

THE IMPACT OF DEMOGRAPHICS ON MACROECONOMIC INDICATORS IN A GREEN ECONOMY ENVIRONMENT

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Abstract. The study analyzed the impact of demography on macroeconomic indicators based on statistical indicators. According to the “Millennium Development Goals” adopted by the UN, ways to eliminate extreme poverty and hunger were analyzed. The dynamics of demographic indicators of Azerbaijan over the past century were also analyzed and reflected in graphic images and tables. The problem of urbanization and devastation of villages in the country's economy was studied and analyzed. By analyzing the number of employed people according to the classifier of types of economic activity, economic development trends were shown. The problem of “hidden unemployment” that demography can create as one of the problems of macroeconomic factors was revealed.

Keywords: Poverty, quintile, actual unemployment, urbanization, ruralization.

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1. Introduction

Greening the global economy is one of the important factors ensuring sustainable development. GDP volume and GDP per capita are used as indicators of the standard of living of the population in international and national reports. However, I must note that these indicators are “technical” indicators and are an indicator obtained by technically dividing the GDP volume by the number of population. In general, since the impact of foreign investments on the GDP formation process is equal to the GNP, the absence of investment income from the income of the population is a serious factor. Although GDP index affects the overall economic situation of the country, it does not have a serious impact on the income of the population. Failure to take expenses into account while calculating the average monthly income of the population leads to the high employment rate and low profitability indirectly, the low unemployment rate (Stjepanovic *et al.*, 2022; Chen *et al.*, 2024; Gunay *et al.*, 2023; Houssam *et al.*, 2023).

The most urgent problems of the world economy are vividly observed in the UN General Assembly Resolution A/RES/52/2 adopted in New York City on 08.09.2000, under the name of the “Millennium Declaration”, which set goals like “Development; Protecting our common environment; Green economy, Human rights, democracy and good governance; Protecting the vulnerable” and in 2015, the UN adopted the “Millennium Development Goals” and 193 countries of the world adopted these goals and the development targets arising from these goals. 6 of the 8 goals set are related to demography and its problems. As we know, the proportion of the population whose per capita income is below the subsistence minimum is an indicator of poverty and this population is considered poor population. The first goal adopted was called “Eradicating

extreme poverty and hunger” (Millennium Development Goals). Methodologically, to determine the category of extreme poverty and hunger the report should be prepared based on the “income of the poorest quintile of the population in the national consumption structure - income of the poorest 20 percent of the population”. For this report, information on the household income distribution (HID) is obtained from household survey materials (HSM). Household income is divided by the number of people in the family-household size (HS) to determine household income per capita (HCP).

$HID / HS = HCP$ (e.g. family= father +mother+ 3 children (600manats +500manats) / 5 = 220 manats)

Assuming the minimum monthly family basket of goods should be (30 manats per day * 5 people) * 30 days = 4500 manats and monthly income per capita equals 220 manats * 5 people = 1100 manats, then a nutritional deficit of 4500-1100= -3400 manats arises. If the nutritional deficit is 3 times higher than the average monthly income of the family, this family should be considered “extremely poor”.

The report should characterize the population by income and calculate the specific weight of the population included in the last 20 percent by income. Therefore, the minimum wage of working family members should not be less than 2250 manats.

The report does not take actual unemployment rate into account, but the number of unemployed people officially registered in the state records. This does not reflect the real situation and as a result, “hidden unemployment” arises.

The second goal is to achieve universal primary education. This right is a right granted to citizens by the Constitution. For this reason, it is mainly implemented by state bodies.

The third goal is to ensure gender equality and empower women. We believe this process requires socio-psychological and moral researches.

The fourth goal is to reduce child mortality and the fifth goal is to improve maternal health. The sixth goal is to combat HIV/AIDS, malaria and other diseases. Compulsory Health Insurance measures are being implemented in these areas. Calculating the effectiveness of the CHI is a separate subject of the research.

2. Main results

2.1. Demographic indicators of Azerbaijan, Administrative-territorial division, population size and composition - Methodological explanations

The administrative-territorial division of the Republic of Azerbaijan consists of 1 - Autonomous Republic, 64 districts, 79 cities, 12 city districts, 68 city administrative-territorial districts, 262 settlements, 190 settlement administrative-territorial districts, 4244 rural settlements and 1724 rural administrative-territorial districts.

The first source to obtain information about the population is the population census. The current calculation of the population size was carried out based on the results of the last population census and the number of births and arrivals to this territory for permanent residence was added to the population each year and the number of deaths and departures from this territory for permanent residence was subtracted from the population.

Age is the number of completed years in life, months for children under one year old and days for children up to 1 month old. Data on age composition are obtained through surveys during censuses. These data are determined by current calculations based on the population movement method from age X to age X+1 for individual ages. Data on current registration of demographic events are taken into account during calculations.

Data on the number of population by sex and age groups are provided based on population census data for 1959+11, 1970+9, 1979+, 1989+10, 1999+10, 2009+10, 2019+10.

Age intervals include the exact ages included in this interval. For example, “20-24” indicates a 5-year age interval from 20 to 24 years old.

Urban and rural population - the population is divided into urban and rural population according to their place of residence. Cities and towns are included in urban areas and all other settlements are considered rural areas.

In this study since 1897 a 127-year period was analyzed, including 2024. The population of Azerbaijan, which was part of the Russian Empire, was recorded as 1 million 806 thousand 700 people. 83.1% of this population, 1,501.6 thousand people, were rural residents and 16.9% or 305.1 thousand people, were urban residents. There may be several reasons for the 11.6 percent decrease in the population during World War

(<https://www.stat.gov.az/source/demography>).

Table 1. Population dynamics (thousand people)

Years	Number of population- Total	Total increase in a year		Also:		Relative to the total population, as a percentage	
		1000 people	percentage	urban	rural	urban	Rural
1897	1 806,7	...	...	305,1	1 501,6	16,9 %	83,1 %
1912	2 131,6	207,6	9,7 %	237,4	1 894,2	11,1%	88,9%
1913	2 339,2	-270,3	-11,6	555,9	1 783,3	23,8	76,2
1920	1 952,2	...	...	405,8	1 546,4	20,8	79,2
1923	1 863,0	265,7	14,3	486,0	1377,0	26,1	73,9
1942	3 157,1	-239,0	-7,6	1195,5	1961,6	37,9	62,1
1943	2 918,1	-141,4	-4,8	1138,1	1780,0	39,0	61,0
1947	2 740,5	-41,2	-1,5	1163,1	1577,4	42,4	57,6
1952	3 056,5	92,8	3,0	1379,3	1677,2	45,1	54,9
1962	4 118,2	99,9	2,4	2018,3	2099,9	49,0	51,0
1979	6 026,6	87 700	1,5%	3 170,0	2 856,6	52,6	47,4
1989	7 021,2	110 700	1,6%	3 805,9	3 215,3	54,2	45,8
2000	8 032,8	81,5	1,0 %	4 107,3	3 925,5	51,1	48,9
2011	9 111,1	124,0	1,4	4829,5	4281,6	53,0	47,0
2022	10 063,3	63,8	0,6	5 502,5	4 560,8	54,7	45,3
2023	10 127,1	53,7	0,5	5 527,2	4 599,9	54,6	45,4
2024	10 180,8	x	x	5 547,8	4 633,0	54,5	45,5

Source: <https://www.stat.gov.az/>

In the post-war decades - 1952-1962, population growth accelerated and the proportion of urban and rural population became approximately equal. This led to the emergence of new industrial enterprises in the country and the development of the process of training qualified specialists in higher education institutions. In 1979, economic development had a positive effect on demographic development, causing the population to exceed 6 million. As a result, the urban population exceeded the rural population.

The growth of cities also seriously affected the country's macroeconomic indicators. The expansion of urban infrastructure, the creation of new jobs required the formation of new technologies and human resources. This trend continued after the collapse of the USSR and the restoration of Independence. In the first years of independence, the political

and economic crisis did not bypass demography. As a result of the far-sighted domestic and foreign policy of the great leader Heydar Aliyev, after the signing of the “Contract of the Century”, Azerbaijan entered both political and economic growth era. (<https://minenergy.gov.az/az/neft/esrin-muqavilesi>).

2.2. Analysis of the implementation of international projects. Urbanization and gender issues

On September 20, 1994, the State Oil Company of Azerbaijan and 10 companies from 6 countries signed an agreement on the joint development and production sharing for the Azeri and Chirag fields and the deep water portion of the Gunashli field in the Azerbaijan sector of the Caspian Sea. The agreement was signed among The State Oil Company Of The Azerbaijan Republic and Amoco Caspian Sea Petroleum Ltd., BP Exploration (Caspian Sea) Ltd., Delta Nimir Khazar Limited, Den Norske Stats Oljeselskap a.s., Lukoil Joint Stock Company, McDermott Azerbaijan Inc., Pennzoil Caspian Corporation, Ramco Hazar Energy Limited, Turkiye Petrolleri A.O., Unocal Khazar Ltd.

According to preliminary calculations, the recoverable oil reserves of the “Azeri-Chirag-Guneshli” field block were determined at 511 million tons, later, according to the results of appraisal wells, this indicator reached 730 million tons. The investment costs required for the development of the fields amounted to 11.5 billion US dollars. 80% of the total net income fell to Azerbaijan and 20% to investors. From the first days of the “Contract of the Century”, the Azerbaijan International Operating Company was established and joint work with the State Oil Company began. This agreement later paved the way for the signing of more than 30 agreements with 41 oil companies from 19 countries. The “Contract of the Century” is among the largest agreements concluded in the world, both in terms of the amount of hydrocarbon reserves and the volume of investments. Of the 64 billion US dollars invested in the development of the Azerbaijani oil industry under the signed oil agreements, 57.6 billion were directed to the development of offshore fields and the conduct of exploration and prospecting work in promising structures (<https://minenergy.gov.az/az/neft/esrin-muqavilesi>).

As a result of the implementation of international projects, the flow of foreign exchange to the country has increased. In 2000, 2011, 2022, 2023, 2024 economic growth continued with demographic growth. In 2024, the population reached 10 million 180.8 thousand people. The ratio of urban and rural population is 54/45. However, I would like to note that the population growth rate has decreased from the 1.6% growth rate in 1979-1989 to a growth rate of 0.5%. The study believes that today's economic management system was made possible precisely thanks to the specialists formed by the demographic growth of the 1960s-1980s. Both oil sector specialists and specialists in the field of infrastructure management of other sectors of the energy sector were obtained as a result of the resources cultivated in those years. In this sense, the analysis of the cycle of Nikolai Kondratiev gives grounds to believe that Kondratieff (2011) by 2040 the number of specialists in the country's economy will decrease by 1/3. With this trend, demographic deficits will seriously affect the economy. Considering that good specialists are formed in 30-40 years, our economy may face these problems in 2040-50 years. Currently, a similar situation has arisen in several European countries (Hajizade, 2011).

The rapid influx of rural population to the city is also one of the serious demographic problems. This is primarily related to the country's food security. Secondary Urbanization and Suburbanization may occur. Although Ruralization programs are not foreseen in the

liberated territories, this should become a serious priority for the coming decades. Population density, traffic jams, lack of infrastructure are already creating serious problems and cities are becoming uninhabitable. This also poses serious threats to human health.

One of the most serious priorities in demography is the problem of “Gender”. This problem is being studied from different perspectives around the world. There has been no serious problem in the field of gender distribution of the population in Azerbaijan. The balance ratio has remained unchanged for a century.

Table 2. Population distribution by gender (thousand people)

Years	Number of people- Total	Also:		Relative to the total population, as a percentage		Number of women per 1000 men
		men	women	men	women	
1926	2314,6	1212,9	1101,7	52,4	47,6	908
1939	3205,2	1642,6	1562,6	51,2	48,8	951
1959	3697,7	1756,6	1941,1	47,5	52,5	1105
1963	4218,1	2029,0	2189,1	48,1	51,9	1079
1973	5444,0	2654,3	2789,7	48,8	51,2	1051
1979	6026,6	2933,3	3093,3	48,7	51,3	1055
1984	6513,3	3176,9	3336,4	48,8	51,2	1050
1994	7549,6	3702,5	3847,1	49,0	51,0	1039
2004	8349,1	4102,2	4246,9	49,1	50,9	1035
2014	9477,1	4713,5	4763,6	49,7	50,3	1011
2024	10180,8	5067,2	5113,6	49,8	50,2	1009

Source: <https://www.stat.gov.az/>

Officially registered marriages and divorces are also factors affecting demography. The study analyzed the situation between 1935 and 2024. The ratio of marriages to divorces was 2/5. We believe that this is a serious socio-economic problem. At the same time, there are also psychological and medical factors. While in 1935, 10 out of every 1,000 people got married and 5 divorced, in 2023 we observe that 5 out of every 1,000 people got married and 2 divorced. I believe that the desire of women to be more independent, to build their own business or career plays one of the main roles in this issue. As a result of the “aging” of the marriage age, the number of children is also limited.

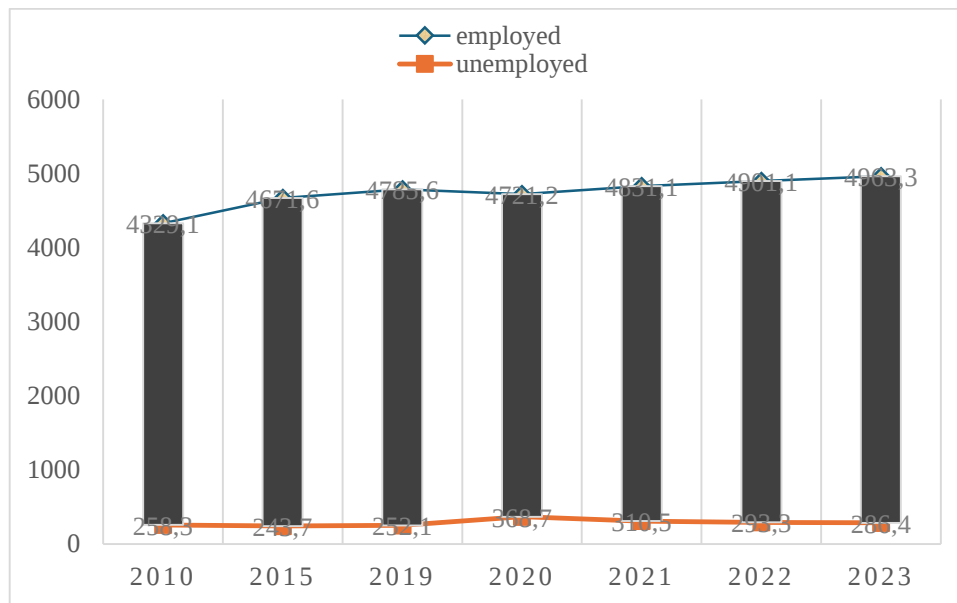
The labor market is one of the main directions of the socio-economic policy implemented in the Republic of Azerbaijan in recent years. The efficient, sustainable and sustainable development of the labor market, the efficient use of labor force are among the macroeconomic problems facing the world economy. In Azerbaijan, the number of labor force in the country in 2023 increased by 662.3 thousand people compared to 2010 and amounted to 5,249.7 thousand people, of which 4,963.3 thousand people are employed in the economy and 286.4 thousand people are unemployed (<https://www.stat.gov.az/source/labour/>).

Table 3. Overall rate and the number of officially recorded marriages and divorces

Years	Number of marriages	Number of divorces	Per 1000 people of the population	
			Number of marriages	Number of divorces
By urban and rural areas – Total				
1935	31 262	14 438	10,5	4,9
1942	10 840	4 810	3,6	1,6
1952	24 906	1 018	8,0	0,3
1962	47 984	2 976	11,5	0,7
1973	38 148	6 605	6,9	1,2
1984	67 368	7 119	10,3	1,1
1994	47 147	6 256	6,3	0,8
2004	62 177	6 914	7,5	0,8
2014	84 912	12 088	9,0	1,3
2021	56 314	17 191	5,6	1,7
2022	61 939	15 983	6,1	1,6
2023	54 200	21 688	5,3	2,1

Source: <https://www.stat.gov.az/>

Let us analyze macroeconomic categories such as employment and unemployment based on the main socio-economic indicators of the labor market. For the study, we take the indicators for 2010-2024 as a basis (Table 4).

**Graph 1.** Dynamics of macroeconomic indicators on employment and unemployment between 2010 and 2023

Source: The graphic was created by the author

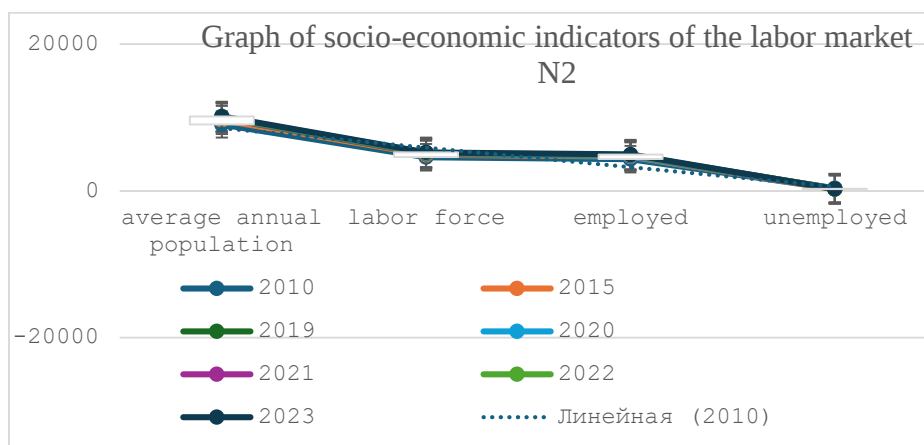
Table 4. Main socio-economic indicators of the labor market (in thousand people)

	2010	2015	2019	2020	2021	2022	2023
Average annual population	9054,3	9649,3	9931,2	10000,1	10044,7	10095,2	10154,0
Labor force	4 587,4	4915,3	5037,7	5089,9	5141,6	5194,4	5 249,7
Number of employed population ²⁾ -							
in public enterprises	1 142,7	1 176,1	1 146,1	1 116,4	1 089,2	1 075,7	1 064,4
in non-governmental enterprise	3 186,4	3 495,5	3 639,5	3 604,8	3 741,9	3 825,4	3 898,9
Number of unemployed population, 2) 3)	258,3	243,7	252,1	368,7	310,5	293,3	286,4

Source: The table was created by the author

In 5 million people labor market about 4 million people are working in non-governmental enterprises and the rest-1 million people are in public sector. Based on the research analysis, it would be good to note that the main reason of unemployment is that public enterprises prefer layoffs instead of creating new job options. Non-state enterprises are in the direction of stable growth. I believe that appropriate economic and social stimulating factors can lead to more efficient private business structures.

If we classify employed population by the types of economic activities and sectors, we will see the road map of the Azerbaijan labor market. According to this classification analysis of the period covering 1990 up to 2024 gives us a good reason to say that agriculture, forestry and fishing are the main sectors covering employment.

**Graph 2.** Graph of socio-economic indicators of the labor market

Source: The graphic was created by the author

Based on the Table 5 the employment map of the urban population emerges, which distributes that the urban population is mainly divided into 3 categories by the classification of economic activities :

I - 1) Trade; 2) Repair of vehicles; 3) Repair and construction; 4) Education; 5) Public administration and defense, social security; 6) Transport, logistics and

warehousing; 7) Providing health and social services for population and other service sectors cover 2 million 290 thousand people;

II - 1) Manufacturing; 2) Mining industry; 3) Electricity, gas and steam production, distribution and supply; 4) Water supply, waste disposal and processing; 5) Information and communication; 6) Professional, scientific and technical activities and 7) Financial and insurance activities sectors - 636.7 thousand people;

III - 1) Provision of administrative and support services; 2) Tourist accommodation and public catering; 3) Recreation, entertainment and art; 4) Real estate related operations sector - 342.2 thousand people.

Table 5. The number of employed part of population by classification of green economic activities*
(at the end of the year) (thousand people)

	1999	2009	2015	2016	2017	2021	2022	2023
Agriculture, forestry and fishing	1569,6	1628,6	1698,4	1729,6	1752,9	1732,9	1753,1	1 777,4
Mining and quarrying	40,5	42,7	39,1	38,1	37,9	39,4	39,3	39,7
Manufacturing	184,5	214,2	229,8	242,2	249,1	266	276,3	285
Electricity, gas and steam production, distribution and supply	20,3	30	27,1	27,3	27,5	27,2	27,9	29,1
Water supply, waste disposal and processing	19,4	25,3	25,4	30,6	30,8	32,7	33,6	34,6
Construction	158,1	229	336,4	343,8	347,9	373,9	379,7	388,6
Trade, repair of vehicles	606,9	678,9	693,7	699,6	705,9	695,2	702,2	707,2
Transport and warehousing	146,7	183,6	197,1	198,4	201	199,7	199,8	202,7
Tourist accommodation and public catering	10	26,3	61,5	68,4	73,5	76,9	87,9	95,1
Information and communication	25,3	34	60,3	61,2	61,7	59,6	60,2	59,5
Financial and insurance activities	15,5	21,8	33	27,1	26,9	31,9	35,1	37,2
Real estate operations	100,8	86,3	89,7	88	88,8	85,2	85,8	84,9
Professional, scientific and technical activities	25,6	45,6	59,6	68,4	73,5	61,6	62,9	66,7
Provision of administrative and support services	16,8	38,7	55,2	57,1	58	94,9	97,1	96,8
Public administration and defense, social security	265,8	269,8	287,3	285,4	284,2	236,7	234,9	230,5
Education	319,1	361	373,5	374,8	377,8	373,8	375,5	376,1
Providing health and social services for the population	171,8	201,9	180,8	185,6	189	186,3	188,7	189,7
Recreation, entertainment and art	30,8	56,9	69,6	77,4	80,6	64,3	65,2	65,4
Provision of other services	55,3	97,1	154,1	156,9	155,1	192,9	195,9	197,1

Source: <https://www.stat.gov.az/>

It is observed that totally 3268.9 thousand people work in urban industries, which is approximately twice as many as the population working in rural industries. Taking into

consideration that ratio of urban people compared to rural one is 54% to 45% (Table 1), we can conclude that some part of the rural population work in cities. Green economic development can give a special impetus to the development of education and science (Gurbanov & Mamedov, 2024).

The study estimates that in the coming years this population will move from villages to cities. This situation also leads to the emergence of social problems. There will be schools in villages, but there may not be enough students. If teachers become unemployed, they will either have to move to cities or be forced to work in jobs that do not correspond to their majors. In many cases, they have to migrate to other countries. Similar processes have occurred in Russia and European countries. Hundreds of villages remain empty and settlement in cities is increasing.

One of the macroeconomic factors that demography can create is “hidden unemployment”. This situation can arise because of the influence of technological processes. This situation arises from the disproportion between employment and income of the population. Thus, the income of the employee is much lower than their monthly expenses. Even if the employee works, they are always seeking extra hustle like an unemployed person. In most cases, they tend to do extra jobs after work.

3. Conclusion

According to state statistical data for the Republic of Azerbaijan, based on macroeconomic indicators of the country's socio-economic development for 11 months (January-November) in 2024, the GDP volume was 113,283.4 million manats, the GDP per capita was 11,104.2 manats. During this period, the nominal income of the population was 74,670.8 million manats, the volume of deposits in banks was 14,266.0 million manats and the average monthly salary/income was 993.2 manats (<https://www.stat.gov.az/news/macroeconomy.php>).

In conclusion, I would like to note that measuring the impact of demography on macroeconomic indicators is an important direction for the country's economy. The research in this direction should be continuous.

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