalesi

ÖZET

Ülkelerin refah düzeyi hakkında bilgi veren sosyoekonomik gelişmişlik ile toplum sağlığındaki iyileşmeler etkileşim içindedir. Bu çalışmada, Türkiye'de şehirleşme oranı ile doğumda beklenen yaşam süresi, gayrisafi yurtiçi hasıla ve doktor başına düşen kişi sayısı 1980-2019 yılları arası VAR analizi ve Granger nedensellik ile incelenmiştir. Elde edilen bulgulara göre doğumda beklenen yaşam süresi, gayrisafi yurtiçi hasıla, doktor başına düşen kişi sayısı bir araya gelerek şehirleşme oranına anlamlı etki sağlamaktadır. Ayrıca şehirleşme ve gayrisafi yurtiçi hasıla arasında anlamlı bir ilişki saptanmıştır. Ancak diğer değişkenler ile şehirleşme oranı arasında anlamlı ilişki bulunamamıştır. Ayrıca etki-tepki grafikleri aracılığıyla, bir değişkende meydana gelen şokun, diğer değişkenler üzerindeki etkisi gösterilmiştir.

* *Sorumlu yazar / Corresponding author*
E-posta / E-mail: dincelyesim@gmail.com
Atıf / Citation: Dinçel, İ. Y. ve Dinçel, G. (2021). Analysis of the urbanization-socioeconomic development relationship with impulse-response functions: the case of Turkey. *Ardahan Üniversitesi İİBF Dergisi*, *3*(2), 112-117.

1. Conceptual Framework

Health was defined by the World Health Organization in 1946 as "not only the absence of illness and disability but a complete state of well-being in physical, mental and social aspects". While this definition covers health most largely, the concepts of physical, mental, and social well-being have been added to this definition (World Health Organization, 1958). Basic factors such as income, social class, health services, working conditions, social environment, personal health practices, healthy child development, and genetics affect human health (World Health Organization).

Socioeconomic status; consists of variables such as the income level of the people, their education level, the social classes they belong to, and their economic levels. Although economic growth is not a sufficient criterion in the development process, socioeconomic development also includes structural developments.

Increasing diseases with low-income level, low education level of parents and infant deaths, utilization of health services according to occupational status show that socioeconomic levels and morbidity and mortality are directly proportional to each other. Factors such as access to clean water, adequate nutrition, the environment where the family lives in the house, and a good living space increase or decrease the diseases.

There are many epidemiological health level criteria to make comparisons between countries, to examine health levels, and to make evaluations. The most frequently used ones to measure the health level can be listed as death, disease, fertility, and socioeconomic status (Köksal et al., 2016). Gross national product per capita, unemployment rate, rural-urban population ratio, population growth rate and literacy rate are some of them. Increasing estimated life time, the importance given to mother-child health, and infant mortality rate is one of the important indicators that show the development level of countries today. With the importance given to preventable causes and the survival of infants and children, the mortality rate under the age of five is tried to be reduced in all countries. For this reason, at the United Nations Millennium Summit held in 2000, reducing infant and under-five mortality was among the Millennium Development Goals (United Nations, 2000).

Due to the relationship between the health level of countries and the socioeconomic structure, health-related indicators are also one of the most important indicators of socioeconomic development. Differences and changes according to the development levels of regions and provinces can be revealed by using the health indicators of a country. There are many criteria used in determining the health levels of countries. Considering these criteria, it will be easier to divide regions or provinces into homogeneous groups and to sort the relevant plans according to their risks.

Deaths that occur in the first five years of life are important in terms of reflecting the impact of the health services in the region or country, as well as the social, economic, and environmental conditions in which children live. According to UNICEF, deaths in the first months of life are mostly caused by problems arising from the pregnancy period, being born in poor conditions, not receiving good postpartum care, genetic disorders, while deaths in the following years are caused by social, economic, and environmental reasons such as nutritional disorders and infectious diseases (UNICEF, 2020). Besides, 80% of infant deaths occur in the first month after birth (UNICEF, 2020).

Another concept underlying the study is life expectancy at birth. Life expectancy/life expectancy at birth is the average number of years a newborn is expected to live. It is calculated separately according to geography and gender. It provides important information about the socio-economic situation and quality of life of the country. Because estimated life time varies according to socioeconomic development, improvement of living conditions, and efficiency of health services. The development stages of Rostow form the theoretical basis of this situation (Rostow, 1969).

Healthy individuals, who are the basis of a healthy society, have an important place in the development economics literature. The human development index was developed by Mahbub ul Haq in 1990 to materialize the level of development of a country, the extent to which the country's economy is reflected on the quality of life, longevity, and literacy rate (UNDP, 1990). It has been offered annually by the United Nations since 1993. In 2010, the human development index calculation method was changed by the United Nations Development Program. With the changing calculation method, estimated life time is calculated based on average and expected education level, purchasing power parity. If the human development index, which takes a value between 0-1, approaches 1, it indicates a high level of development. Figure 1 shows the human development index of the countries for 2020. While it is observed that the North American and Northern European countries are at a very developed level, the Central African countries are at the lowest level of development.

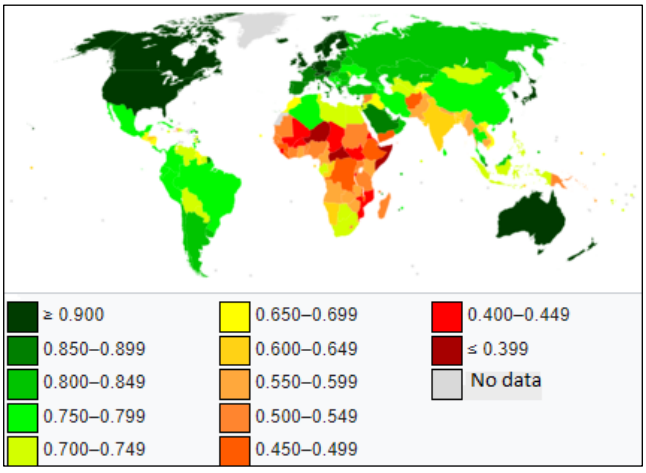

Figure 1. Human development index for 2020

Source: UNDP, 2020

After historically Turkey's 1990 shows that infant and child mortality significantly reduced. Primary health care services, immunization studies, health education, and the increase in the literacy level of parents have increased the rate of individuals' utilization of health services. When analyzed worldwide infant mortality rate and the decrease in under-five mortality rate in Turkey is among the fastest reductions (UNICEF, 2009). When the literature with estimated life time in Turkey, this study measures the relationship between socio-economic development. There are few studies that measure socioeconomic development in Turkey based on the human development index. At this point, it is thought that this study will fill an important gap in the literature.

2. Literature Review

Lorcan and Parker (2009), have used the canonical correlation analysis with indicators of 2003, 67 provinces in Turkey. In the study, the relationship between mortality by age and socioeconomic indicators, one of the measures of health, which is also accepted as the main determinant of population growth in countries, was examined. Mortality rates by age were used as dependent variables and socioeconomic indicators were used as

independent variables in the analysis. It has been determined that there is a strong relationship between age-based mortality and socioeconomic variables.

Kocaman et al. (2012) used data envelopment analysis in OECD countries. In this study, the number of physicians per thousand people, the number of hospital beds per thousand people, the health expenditure per person, the share of the gross domestic product for health expenditures; estimated life time, and under-five mortality rate were used as outputs.

Girginer (2013), with Turkey in the EU countries and non-hierarchical clustering and multidimensional scaling analysis; estimated life time, healthy life time, the mortality rate of children under 5 years of age per thousand live births, the mortality rate for children aged 15-59 per thousand population, the share of health expenditure of gross domestic product, the annual share of total health expenditures, public health expenditures have evaluated health expenditures. In this study; health indicators in terms of examining the position about Turkey's EU member states and aimed to reveal the similarities or differences between them.

Köksal et al. (2016), Turkey and the 28 health indicators between 1960 to 2009 years of European Union countries was measured by Single Sample T-Test. In this study; estimated life time, GNP per capita, health expenditure per capita, health share allocated from the general budget, population growth rate, literacy rate, infant mortality rate, under-five mortality rate, maternal mortality rate, crude birth rate, crude mortality rate, total fertility rate, physician, nurse-midwife and bed number per ten thousand people were used.

Ghimire et al. (2019), community-level factors, household-level factor, individual-level factors, environmental factors, and health service factors as inputs in 2001-2016 data in Nepal; used deaths of children under the age of five, age of death of children, maternal birth history, each live birth interval (single and multiple births), survival status, the current age of life as outputs. It has been demonstrated that mothers who had a child who died before, who were not vaccinated during pregnancy, and those who did not use contraception had a higher risk of neonatal, post-neonatal, infant, child, and under-five deaths in Nepal.

Malderen et al. (2019), in Sub-Saharan Africa between 2010 and 2016, multivariable with indicators of child's gender, place of residence (urban or rural), mother's education level (primary school and above), family's income level, and under-five mortality rate as output They used the Poisson regression analysis method. In 13 countries in Sub-Saharan Africa, mother's education level, child's gender in 12 countries, household wealth in 11 countries, and place of residence in 8 countries were the main factors affecting the under-five mortality rate.

As can be seen in the studies presented, it has been demonstrated by various countries and various analysis methods that there is a strong relationship between socioeconomic development and reduction in child mortality and estimated life time. In this study, socio-economic developments concerning Turkey will be assessed based on the estimated life time of the year 1980-2019. This study differs from other studies in the literature in that it measures socioeconomic development in Turkey based on the human development index.

3. Data Set

The data set used in the study consists of estimated life time, urbanization rate, number of people per doctor, and gross domestic product. The data of the variables were obtained from the World Bank. The data are annual and cover the period between 1980-2019. Analyzes were made using E-views 11 package program. The raw states of the variables are used, and only the logarithm of the gross domestic product data is taken. Descriptive statistics for the variables are presented in Table 1. Accordingly, the average urbanization rate between the relevant years was 63.4%, the estimated life time was 69 years, the number of people per doctor was 895, and the gross domestic product was 9384 TL.

Table 1. Descriptive statistics of variables

Variable	Observation	Mean	St. Deviation	Min.	Max.
Seh	40	63.4462	8.7214	43.78	75.63
Bek	40	69.1246	5.8901	58.667	78.16
Doctor	40	895.054	343.5253	535	1631.328
Lgdp	40	9.3842	0.3345	8.8545	9.9680

The Pearson correlation matrix of the variables is shown in Table 2.

Table 2. Pearson correlation coefficients of the variables

	Seh	Bek	Doctor	lgdp
Seh	1.0000			
Bek	0.9860	1.0000		
Doctor	-0.9763	-0.9594	1.0000	
Lgdp	0.9632	0.9750	0.9011	1.0000

Time series graphs regarding the level values of the series are shown in Figure 2.

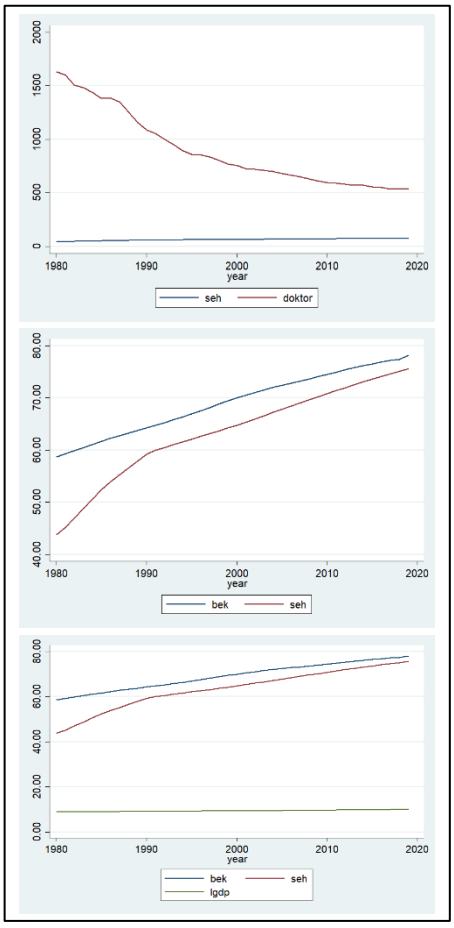

Figure 2. Time series graphs of the variables

4. Methodology and Empirical Findings

In this study, estimated life time in Turkey, urbanization rate, gross domestic product, people per doctor between 1980-2019 VAR analysis and examined by Granger causality analysis. Then, impulse-response graphs were obtained.

Before starting the analysis, it is necessary to determine whether the series used are stationary or not. Because the series that are not stationary need to be stabilized. To determine whether the series is stationary, Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) unit root, and Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) stationarity tests are commonly used tests. In this study, PP unit root is used.

The PP unit root test developed by Phillips and Perron (1988) is among the tests that are frequently used to determine the stationarity of the series. The nonparametric unit root test was developed by expanding the assumption that the ADF unit root test has no correlation between error terms and has a constant variance (Phillips and Perron, 1988). In this respect, the PP test is more robust than the ADF unit root test in terms of autocorrelation and heteroscedastic. The PP unit root test hypotheses are as follows:

H0: The serial volume contains a root.

H1: The serial volume does not contain a root.

Table 3 shows the PP unit root test results. Considering the results of the PP tests, it was decided that the series were stationary at the level. Since the series are stable at the level, there is no need to make the difference. Because lgdp variable is not stable at level, this variable is used 1st difference.

Table 3. Phillips-Perron unit root test results

Phillips-Perron Unit Root Test (With Trend and Intercept)

	Critical Value		Test Statistics
	%5	%10	
bek	-2.961	-2.613	-3.820
seh	-2.961	-2.613	-5.814
doctor	-2.961	-2.613	-4.720
lgdp	-3.504330	-3.181826	-2.219
dlgdp*	-3.50637	-3.18300	-7.069

* is 1st difference.

VAR analysis was conducted to investigate socioeconomic factors affecting estimated life time. In the VAR analysis, the relationship between the variables in the model and the forward/backward connections are examined (Kearney and Monadjemi, 1990). In the VAR model developed by Sims (1980), all variables are considered internally. (Gujarati and Porter, 2012). Results of causality, impulse-response analysis, and variance decomposition can be obtained from VAR models (Davidson and MacKinnon, 1993). In this study, causality analysis and impulse-response functions of the VAR model were used.

Determining the appropriate delay length to be used in the VAR model is one of the important points. Choosing incorrect delayed values will cause problems in degrees of freedom. Suitable delay lengths are determined using the criteria of Akaike (AIC), Schwartz (SBIC), Hannan-Quinn (HQIC), Final Prediction Error (FPE).

Table 4. Suitable lag lengths

Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	-296.232	-	206.049	16.6796	16.741	16.8555
1	5.9579	604.38	0.000026	0.780117	1.08717	1.65985
2	41.6364	71.357	9.0e-06*	-0.313135*	0.239556*	1.27038*
3	50.3963	17.52	0.000015	0.089096	0.887426	2.3764
4	66.8718	32.951*	0.000017	0.062678	1.10665	3.05377

*Suitable lag lengths for criterion.

It is seen that FPE, AIC, HQIC, and SBIC values give minimum value for 2 delays. For this reason, 2 delays were preferred and the analysis made after that was based on 2 delays.

Causality analysis determines the relationship and direction between variables, based on the cause-effect relationship between two variables. Causality analysis was developed by Granger.

$$y_t = a_0 + \sum_{i=1}^{n} \beta_i x_{t-i} + \sum_{i=1}^{n} a_i y_{t-i} + u_i \quad (1)$$

$$x_t = \beta_0 + \sum_{i=1}^{n} a_i y_{t-i} + \sum_{i=1}^{n} \beta_i x_{t-i} + u_i \quad (2)$$

It is estimated how x and y affect each other by the causality analysis made using equations 1 and 2. In the Granger causality test, the following hypotheses are tested and if both hypotheses are rejected, it means that there is a bidirectional causality relationship between the variables. (Granger, 1969):

H1: x is not the Granger cause of y.

H2: y is not the Granger cause of x.

In Table 5, the causality relationship between variables is shown with the Granger causality test. According to this; estimated life time, the number of people per doctor and gross domestic product are the reasons for urbanization.

Table 5. Granger causality results

Dependent Variable: seh

Excluded	chi-sq	df	Prob.
bek	5.831207	2	0.0542
doctor	0.301369	2	0.8601
dlgdp	7.628757	2	0.0221
ALL	24.34624	6	0.0005

The causality relationship between variables is shown in Figure 3 more concretely.

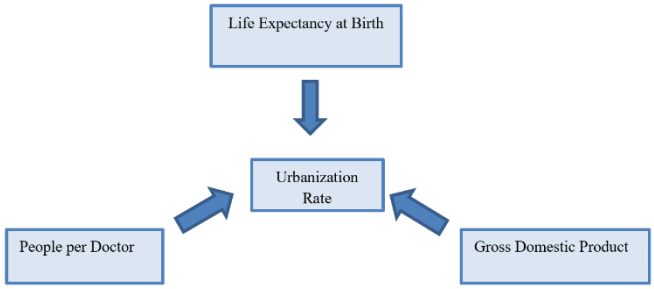

Figure 3. Causality relationship between variables

Impulse-response functions; shows the effect of one-unit deviation in error terms on other variables of the model. In the impulse-response graphs, the horizontal axis shows the duration of the reaction and the vertical axis shows the size.

The order of the variables is important in determining the impulse-response functions. The ranking is done from external to internal according to the responses of the variables to transient shocks. The ordering of the variables was done by Granger causality analysis. The order of the variables in the study from external to internal is in the form of estimated life time, domestic product, number of people per doctor, urbanization rate. Dashed lines in the graphs show the response of the dependent variable to a shock with one standard error in the error terms of the model at 95% confidence intervals. Impulse-response graphs formed according to this order are shown in Figure 4.

Figure 4 shows the responses of each variable to the shock of 1 standard deviation applied to itself and each other. One unit of shock in estimated life time affects the population per doctor for up to 2 periods. The shock occurring in the gross domestic product affects the population per doctor for 1 period. Considering the urbanization and the population per doctor, the greater the shock in urbanization, the more the population per doctor reacts.

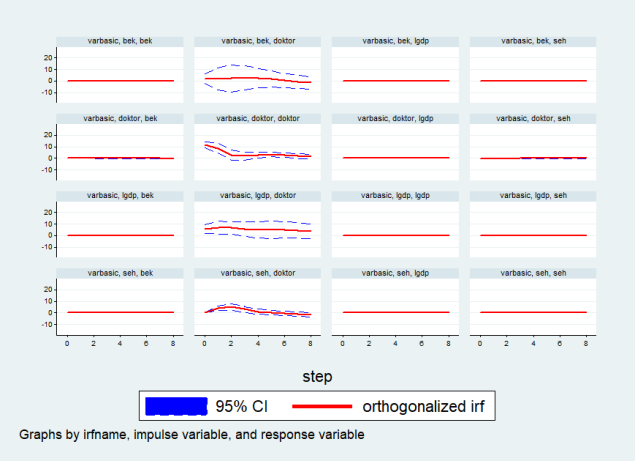

Figure 4. Impulse-response graphs

For the results revealed by VAR analysis to be acceptable, the model should not have multiple linear connections with a normal distribution of residues, heteroscedastic, autocorrelation, and a relationship between independent variables. Breusch-Pagan test, Breusch-Godfrey autocorrelation test, and Jargue-Bera test for error term distribution were used for heteroscedastic detection. The final model will be formed as a result of these diagnostic tests. The final model of the socio-economic indicators in Turkey with urbanization, population per physician, and the birth of changes in gross domestic product impact on estimated life time will be presented empirically. Table 6 is last regression after diagnostis test.

Table 6: The last regression model

Seh	Coef.	Std. Err.	Prob.
Bek	1.885180	0.178463	0.000
Doctor	1.795436	0.165500	0.007
Lgdp	2.908006	1.202671	0.000
cons.	2.970373	1.745977	0.004
F	0.000000	**R-squared**	0.9836

5. Conclusion

The birth and development of children, who make up the future of societies, under good conditions are of great importance for the future of countries. The fact that child deaths can be prevented with low-cost interventions is an indispensable element in the development phase. Besides, prolonged estimated life time, fertility rates, and the proportion of the young population in the total population are important for developing countries. Primary health care services, immunization studies, health education, and the increase in the literacy level of parents have increased the rate of individuals' utilization of health services

Neoliberalism began to gain momentum in the global economy along with the 1980s, Turkey has undergone a rapid social transformation process, a large population of the citizens began to migrate to cities from rural areas to a large population. This transformation has brought along geographical, socioeconomic, and health transformation. When the literature with estimated life time in Turkey, the study measures the relationship between socio-economic development seems to be enough. At this point, it is thought that the study will fill an important gap in the literature.

In this study, the analysis, the number of persons per doctor, estimated life time and is caused as a result of urbanization in Turkey. Estimated life time, the number of people per doctor and gross domestic product are the reasons for urbanization. Besides, one unit of shock in estimated life time affects the population per doctor for up to 2 periods. The shock occurring in the gross domestic product affects the population per doctor for 1 period. Considering the urbanization and the population per doctor, the greater the shock in urbanization, the more the population per doctor reacts.

Although this study and the results of previous studies generally show parallelism, in this study, unlike the others, the following were examined and included in the literature. The gradually increasing average rate of gross domestic product, ceteris paribus, indicates that the population is employed in productive activities in cities. Gross domestic product, estimated life time, the number of doctors, and urbanization increased steadily 1980-2019 in Turkey. The results obtained support development theories. It is in line with Seers' (1963) understanding of development, which he claims is to reduce poverty, inequality and unemployment, and Sen's (1999) development approach, which he explains as reducing deprivations and expanding preferences. According to Sen (1999), deprivation hunger is a multidimensional poverty that includes illiteracy, diseases and generally poor health, powerlessness and lack of access to basic infrastructure services.

Yazar Katkı Oranı Beyanı

Veri, İlknur Yeşim Dinçel tarafından toplanmıştır. Analiz, İlknur Yeşim Dinçel tarafından gerçekleştirilmiştir. Literatür taraması, Gizem Dinçel tarafından yapılmıştır. Sonuç ve tartışma bölümü yazarlar tarafından ortak olarak yazılmıştır.

Çatışma Beyanı

Çalışmada yazarlar arasında çıkar çatışması yoktur.

Destek Beyanı

Bu çalışma için herhangi bir kurumdan destek alınmamıştır.

References

Davidson, R., MacKinnon, J., (1993), "Estimation and Inference in Econometrics", 2nd ed. New York: Oxford University Press.

Ghimire, P. R., Agho, K. E., Ezeh, O. K., and RENZAHO, A. M. (2019). Under-Five Mortality and Associated Factors: Evidence from the Nepal Demographic and Health Survey (2001–2016). International Journal Environment Research Public Health, (16).

Girginer, N. (2013). A Comparison of the Healthcare Indicators of Turkey and The European Union Members Countries Using Multidimensional Scaling Analysis and Cluster Analysis. İktisat İşletme ve Finans, 28(323), pp.55-72.

Gujarati, D. N., (2009), "Temel Ekonometri", (Çev. Şenesen, U. ve Şenesen, G.G.), İstanbul: Literatür Yayıncılık.

Kearney, C., Monadjemi, M., (1990), "Fiscal Policy And Current Ac¬count: International Evidence On The Twin Deficit", Journal of Macroecono¬mics, 12(2), pp.197-217.

Kocaman, A. M., vd., (2012). OECD Ülkelerinin Sağlık Sistemlerinin Etkinlik Analizi. Endüstri Mühendisleri Dergisi, 23(4), ss.14-31.

Köksal, S. S., vd., (2016). Temel Sağlık Düzeyi Göstergeleri Açısından Türkiye ve Avrupa Birliği Ülkeleri. TJFMPC, ss.205-212.

Lorcu, F., ve Polat, B. A. (2009). Yaşlara Göre Ölüm Oranları ile Sosyo-ekonomik Göstergeler Arasındaki İlişkinin İncelenmesi. İstanbul Üniversitesi İşletme Fakültesi Dergisi (38,2), ss.124-133.

Malderen, C. V., et al., (2019). Socioeconomic Factors Contributing to Under-five Mortality in Sub-Saharan Africa: A Decomposition Analysis. BMC Public Health.

Phillips, P. and Perron P., (1988). Testing for a unit root in time series regression, Biometrica, 75, pp. 335-346.

Rostow, W. W. (1960). "The Five Stages of Growth-A Summary". The Stages of Economic Growth: A Non-Communist Manifesto. Cambridge: Cambridge University Press. pp. 4–16

Seers, D. (1963). The Limitations of the Special Case, Bulletin of the Oxford Institute of Economics and Statistics, 25(2).

Sen, A. (1999). Development as Freedom, New York, pp.15-25.

Sims, C. A. (1980), "Macroeconomics and Reality", Econometrica.

UNDP, Human Development Report, (1990). http://hdr.undp.org/sites/default/files/reports/219/hdr_1990_en_complete_nostats.pdf (02.10.2021)

UNICEF, (2019). https://www.unicef.org/turkey/bas%C4%B1n-b%C3%BCltenleri/bm-raporu-g%C3%BCn%C3%BCm%C3%BCzde-%C3%B6ncesine-g%C3%B6re-daha-fazla-kad%C4%B1n-ve-%C3%A7ocuk-hayatta-kal%C4%B1yor (11.04.2021)

UNICEF, (2020). Levels & Trends in Estimates developed by the UN Inter-agency Group for Child Mortality Estimation United Nations Child Mortality, https://data.unicef.org/resources/levels-and-trends-in-child-mortality/ (20.02.2021)

United Nation, (2000). Bin Yıl Kalkınma Hedefleri. https://www.tr.undp.org/content/turkey/tr/home/mdgoverview/overview/mdg4.html (10.11.2020)

World Health Organization, (1958), The First ten years of the World Health Organization, https://web.archive.org/web/20200402025147/https://apps.who.int/iris/handle/10665/37089 (11.04.2021)

World Health Organization. The Determinants of Health, https://web.archive.org/web/20191214054600/https://www.who.int/hia/evidence/doh/en/ (11.04.2021)