



Analyzing The Role of Migration Phenomenon on The Human Development Index of The City, Case Study: Bojnord City

Atefeh Sedaghati^{1*}, Hamid Talebkhah², Sogand Omrani³

¹Department of Urban Planning, Faculty of Arts,
University of Bojnord, North Khorasan, Bojnord, IRAN

²Shahid Beheshti University, Tehran, IRAN

³Tehran University, Tehran, IRAN

*Corresponding Author

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Abstract: One of the UN's Human Development Reports on Migration shows that the negative impact of migrants on host communities is inconsistent with reality. The main message of the Human Development Report is that the benefits of human development can be reaped by reducing barriers to mobility and improving the treatment of migrants. The present study is done, using a descriptive-analytical method of applied studies. This study tries to calculate and analyze the Human Development Index (HDI) during the official general census of the country in 2006, 2011 and 2016 and do a comparative study among "population of the province", "urban areas of the county" and "immigrants" in the county of Bojnord, using two possible methods of calculation and analysis of this index (Natural and geometric method in addition to changes in the type of data in accordance with the old and new method proposed by the United Nations and contained in valid scientific texts in calculating the human development index). According to the findings, migration has not reduced the human development index, and has also grown at all three levels. On the other hand, the results show that migration is not necessarily associated with negative consequences and, conversely, has been able to accelerate development in the host society, and this is because the nature of modern migration is more related to improving one's position in society and human mobility than simply respond to the basic instincts of survival. The index calculated for immigrants in 2016 (0.752) was more than the other two periods (0.744 and 0.7); While the number of immigrants entering the urban areas of the county was less than the previous two periods. In general, the development index of 2011 and 2016 is more than 2006, due to the opportunities created by the centralization of Bojnord in 2005.

Keywords: Migration, human development index, Bojnord country

1. Introduction

Population mobility is a rule in human history, rather than an exception. Migration as one of the main factors of population change due to its nature can have rapid and short-term effects on the number and structure of the population in addition to long-term and long-term changes, and also create balances and imbalances in the population under its influence (Mahmoudian and Shahrirani, 2018: 2). The nature of human migration has changed over time. While humans have historically migrated in response to basic survival instincts, modern migration has stronger links to improving one's position in society (voluntary migration) (Faggian et al., 2017: 3). It is considered as a basic strategy to improve individual well-being (Melde, 2012: 5). In the past, migration was seen as a development failure, and

policymakers sought to suggest ways to reduce migration (Bhagat, 2017: 1) because high volumes of migration without adequate planning and support lead to urban problems. Such as the expansion of informal settlements, slums, traffic congestion, urban poverty, urban sprawl, etc. (Rashid & Ghani, 2011: 1). But today this view has changed because migration has positive and negative effects on origin and destination (Bhagat, 2017: 1). This is why the issue of migration and development has become very prominent in the last decade (Melde, 2012: 5) and human migration is one of the issues that has become increasingly important in scientific and political circles (Grecequet et al., 2017: 1). The United Nations Human Development Report on Migration in 2015 also shows that the negative burden that host communities feel because of migrants is inconsistent with reality (UNDP, 2015). For this reason, today and in highly-globalized world, it is important to understand the causes and consequences of the migration phenomenon, as well as to predict the flow of migration in order to develop national public policies and urban resource planning (Dominguez et al., 2019). Because migration has different effects on the growth and development of regions or countries. In some areas, migration is considered as an accelerator in achieving sustainable and extensive economic growth and development (Akanbi, 2017: 2) or causes the exchange of knowledge, skills, technology and capital between different countries or regions, which leads to innovation (Le Caous & Huarng, 2021: 5). But in some other areas, migration may be seen as a setback to progress (Akanbi, 2017: 2). In general, the movement of people in regions and countries depends on several factors that can be of internal and external origin, among which can be differences in wages, as well as government policies that affect the welfare of society, especially the active population. (Akanbi, 2017: 2) On the other hand, migration is also related to urban planning development policies and is one of the important spatial phenomena in urban areas that can lead to high urban growth and urbanization. (Rashid & Ghani, 2011: 1). In this regard, should the phenomenon of migration always be considered negative and combated? And can immigrants be seen as a potential driver of urban development? As a result, the main research question would be: What is the relationship between migrants and the human development index? In other words, what is the role and position of immigrants on the human development index and how can immigrants be used to improve this index? In order to answer these questions, the objectives of the research are firstly to reveal the desired effects of migration on urban development and secondly to use the development potential of migrants' human resources in urban development programs.

1.1 Literature Review

1.1.1 Migration

In the UN Demographic Dictionary, it is defined that "migration is a form of geographical displacement or spatial mobility of population that occurs between two geographical units" (Heydarian, 2016: 6). Migration, along with mortality and fertility, is one of the three main components shaping population growth and dynamism. Migration may occur repeatedly throughout a person's life, despite of birth and death, which occur once in a person's life at a specific time and place, (Sadeghi and Shokriani, 139: 246). The mutual relationship between development and migration is one of the topics that has been the focus of follow-up discussions in numerous studies since the second half of the twentieth century. Analysis of the existing theoretical foundations shows that in an important part of these foundations, the main focus has been on assessing the consequences and effects of migration on the development of origin and destination areas. The dominant view in recent decades has been a pessimistic view of the relationship between development and migration, with migration largely seen as the cause of underdevelopment in the regions of origin. A newer perspective was that migration should be assumed as an exploitable opportunity for development, instead of being considered a problem for the underdevelopment of the source logic (Askari Nodooshan et al., 2017: 131 and 132). The World Organization for Migration reports annually on migration, development and related issues. The Global Migration 2015 report states that migrants are rich partners and solutions for urban management. Immigrants play an important and fundamental role in the economic, social and cultural development of their host communities as well as in their communities of origin. But most of these contributions go unnoticed or, at best, are measured in terms of the revenue they send to their communities of origin. Immigrants play an important role in rebuilding and promoting their communities of origin and destination, and they do so through the exchange of resources and financial support (IMO, 2015: 187). The same organization's 2020 report also provides comparative statistics for migrants between 2000 and 2020 worldwide. Estimates of international migrants range from 150 million to 272 million, with the UAE being the country with the highest share of international migrants (IMO, 2020: 10). Migration usually takes place from areas with fewer job opportunities to areas that have more job opportunities (Zanjani, 2001: 133). In this regard, the theory of the expected income of immigrants at the destination was formed, in connection with the inefficiency and failure of the theories of Arthur Lewis, John Fei and Gustav Ranis, which considered internal migration a natural process (from village to city). In the new theory, Todaro and his colleagues related migration (from rural to urban areas) to the expected income of the migrant at the destination more than anything else. According to them, given that most immigrants are between 15 and 24 years old, even if their expected urban income in the early years is lower than the income of the villagers, but they are confident that they will be better off in the future, they would migrate. Today, this theory is more scientifically accepted than any other model in the analysis of rural-urban migration in developing countries. Todaro's model is that the decision to migrate from rural to urban is the function of two main variables of

repulsion and absorption: 1) the huge difference between urban and rural income; 2) The possibility of achieving some kind of employment in the city. Todaro finds it correct to choose unemployment in the city over the possibility of choosing unemployment in the city or the countryside, because the future of the city has a brighter perspective than the countryside. Mackenzie and Rapoport, in examining the economic causes and incentives for immigration, argue that the relationship between wealth and immigration is plotted on a u-chart, meaning that the higher a person's financial capacity is, the easier it is for them to take risks and suffer immigration. It is getting hotter and migration is on the rise. While the financial capacity of the individual and the family increases and the desire to emigrate decreases as they become richer (Mckenzie & Rapoport, 2007: 4). Accordingly, middle-income people have the greatest desire and motivation to immigrate. Therefore, if the immigrant in the destination point has a higher income than the origin of his migration, he will have more motivation to migrate, and since the income component is one of the components of calculating the human development index, it actually increases the level of human development point of destination.

1.1.2 Human Development

At the core of the concept of human development is living in a world where the economic wealth and richness of human life can be expanded. Greater welfare for all can be achieved by improving the abilities of individuals and, most importantly, by using the knowledge and skills of individuals. The concept of human development focuses on the economy and the balance of welfare among citizens, as well as the process that allows individuals to meet their basic human needs (Le Caous & Huarng, 2021: 1). Human development is a new concept that the United Nations has replaced as an index of development per capita income and gross domestic product since 1990, stating that income is not all human life and progress cannot be measured by per capita income alone. Human development means expanding the process of selecting individuals. The concept of human development emphasizes the goals of progress and development instead of focusing on tools. The real goal of development should be to create an environment for people to enjoy a long, healthy and creative life. The most important dimensions of human development are long and healthy life, knowledge and dignified living standards (Bayat and Maadi, 2016: 3). The Human Development index (HDI) is a statistical tool used to measure the overall achievements of countries in the social and economic dimensions (Stanton, 2007: 3). Life, education and per capita income are the three key dimensions of HDI (Smit, 2016: 2). The Human Development Index provides a general criterion of the human development situation that before 2010 was calculated through three indexes of life expectancy (in terms of hygiene, health and life expectancy), the literacy rate of adults and the enrollment rate in the school education (in terms of education) and GDP per capita index (in terms of standard of living). But some changes were made in the calculation of this index since 2010, so that there were slight changes in the indicators; In the field of education, there are two indicators of the average length of education for people over 25 and the length of the period expected for Education of children at school age and in the standard of living, per capita gross national income was used instead of per capita GDP (Iran Deputy of Management Development and Human Capital, 2019: 7). This method has been used in the UN report on human development in the following years, but in the latest report of United Nations Development Programme (UNDP) 2020, the emphasis is on the dimensions of human development and Anthropocene. In fact, the pressures we are putting on the Earth have become so great that scientists are examining whether the Earth has entered a completely new geological period: the Anthropocene or the human age. This means that we are the first people to live in an age defined by human choice, in which the main danger to our survival is "ourselves" (UNDP, 2020). The proposal of studying the integration of environmental dimensions, in the calculation of the human development index has been proposed in 2020(Ibid: 261).

The Human Development Index is designed to measure the well-being of individuals in specific communities. This index is graded from zero to a maximum of one. Countries with a grade of 0.5 or less have a low human development index. While a degree higher than 0.5 indicates a high level of human development. this ranking is as follows, according to the level of development from the perspective of the Human Development Index, in the report of the United Nations Human Development Index in 2005, 2011 and 2020 (Table 1):

Table 1 - Levels of development by size of human development index
(UNDP, 2020: 36; UNDP, 2011: 143-146; UNDP, 2005: 215)

Human Development	Human Development Index		
	2005	2011	2020
Very high	Higher than 0.9	Higher than 0.793	Higher than 0.800
High	0.8 < HDI < 0.9	0.698 < HDI < 0.793	0.700 < HDI < 0.799
Average	0.5 < HDI < 0.8	0.522 < HDI < 0.698	0.550 < HDI < 0.699
Low	Less than 0.5	Less than 0.522	Less than 0.550

1.2 Background

Many studies by previous researchers have emphasized the negative and destructive effects of migration on development, or in particular, human development. Abbasinejad and Rafiei Imam (2006) examined the evaluation of human development index in rural areas of Iran, and concluded that the negative dimensions of rural migration are quite evident, which are effective on the low human development index in these areas. Rasouli et al. (2020) evaluated the causes of informal settlements with the focus on the phenomenon of migration in the lower tissues in Sanandaj city and concluded that the sub-criteria and migration index, with the aim of identifying the lower settlements and the context of informal settlements is highly correlated with the widespread nature of urban poverty, and the main reasons for this phenomenon can be economic and social causes of the origin of migration and the appropriate context of the destination. Satarifar et al. (2014) investigated the effect of migration and urbanization on informal employment in Iran and claimed that migration and urbanization to metropolitan areas and more developed areas, promote informal employment. Shirkhani and Bayazidi (2018) identified migration with destructive effects on Iran's development and less destructive effects on Turkey (due to better migration indicators). However, there are studies that have examined and to some extent confirmed the positive relationship between migration and the severity of sending migrants. Sadeghi and Shokriani (2016) observed the relationship between development and migration up-up (increase in development with increasing migration), down-down, up-down and down-up, and in some cases unrelated, while analyzing the spatial fluctuations of development impact on intra-city migration in the country. Askari Nodooshan et al. (2017) examined the relationship between development indicators and absorbing migrants by cities and showed that the difference in the level of development of counties have the most explanatory power in the case of migrants absorbed from other provinces, rather than being related with the migration flows within the county or intra-provincial. Also, among the components of development, the benefit of cities from employment and education is one of the important factors in explaining their power to absorb migrants. Although some researchers have paid close attention to the positive dimensions and benefits of migration, they also emphasize the negative dimensions of migration in their writing. For example, Rahmani and Hassanzadeh (2011) studied the effect of migration on economic growth and regional convergence in Iran, and acknowledged that internal migration can be one of the factors that affect the economic growth of provinces and is effective the convergence among them. But they pointed out that migration has a greater overall negative effect on inter-provincial convergence. Rahmani and Mazaheri Marbari (2014) studied the impact of migration on human capital accumulation and economic growth in developing countries, and claimed that migration itself in each period of study has a negative effect on capital accumulation. Also, statistically, the sum of the effects of the prospect of migration (positive motivational effect) and migration itself (negative effect) on the accumulation of human capital in the country of origin neutralize each other. In addition, the economic impact of migrants will in any case be negative for the country of origin.

1.3 Materials and Methods

1.3.1 Methodology

In the present study, a descriptive-analytical method has been used. In the section of recognizing and collecting information, the descriptive method has been used and in the section of analysis, the evaluation in relation to the changes in the human resources development index of Bojnord city and the share of migrants in the changes of this index. Three 5-year periods in accordance with the general census of population and official housing in the years 2006, 2011 and 2016, are the basis of the study and the three levels of North Khorasan province, urban areas of Bojnord city and migrants entering urban areas of the city are analyzed comparatively, to show the effect of migrants on the human development index. For this purpose, the method of calculating the Human Development Index (HDI) and comparison and statistical analysis (using SPSS and EXCEL software) have been used in three time periods based on available data. The calculation of human development index in this research is based on two old and new methods declared in scientific texts, which are described below. It is worth noting that the reason for using both methods is because some of the basic data required for this method are very different from the methods mentioned by the United Nations, while in some censuses done in the country these data has not been the basis of calculation. Therefore, the application of the new method (which seems to be more valid and accurate) is not possible in some statistical periods.

1.3.2 Case Study

Bojnord, the capital of North Khorasan province along the Asian highway with a longitude of 19 and 57 degrees and latitude 28 and 37 degrees is limited to the city of Raz and Jargalan from the north, to the city of Shirvan from the east, to the city of Mane-o-Samalghan from the west and to the city of Jajarm from the south (Figure 1). Bojnord county is 55 km away straight from the border line between Iran and Turkmenistan (Naghsh Jahan Pars Consulting Engineers, 2010). The population of the city is 199791 according to the census of 2011 (about 35% of the total urban population of the province) and 229131 according to the census of 2016 (about 38% of the total urban population of the province). This is while considering the population of the city in 2006, the population growth can be calculated at 2.48%. Besides, the population of the city has increased from 47719 people in 1976 to 229131 people in 2016 (has

increased almost 4.8 times); part of which is due to natural population growth and migration and part of which is due to the integration of marginal settlements in the city. Bojnord city has played an important role in attracting the population of mainly rural-urban migrants, as one of the important cities in northern Khorasan in terms of geographical location (close to the northern international borders) and in urban hierarchy (as the first city). The number of migrants entering the city of Bojnord during four decades is over 100,000 people. If the main migrations to Bojnord in the second 5 years of the decade 1996-2006 are due to the political approach of the government in the division of Khorasan and the formation of North Khorasan and the centralization of Bojnord, two factors can be considered for that: First, these migrations have accelerated as a result of the government's political approach (divisions of the country). Second, the urban labor market in the public and private sectors is somewhat affected by the phenomenon of migration by creating employment capacity and shows the uprising share of migration after the division of Khorasan. Therefore, job opportunities in the city have increased and job creation has also become significant.

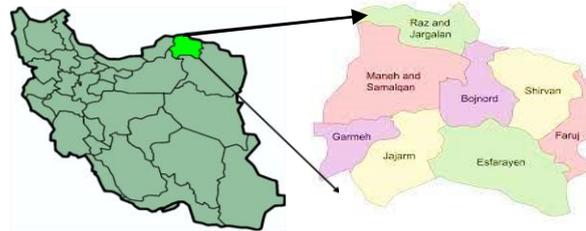


Fig. 1 - Location of the city of Bojnord and the county of Bojnord in North Khorasan province and country

2. Running Method: Calculation of Human Development Index

2.1 Calculation of Human Development Index (Old Method of UN Human Development Report)

In this method, the human development index is calculated after the implementation of paragraphs A, B and C steps (UNDP, 2007: 356)

A) Life Expectancy Index

In this index, which is shown in Equation 1, L_{max} is the highest life expectancy among the studied cities (countries), which is equivalent to 85 years. L_{min} is the lowest life expectancy among the studied cities, which is equivalent to 25 years, and L_c is the life expectancy in the considered city.

Equation 1: Life expectancy index

$$I1 = \frac{L_c - L_{min}}{L_{max} - L_{min}} = \frac{L_c - 25}{85 - 25} \quad (1)$$

B) Knowledge Index (Literacy)

This index is a combination of two variables: adult literacy rate and tertiary gross enrolment. In this index, which equation 2 shows how to calculate, L_{max} represents the highest adult literacy rate (population 15 years and older) which is considered to be 100%, L_{min} represents the lowest adult literacy rate which is equivalent to 0% and L_c represents the literacy rate in the city (region). Similarly, E_{max} represents the highest tertiary gross enrolment of 100 percent, E_{min} represents the lowest tertiary gross enrolment of zero percent, and E_c represents the tertiary gross enrolment of zero percent. In the desired city (region). $W1$ is also the weight intended for literacy and is usually $\frac{2}{3}$ or 0.66. $W2$ is the weight given to the tertiary gross enrolment and is usually considered to be 0.33.

Equation 2: Knowledge Index

$$I2 = w1\left(\frac{L_c - L_{min}}{L_{max} - L_{min}}\right) + w2\left(\frac{E_c - E_{min}}{E_{max} - E_{min}}\right) \quad (2)$$

C) Income Index

In order to calculate the income index, per capita gross domestic product (GDP) (in terms of parity of domestic purchasing power of the US dollar) is used (Sadeghi et al., 2010: 6). Equation 3 shows the income index relationship.

In this regard, the maximum per capita GDP is equal to \$ 40,000 and the minimum is equal to \$ 100. GDPc also shows the per capita GDP of the study area.

Equation 3: Income Index

$$I3 = \frac{\log(\text{GDPc}) - \log(100)}{\log(40000) - \log(100)} \quad (3)$$

Finally, the amount of the Human Development Index is calculated by adding the three indicators that are said to be components of HDI and dividing them by three. Equation 4 shows the relationship between the human development index.

Equation 4: Human Development Index Equation

$$I = \frac{I1+I2+I3}{3} \quad (4)$$

2.2 Calculation of Human Development Index (New Method of UN Human Development Report)

The Human Development Index was calculated using a new method, in the 2010 UN Human Development Report. With the exception of health, which is still measured by the life expectancy index at birth, the education and income index have changed (per capita GDP). Thus, for the subject of education, the two indicators have been used; the average length of the course spent on education (in 25-year-old adults and older) and the length of the period expected to study, and per capita income Gross national has been used for the subject of standard of living, instead of per capita GDP (Amiri, 2011:2). In the 2010 UN Human Development Report, the above indicators are calculated as follows (UNDP, 2010: 216-217; UNDP, 2011: 168).

A) Life Expectancy Index at Birth

In this index, which is shown in Equation 5, Lmax is the highest life expectancy at birth among the examined cities (countries), which is equivalent to 83 years (in the 2010 report this number is related to Japan). Lmin is the lowest life expectancy at birth among the examined cities, which is equivalent to 20 years, and Lc is the life expectancy at birth in the study city or region.

Equation 5: Life expectancy index at birth equation

$$\text{life expectancy} = \frac{Lc - Lmin}{Lmax - Lmin} = \frac{Lc - 20}{83 - 20} \quad (5)$$

B) Literacy Index

This index is obtained by combining the two variables of the average length of the course spent in education (in 25-year-old adults and older) and the length of the course expected to study. Equation 6 shows the relationship between the average number of years of study. In this equation, MYSc represents the average number of years of study in examined city or region, MYScmin represents the minimum average number of years of study, which is considered equal to zero, and MYScmax It represents the maximum average number of years of study among the countries of the world up to the study year; This number was related to the United States and was equal to 13.2 in 2010.

Equation 6: The average Equation of education years

$$MS = \frac{MYSc - MYScmin}{MYScmax - MYScmin} \quad (6)$$

Equation 7 shows the relationship between the length of the expected period of study. In this regard, EYSc represents the length of the expected period of study in examined city or region, EYScmin represents the minimum length of the period of study to be considered equal to zero, and EYScmax represents the maximum length of the period of study to study among countries up to the study year, this number was equivalent to 20.6 in Australia in 2010.

Equation 7: The length of the period expected to study equation

$$ES = \frac{MYS_c - MYS_{min}}{MYS_{max} - MYS_{min}} \quad (7)$$

Finally, Equation 8 shows the equation of the literacy index. In this regard, $MSc * ESc$ is equal to the product of the two variables of the average years of study and the length of the course expected to study in the city or study area, $MSmin * ESmin$ is equal to the product of the two variables of the average years of study and the minimum length of the course I_s expected to study, which is considered equal to zero, and $MSmax * ESmax$ is the product of two variables, the maximum average of the study years and the maximum length of the period of study expected in the world up to the study year. It was 0.951 in New Zealand in 2010.

Equation 8: Literacy Rate Index

$$I_{education} = \frac{\sqrt{MSc * ESc} - \sqrt{MSmin * ESmin}}{\sqrt{MSmax * ESmax} - \sqrt{MSmin * ESmin}} \quad (8)$$

C) Income Index

The income index is also calculated using equation 9 according to the 2010 UN Human Development Report, in which GNI_c represents the per capita gross national income (in US dollars) in the study area, GNI_{min} represents the minimum per capita gross national income among the countries of the world, which is equal to \$ 100, GNI_{max} represents the maximum per capita gross national income among the countries of the world up to the study year.

Equation 9: Income Index

$$(I_{income}) = \frac{\ln(GNI_c) - \ln(GNI_{min})}{\ln(GNI_{max}) - \ln(GNI_{min})} \quad (9)$$

Finally, the value of the Human Development Index (HDI) is obtained by calculating the geometric mean of the above three indices (life expectancy, literacy and income) according to Equation 10:

Equation 10: Human Development Index

$$HDI = \sqrt[3]{life\ expectancy \cdot I_{education} \cdot I_{income}} \quad (10)$$

3. Calculation of HDI Index in The Study Case: Bojnord City

Data from three periods have been considered to calculate the human development index in Bojnord (10 years ending in 2006, 5 years ending in 2011 and 5 years ending in 2016). Unfortunately, the last available information period is related to the 2011 census and the comprehensive plan of the city, which was prepared in 2010. Calculations have been performed in order to compare the human development index in three levels of urban areas of North Khorasan province, urban areas of Bojnord county and migrants coming to urban areas of Bojnord county. It should be noted that this information was the only statistical data available for the present study. However, cities of Bojnord County can be a suitable criterion for identifying the status of human development index at this level, considering the role of Bojnord city as the center of Bojnord County. Also, the destination of most migrants to urban areas of Bojnord County is Bojnord city, due to its urban services and job opportunities.

3.1 Calculation of Human Development Index in The Study Case, Using the Old Method

A) Calculation of Life Expectancy Index (I1)

The results of general population and housing censuses in the mentioned periods were used for this calculation; its basis is the migrants who entered the urban areas of Bojnord County in the last 5 years and were separated by their origin provinces. Firstly, the life expectancy of the migrants was considered the same as of the origin province before migration. Then, the life expectancy of the migrants was calculated based on the average life expectancy of their origin provinces. Using Equation 1, the life expectancy index in three cases (1995-90-95) was calculated according to Table 2. The results of the calculations are given in Table 2.

Table 2 - Life Expectancy Index in The Three Studied Periods

(Authors' calculations based on North Khorasan province planning program, 2016: 49; population and housing census information in 2006, 2011 and 2016, Statistics Center of Iran)

Time period	Area	Population	Life expectancy	life expectancy index
1996- 2006	Urban areas of North Khorasan province	392458	68.9	0.731
	Urban areas of Bojnord county	182751	68.9	0.731
	Entered migrants to the urban areas of Bojnord county	35202	70.87	0.764
2006- 2011	Urban areas of North Khorasan province	446872	70.85	0.764
	Urban areas of Bojnord county	207196	70.85	0.764
	Entered migrants to the urban areas of Bojnord county	24789	71.48	0.774
2011- 2016	Urban areas of North Khorasan province	484346	71.2	0.770
	Urban areas of Bojnord county	233810	71.2	0.770
	Entered migrants to the urban areas of Bojnord county	18350	72.5	0.791

B) Calculation of Literacy Index (I2)

The available information on the number of migrants entering the urban areas of each city, separately by their origin provinces before migration, is available in the Statistics Center. Therefore, in order to calculate the literacy index, first the literacy rate of urban areas of every province was extracted from Statistics Center, based on which the literacy rate of migrants imported from the province to the urban areas of Bojnord county was calculated and finally, the literacy rate of migrants entering the urban areas of Bojnord city was calculated, using the average literacy rate of migrants. The information available in the population and housing censuses was used to calculate the tertiary gross enrolment index. the average index of the whole country was used to calculate this index in 2006, due to the lack of information about entered migrants to the urban areas of Bojnord county by their origin provinces. Finally, the literacy index was calculated as described in Table 3, based on Equation 2.

Table 3: Literacy index in the three studied periods (Authors' calculations based on population and housing census data in 2006, 2011 and 2016, Statistics Center of Iran)

Time period	Area	Population (over 15-year-old)	Literate population (over 15-year-old)	Adult literacy rate (percent)	tertiary gross enrolment rate (percent)	Literacy index
1996-2006	Urban areas of North Khorasan province	328892	285651	84,86	94.73	0.873
	Urban areas of Bojnord county	154058	134573	85.52	94.5	0.876
	Entered migrants to the urban areas of Bojnord county	27583	21673	78.57	93.35	0.827
2006-2011	Urban areas of North Khorasan province	332232	286682	86.29	98.31	0.894
	Urban areas of Bojnord county	156409	136032	86.97	98.4	0.899
	Entered migrants to the urban areas of Bojnord county	20043	17522	87.42	97.62	0.899
2011-2016	Urban areas of North Khorasan	358165	314862	87.90	99.33	0.908

province					
Urban areas of Bojnord county	174118	155137	89.10	99.64	0.917
Entered migrants to the urban areas of Bojnord county	14739	13134	89.11	98.85	0.914

C) Calculation of Income Index (I3)

The per capita income of urban households has been used to calculate the income index, due to the lack of GDP data for migrants. In the 2002 Human Development Report, income was also used to calculate the income index (UNDP, 2002: 255). The weighted average income of urban households in all provinces was used to calculate the per capita income of migrants, according to the number of entered migrants to the urban areas of Bojnord County from different provinces and the average income of urban households in the same province. The relative share of urban areas population of the county from the total urban population of the province was used to calculate the income of urban areas of the city, due to the lack of income information at this level. At first, the share of urban households in Bojnord County was calculated from the total urban households of North Khorasan province. Then, the relative share of urban households in the county was calculated based on the total income of the province (for all households in urban areas of the province). Finally, the per capita income of each person at this level was calculated, dividing the result numbers to the size of the household in urban areas of Bojnord County. Due to the lack of detailed household income information by urban areas of provinces and Bojnord county in 2006, calculating the income index was done in three levels of urban areas of North Khorasan province, urban areas of Bojnord county and entered migrants to the urban areas of Bojnord county, by dividing the average income of an urban household in the country to: 1. the household size in Urban areas of North Khorasan province; 2. the household size in Urban areas of Bojnord county; and, 3. the household size in Urban areas of Iran in 2006. Finally, the income index was calculated as described in Table 4, based on equation 3. It should be noted that in equation 3, the maximum per capita income according to the Human Development Report in 2002 is equal to 40,000 US dollars and the minimum is equal to 100 US dollars. In order to convert the rial income rate into dollars, the value of the US dollar based on the data available on the Central Bank website was used in the study years. Accordingly, the dollar exchange rate in 2006 was equal to 9200 Rials, in 2011 was equal to 12000 Rials and in 2016 was equal to 32000 Rials (https://www.cbi.ir/exrates/rates_fa.aspx).

Table 4 - Income Index in The Three Studied Periods

(Authors' calculations based on the population and housing census data 2006, 2011 and 2016 and the results of the urban household expenditure and income survey of the Statistics Center of Iran)

Time period	Area	Population	Income per capita (Rial)	Income per capita (Dollar)	Income index
1996- 2006	Urban areas of North Khorasan province	392458	19088494	2075	0.506
	Urban areas of Bojnord county	182751	18966654	2062	0.505
	Entered migrants to the urban areas of Bojnord county	35202	19498564	2119	0.510
2006- 2011	Urban areas of North Khorasan province	446872	32222310	2685	0.550
	Urban areas of Bojnord county	207196	32582995	2715	0.550
	Entered migrants to the urban areas of Bojnord county	24789	34374574	2865	0.560
2011- 2016	Urban areas of North Khorasan province	484346	82733570	2585	0.543
	Urban areas of Bojnord county	233810	82274531	2571	0.542
	Entered migrants to the urban areas of Bojnord county	18350	87326400	2729	0.552

After calculating all three indicators and based on Equation 4, the Human Development Index in the three time periods was calculated as described in Table 5.

Table 5 - The Human Development Index in The Three Time Periods (Authors' calculations)

Time period	Area	Life expectancy index	Literacy index	Income index	Human development index
1996- 2006	Urban areas of North Khorasan province	0.731	0.873	0.506	0.703
	Urban areas of Bojnord county	0.731	0.876	0.505	0.704
	Entered migrants to the urban areas of Bojnord county	0.764	0.827	0.510	0.700
2006- 2011	Urban areas of North Khorasan province	0.764	0.894	0.550	0.736
	Urban areas of Bojnord county	0.764	0.899	0.550	0.738
	Entered migrants to the urban areas of Bojnord county	0.774	0.899	0.560	0.744
2011- 2016	Urban areas of North Khorasan province	0.770	0.908	0.543	0.740
	Urban areas of Bojnord county	0.770	0.917	0.542	0.743
	Entered migrants to the urban areas of Bojnord county	0.791	0.914	0.552	0.752

3.2 Calculation of Human Development Index in The Study Case Using New Method

Calculating the human development index in the new method for 2006 was not possible due to the fact that the year 2006 is in the periods when the new method of the United Nations was not introduced and also due to the lack of information about the index of expected years of study, , So the year 2006 did not include the new method of human development.

A) Calculation of Life Expectancy Index at Birth ($I_{life\ expectancy}$)

Life expectancy index was calculated at three levels, using Equation 5. In this calculation, the maximum life expectancy at birth in the study years and according to the United Nations Global Development Report, is equal to 84.1 years in 2016 and 83.4 years in 2011, and the minimum of life expectancy at birth is also considered equal to 20 years, according to Equation 6 (UNDP, 2011: 127; UNDP, 2016: 198). Finally, the life expectancy index at birth was calculated based on Equation 5 and as described in Table 6.

Table 6 - The Life Expectancy Index at Birth Was Calculated Based on Equation 5
(Authors' calculations based on the information from the Statistics Center of Iran)

Time period	Area	population	Life expectancy	Life expectancy index
2006- 2011	Urban areas of North Khorasan province	446872	70.85	0.802
	Urban areas of Bojnord county	207196	70.85	0.802
	Entered migrants to the urban areas of Bojnord county	24789	71.48	0.812
2011- 2016	Urban areas of North Khorasan province	484346	71.2	0.799
	Urban areas of Bojnord county	233810	71.2	0.799
	Entered migrants to the urban areas of Bojnord county	18350	72.5	0.819

B) Calculation of Literacy Index ($I_{education}$)

As mentioned, this index is obtained by combining the two variables of the average length of the course spent on education or the average of the years of study (in 25-year-old and older) and the length of the course expected to study. In order to calculate the average years of study (in 25-year-old and older) at first, information about the number of literate people in each degree was extracted from the website of the Statistics Center of Iran, then the number of population in each degree, was multiplied to the number of the years of study at the same level (for this purpose, the number of years of study at the elementary level was 5 years, at the middle school level was 8 years, at the secondary level was 12 years, and at the higher level was 18 years). The resulting numbers were then added together and the resulting number was divided into the total literate population of 25-year- old and older adults to calculate the average years of adult education. In order to calculate the average years of education of entered migrants to the urban areas of Bojnord County, first the literacy rate of 25-year-old and older people and the average years of adult education in urban

areas of all provinces of the country was calculated. Then, the number of 25-year-old and older entered migrants to the urban areas of Bojnord County from each province was multiplied to the literacy rate of the same province and the obtained number was multiplied to the average number of years of education in the same province. The resulting number for all provinces was added up together, and the obtained number was divided into the number of 25-year-old and older entered migrants to the urban areas of Bojnord County to calculate the migrants' average years of education. The average years of education of adults was finally calculated based on Equation 6. In this regard, according to the United Nations Human Development Report, the highest average years of adult education in 2016 was equal to 14.1 years, and in 2011 was equal to 12.6 years.

The required information for calculating the expected years of study index, was not available separately by city and province. Therefore, the size of this index for Iran in the UN Human Development Reports was used to calculate it (2016 and 2011). The number of expected years to study index was calculated based on Equation 7. In this regard, the most expected years of study in 2016 was 22.9 years, and in 2011 was 18 years, according to the United Nations Human Development Report. So, the literacy index was calculated for the three levels of urban areas of North Khorasan province, urban areas of Bojnord County and entered migrants to the urban areas of Bojnord County based on Equation 8, as described in Table 7.

Table 7 - Literacy Index in The New Method of Calculating Human Development Index in The Three Studied Period)

(Authors' calculations based on population and housing census data of 2011 and 2016 of the Statistics Center of Iran and UN Human Development Reports in 2011 and 2016)

Time period	Area	Average years of study	Average years of study index (MS)	expected years of study	expected years of study index (ES)	$\sqrt{MS * ES}$	Literacy rate
2006-2011	Urban areas of North Khorasan province	11.11	0.881	12.7	0.705	0.788	0.806
	Urban areas of Bojnord county	11.6	0.920		0.705	0.805	0.823
	Entered migrants to the urban areas of Bojnord county	11	0.873		0.705	0.785	0.803
2011-2016	Urban areas of North Khorasan province	11.75	0.830	15	0.655	0.737	0.840
	Urban areas of Bojnord county	12.23	0.867		0.655	0.754	0.850
	Entered migrants to the urban areas of Bojnord county	11.68	0.828		0.655	0.736	0.839

C) Income Index (I_{Income})

The per capita income of urban households has been used to calculate the income index. In order to calculate the per capita income of migrants the weighted average income of urban households in all provinces was used, according to the number of entered migrants to the urban areas of Bojnord County from different provinces and the average income of urban households in the same province. The relative share of the urban areas' population of the county from the total urban population of the province was used to calculate the income of urban areas of the county, due to the lack of income information at this level. Then, based on the total income of the province (for all households in urban areas of the province), the relative share of urban household income of the county was calculated. The per capita income of each person was also calculated by dividing the obtained number into the household size in urban areas of Bojnord County. Finally, the income index was calculated based on Equation 9, as described in Table 8. According to the United Nations Human Development Reports, the highest per capita income in equation 9 in 2016 was equal to 116818 dollars, and in 2011 was equal to 107721 dollars. In order to convert the rial income rate into dollars, the value of the US dollar was used based on the data available on the Central Bank website in the study years. Accordingly, the dollar exchange rate in 2011 was equal to 12,000 Rials and in 2016 was equal to 32,000 Rials (https://www.cbi.ir/exrates/rates_fa.aspx).

Table 8 - Income Index in The Three Studied Periods

(Authors' calculations based on the population and housing census data of 2011 and 2016 and the results of the cost-income survey of urban households of the Statistics Center of Iran)

Time period	Area	population	Income per capita (Rial)	Income per capita (Dollar)	Income index
2006-2011	Urban areas of North Khorasan province	446872	32222310	2685	0.471
	Urban areas of Bojnord county	207196	32582995	2715	0.473
	Entered migrants to the urban areas of Bojnord county	24789	34374574	2865	0.481
2011-2016	Urban areas of North Khorasan province	484346	82733570	2585	0.460
	Urban areas of Bojnord county	233810	82274531	2571	0.460
	Entered migrants to the urban areas of Bojnord county	18350	87326400	2729	0.468

The human development index in the three time periods was calculated after calculating all three indicators and based on Equation 10, as described in Table 9.

Table 9 - Human Development Index in The Three Studied Periods Using The New Method
(Authors' calculations)

Time period	Area	Life expectancy index	Literacy index	Income index	Human development index
2006-2011	Urban areas of North Khorasan province	0.802	0.806	0.471	0.673
	Urban areas of Bojnord county	0.802	0.823	0.473	0.679
	Entered migrants to the urban areas of Bojnord county	0.812	0.803	0.481	0.680
2011-2016	Urban areas of North Khorasan province	0.799	0.840	0.460	0.676
	Urban areas of Bojnord county	0.799	0.850	0.460	0.679
	Entered migrants to the urban areas of Bojnord county	0.819	0.839	0.468	0.686

4. Discussion

4.1 Comparison The Human Development Index Values Calculated Using New and Old Methods

As stated in the theoretical part of the article, migration does not necessarily have negative consequences and, conversely, can accelerate development in the host community. Based on the calculations made in three time periods about the entered migrants to the urban areas of Bojnord County, the human development index of the entered migrants to Bojnord County in the two periods of 2011 and 2016 have been higher than the human development index of urban areas of Bojnord county and urban areas of North Khorasan province. This can be due to the change in Bojnord county political position in 2004 and becoming the capital of North Khorasan province, which offered opportunities to migrants. Human development index of entered migrants to the urban areas of Bojnord county in 2006 was less than the value of this index in urban areas of North Khorasan province and urban areas of Bojnord county, which is also due to the fact that in 2006, according to the Statistics center of Iran, most of the migrants who entered the urban areas of Bojnord county were from rural areas of this county and the share of entered migrants from outside North Khorasan province to the urban areas of Bojnord county was lesser. Human development index of entered migrants to the urban areas of Bojnord County in 2016 was more than this index in 2006 and 2011, while the number of migrants in this period have been less than in 2006- 2011 and 1996-2006. Table 10 shows the human development index calculated by both old and new methods and the number of entered migrants to the urban areas of Bojnord County from inside of North Khorasan province and outside it.

Table 10 - Comparison the Human Development Index Values Calculated Using New and Old Methods and The Number of Entered Migrants to The Urban Areas of Bojnord County from the Inside and Outside of North Khorasan province (Authors' calculations based on population and housing census data for 2006, 2011, 2016 Statistics Center of Iran)

Time period	number of entered migrants to the urban areas of Bojnord county			HDI using old method	HDI using new method
	From inside of North Khorasan province	From outside of North Khorasan province	Total migrants		
1996-2006	20870	14331	35202	0.700	-
2006-2011	12259	12530	24789	0.744	0.680
2011-2016	9118	9232	18350	0.752	0.686

Based on Table 10, the rate of human development in all three levels of urban areas of North Khorasan province, urban areas of Bojnord county, and entered migrants to the urban areas of Bojnord County, using the old method is at high level, and this value is at an average level using new method. The value of the human development index in the old method was more than the value of calculating this index in the new method. One of the most important reasons for this is that the new method is based on the calculation of more reliable and accurate data, and therefore the resulting value is usually less than the obtained value in the old method.

5. Conclusion

According to the calculations, although the human development index of migrants in 2006 is lower than the other two levels, it has increased significantly in 2011 and 2016, which is also because of changes in political status of Bojnord and becoming the center of north Khorasan province. This effect is to the extent that it has even surpassed values such as urban areas of the county and province. Migrants have a higher human development index in both 2011 and 2016 and it seems that this has caused urban areas to gain a higher share than the province. At the same time, whether this is only because of the migrants or not may not be very documentable, but the fact that the migrant index is higher will undoubtedly indicate its positive effect on the city. Regarding the old and new methods calculated, it should be said that in the calculation of the old method for values such as the Human Development Index, despite proving the above relationship (higher values for migrants), the calculated numbers have a higher level. One of its reasons is the decrease in the accuracy of some indicators at that time compared to the new method, because more data validity and higher accuracy are the basis of calculations in the newer method, so the calculated numbers have a lower level. In conclusion, despite the substantial change in the concept of migration in recent urban development, it seems that more comprehensive planning is needed to benefit from these human resources and lead it to improve the human development index, and thus improved quality of life.

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