



RESEARCH AND MAPPING THE STATE OF POPULATION DENSITY OF THE REPUBLIC OF KARAKALPAKSTAN

(Based on demographic indicators between 2014-2021)

Matjanova Shynar Kadyrbaevna,
Davletov Azamat Madaminovich,
Amanbaev Zafar Rustamovich

Abstract

In this article, the territory of the Republic of Karakalpakstan was analyzed and mapped on the basis of statistical indicators of population demographic changes between 2014-2021. Periodic analyzes were conducted on the basis of statistical data on the population of the region. The periods included 2014-2017 and 2018-2021, respectively. During these periods, the dynamics of population change in the region, population density indicators and natural population growth coefficient indicators were studied. Based on the studied and developed data, the population density map of the region was formed.

Keywords: Population, birth, death, growth, natural growth, demographic indicators, population density, mapping, population map, Republic of Karakalpakstan

Introduction

Currently, the development of a development strategy in socio-economic spheres and its application to the regions has become an urgent issue. In this way, the study of the social situation of the regions is considered one of the priority tasks. The assessment of the potential of various sectors of the economy is based on the population and other demographic indicators of the region. We can confirm the reason for this through the following points:

"The population is the main productive force of society. Without population, neither production nor the development and existence of science and technology is possible. At the same time, the population is the main consumer of industrial, agricultural products, transport and service sectors. Therefore, population is an important factor for every country. [1:224].

These thoughts show that any socioeconomic development is first of all researched through the study of population geography, and demographic processes. This forms the basis of the analyze we conduct through various population indicators (population density, birth and death rate, natural growth, etc.). For this reason, there is always a





need to create population cards and update them constantly. These cards are studied and mapped through statistical and demographic analysis.

Mapping is a cartographic description of the state of the researched area based on scientific and detailed solutions. This allows us to describe the changes occurring in the population indicators of our studied area (the Republic of Karakalpakstan). It is known that "population maps are mainly based on statistical data." [3: 105] When describing and evaluating statistical indicators, the territorial location of the population is directly taken into account. This makes it possible to carry out regional analysis through the population card. Demographic indicators of the population can also give a first idea of how favorable or unfavorable the area is located. According to the American scientist Christian S.'s opinion about the territorial location of the population: "The population is often concentrated around life-sustaining resources such as water bodies and arable land. Few people live in underdeveloped areas, for example, in deserts..." [1 : 224][2 : 37].

We can conclude from the above opinion that we can evaluate the geographical conditions of the area by studying the demographics of the population and mapping. In this case, by describing the territorial location, we get information about the densely populated areas and, on the contrary, scattered areas. There will also be an opportunity to learn the reasons for this.

The purpose of our scientific analysis is to find out and map in which regions the indicators of population density and natural growth rate are increasing or decreasing in the Republic of Karakalpakstan.

Study area: Republic of Karakalpakstan. "It is located in the extreme north-west of Uzbekistan. The area is 166.59 thousand square km. Population - 2020. As of 01.01, it is 1898.3 thousand people. The level of urbanization is 49.1 percent. The population density is 1 sq. km. 11 people. The capital is the city of Nukus (314.9 thousand people, 01.01.2019).

The surface structure of the district is not complicated. The highest point is located on the Sultan Uwais Ridge, 473 meters above sea level. In the western part of Karakalpakstan there is the Ustyurt plateau, in the central and southern part is the Amudarya delta, the eastern part is occupied by the Qizilkum desert, and the northern part is occupied by the residual water basins of the Aral Sea and the Orolkum desert. ... The main source of water is Amudarya.

The Republic of Karakalpakstan accounts for 4.8% of the total industrial products produced in Uzbekistan. Chemical, petrochemical and gas-chemical (45.7%) and fuel (29.4%) industries dominate the industry. The industrial potential of Kungirotdistrict and the cities of Nukus is quite large." [5: 227]





According to the territorial division of the Republic of Karakalpakstan, it consists of 16 districts and the city of Nukus. The largest district in terms of territorial size is Kun'irotdistrict (76,000 km. sq. km.) and the smallest district is Takhyatosh district (0.18 thousand km. sq. km.) [6]

The manner in which the research was conducted. The method of conducting scientific research consists in the formation of statistical analysis cards using statistical data of population cards. Analytical research was conducted based on the data of the open data portal of the Statistics Department of the Republic of Karakalpakstan. These analyzes were based on data on the territorial division, the population of cities and villages by region (Table 1).

Table 1. Statistical indicators of the population for the period of 2014-2021 (formulated based on the data of the website www.qrstat.uz)

Population statistics of the Republic of Karakalpakstan (2014-2021)								
	2014	2015	2016	2017	2018	2019	2020	2021
Total population	1736500	1763100	1791100	1817500	1842300	1869800	1898300	1923700
City dwellers	862000	873000	883200	894700	905500	917700	930500	942000
Villagers	874500	890100	907900	922800	936800	952100	967800	981700
Birth	40883	41345	39427	37754	40108	41137	39286	40272
Death	8157	8094	8396	8661	8602	8461	9164	8756

Demographic indicators in the formation of the population card were formed on the basis of data such as the area of the analyzed territory, population, birth and death rates.

In order to determine the changes in the region over time and monitor the demographic movement, we calculated the demographic aspects of the population with formulas (Table 2).

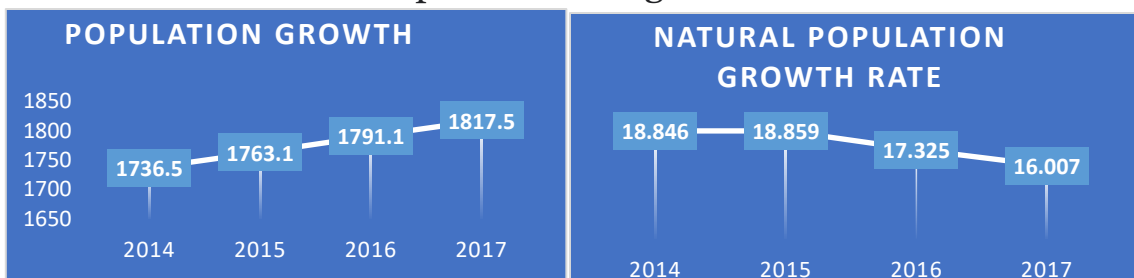
Table 2. Formulas used.

Formula name	Defenition	Formula	Source
Population density: (PD)	P – per unit area Q – number of people	$PD = \frac{P}{Q}$	[7]
Natural population growth: (NG)	B - Birth and M – the difference between death	$NG=B-M$	[7]
Coefficient of natural population growth	K_{NG} - Coefficient of natural population growth; T – Period length; P – average population for the period (promille)	$K_{NG} = \frac{NG}{PT} * 1000 \text{ ‰}$	[7]



Based on the above data, population density and natural growth coefficient were calculated. We used the data for the period of 2014-2021 to carry out the analysis. We divided this period into two periods. The first period is 2014-2017, and the second period is 2018-2021.

Analysis of the population density showed that the population density of the northern and western districts of the region is somewhat sparse; on the contrary, the density is high in the central and Amudarya regions. The reason for this is the settlement of the local population in the riverside areas and the critical level of the problem of the Aral Sea in the northern and western parts of the region.



Graph 1. Population growth dynamics (2014-17)

Graph 2. Natural population growth rate (2014-17)

During this period, the districts with high population density were: Nukus city, Amudarya and Khojayli districts. The annual population of these regions exceeds 180,000. One of the main reasons for the high density in these areas is the economic and natural conditions that are more convenient than in other places. Taking into account the location of the Amudarya and Khojaly districts along the Amudarya River, the fertility level of the land has created very favorable conditions for agriculture. Due to these factors, the population growth and density increase in these regions showed high indicators between 2014-2017.

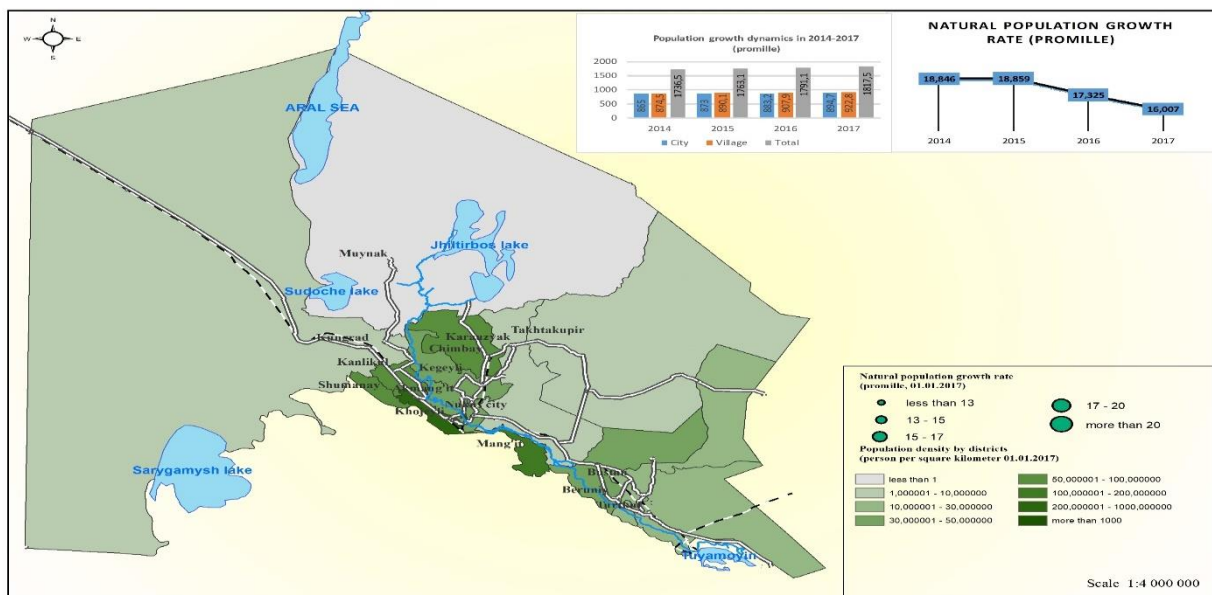
Areas with very low population density include: Kungirod, Moynaq and Takhtakopir districts. In these areas, the density index was around 1-2. These districts are the largest districts of the Republic of Karakalpakstan in terms of territory. But the population is quite small according to the indicators. The reason for this is the severity of the natural conditions in the regions and the limited use of water resources. Due to this reason, the population density is very low.



Table 3. Statistical indicators of the population of the Republic of Karakalpakstan in 2017 (formed based on the data of the website www.qrstat.uz).

	Area (sq. km.)	Total population	City dweller	Villagers	Share of district (%)	Population density	Birth	Death	Natural growth
Republic of Karakalpakstan	166595,25	1817500	894700	922800	100	10,90967	37754	8661	16,00715
Nukus city	220,96	307400	307400	0	16,91334	1391,202	5499	1451	13,16851
Amudarya	1021,19	188700	49700	139000	10,38239	184,7844	4093	854	17,16481
Beruniy	3951,94	180500	64700	115800	9,931224	45,67377	4338	861	19,26316
Karauzyak	5891,07	51500	15300	36200	2,833563	8,742045	966	240	14,09709
Kegeyli	2210	88100	33500	54600	4,847318	39,86425	1660	490	13,28036
Kungrad	75995,81	125200	78900	46300	6,888583	1,647459	2558	600	15,63898
Kanlikul	744,09	49100	12000	37100	2,701513	65,98664	1016	256	15,47862
Muynak	37881,16	30600	13400	17200	1,683631	0,807789	565	155	13,39869
Nukus	943,91	47100	9900	37200	2,591472	49,89883	1215	230	20,91295
Takhtakupir	21122,18	39400	16500	22900	2,167813	1,865338	751	207	13,80711
Turtkul	7482,69	203100	78200	124900	11,17469	27,14265	4482	988	17,20335
Khojeyli	728,62	189500	127300	62200	10,42641	260,0807	3656	911	14,48549
Chimbay	2200	112700	55300	57400	6,200825	51,22727	2352	594	15,59894
Shumanay	782,43	54700	14400	40300	3,009629	69,91041	924	214	12,97989
Ellikkala	5419,2	149900	18200	131700	8,247593	27,66091	3679	610	20,47365

We can also see densely populated areas using the map developed based on the data of the end of the period (map 1).



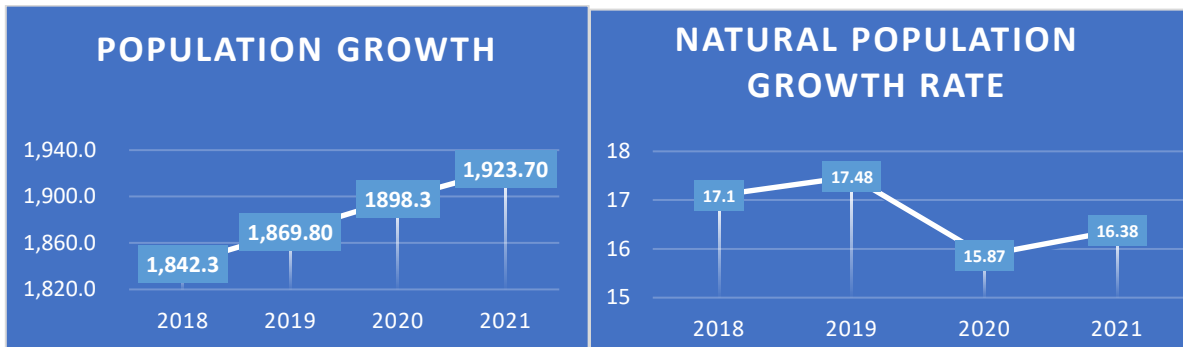
Card 1. Population density map of the Republic of Karakalpakstan (status of 2017)

The second period (2018-21). In 2018, the population of the Republic of Karakalpakstan was 1842.3 thousand people. By the end of 2021, this indicator was 1948.5 thousand people. This situation also showed a constant growth in the dynamics



of population growth (Graph 3). This increase showed an increase of 81.4 thousand people compared to the beginning of the period.

The dynamics of the natural growth rate showed that it changed with slightly unstable indicators (Graph 4). In 2018-19, the rate of natural growth increased from 17.1‰ to 17.48‰, while in 2020, this indicator decreased significantly and amounted to 15.87‰. By the end of 2021, this indicator was 16.38 ‰.



Graph 3. Population growth dynamics (2018-21)

Chart 4. Population natural growth rate (2018-21)

In 2018-2021, a change occurred in the administrative territorial division of the Republic of Karakalpakstan. In 2018, Takhyatosh district was separated from Khojayli district, and Bozatov district was established in 2020. These changes did not affect the total area. There have been partial changes in the borders of internal regions. Thus, in the second period, the population situation of 16 districts of the Republic of Karakalpakstan was studied.

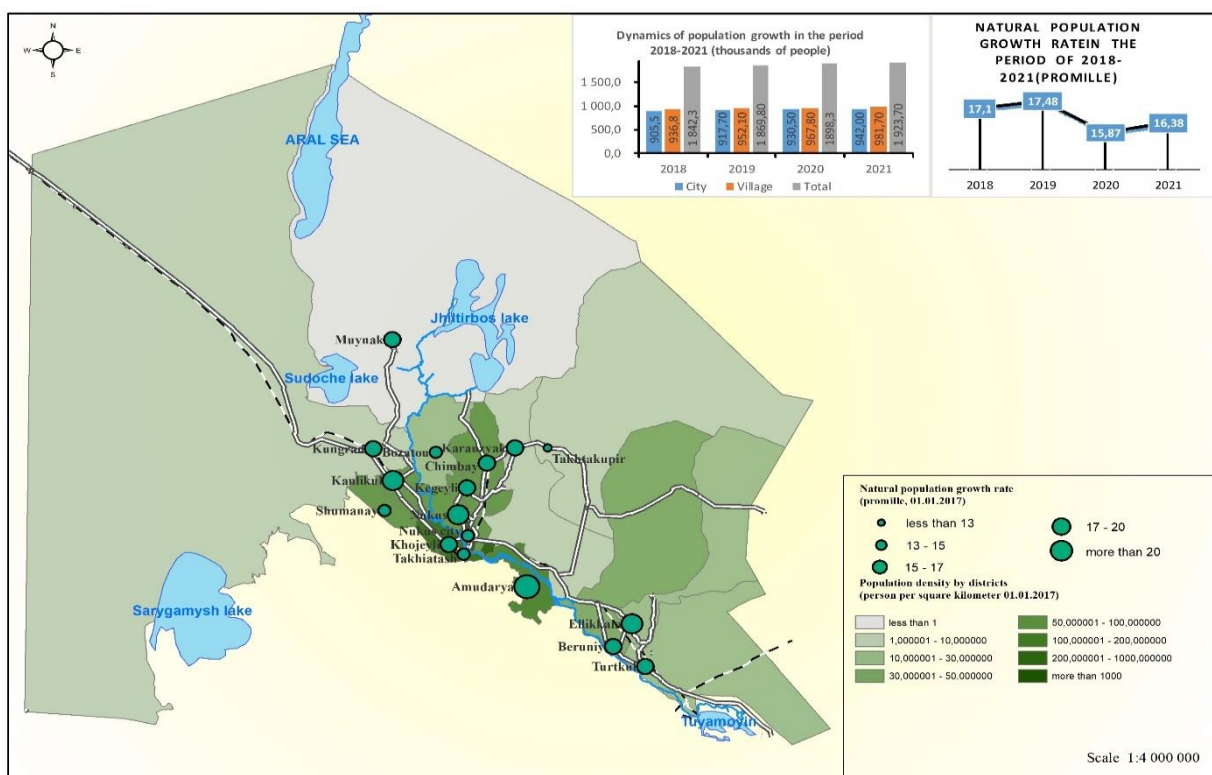
Table 3. Statistical indicators of the population of the Republic of Karakalpakstan in 2021 (formed on the basis of information from the website www.qrstat.uz)

	Area (sq. km.)	Total population	City dweller	Villagers	Share of district (%)	Population density	Birth	Death	Natural growth
Republic of Karakalpakstan	166590	1923700	942000	981700	100%	11,54	40272	8756	16,38
Nukus city	220,96	323 800	323 800	-	16,83215	1465,42	6 240	1412	14,91
Amudarya	1021,19	201 400	52 400	149 000	10,46941	197,22	4 938	891	20,09
Beruniy	3951,94	194 500	68 800	125 700	10,11072	49,21	4 133	903	16,60
Bozatou	2040,00	21 700	5 400	16 300	1,128035	10,63	371	86	13,13
Karauzyak	5891,07	53 300	16 200	37 100	2,770702	9,04	1 062	249	15,25
Kegeyli	920,00	73 200	29 600	43 600	3,805167	79,56	1 485	375	15,16
Kungrad	75995,81	131 600	83 000	48 600	6,840984	1,73	2 738	636	15,97
Kanlikul	744,09	51 700	12 900	38 800	2,687529	69,48	1 133	224	17,58
Muynak	3788,16	32 300	14 100	18 200	1,679056	0,85	675	158	16,01
Nukus	943,91	51 100	10 400	40 700	2,656339	54,13	1 259	269	19,37
Takhtiatash	177,62	74 700	53 500	21 200	3,883142	420,56	1 385	350	13,85
Takhtakupir	21122,18	40 400	16 900	23 500	2,10012	1,91	727	211	12,77
Turtkul	7482,69	217 700	82 800	134 900	11,31673	29,09	4 567	1018	16,30
Khojeyli	551,00	124 300	79 500	44 800	6,461506	225,58	2 590	549	16,41
Chimbay	1440,00	113 400	58 000	55 400	5,89489	78,75	2 334	565	15,59
Shumanay	782,43	56 600	14 800	41 800	2,942247	72,33	949	197	13,28
Ellikkala	5419,20	162 000	19 900	142 100	8,421272	29,89	3 686	663	18,66



During this period, the population density remained almost unchanged. The areas with a high level of density were the city of Nukus, Khojaly district, Amudarya district and the newly formed Takhiatash districts. Takhyatosh district has particularly high density indicators. The area of this district is 117.62 sq.km. constitutes The population is 74,700 people. The population layer is very dense in the area. The population density is about 420 people per square kilometer. The indicators of Bozatou district, the second newly established district, returned 10.63 indicators.

Like all cards, the population cards also underwent changes during these periods. In calculating the population density, analytical calculations were made and mapped for the territory of 16 districts instead of 14 districts (card 2)



Card 2. Population density map of the Republic of Karakalpakstan (as of 2021)

Summary

The analysis of the situation of the population of the Republic of Karakalpakstan showed that, if we evaluate the population density in the territory of the Republic of Karakalpakstan. It became known that the population density in the regions of Ustyurt and Arol is quite low due to the severe health conditions and the abundance of salts in the soil. In many areas, there are saline soils with no fertility level. For this reason, the main part of the population is located along the Amudarya River.



In the northern and western regions, the sand dunes and salt marshes created by the formation of the Aral Sea have made most of the land unusable. As a result, internal migration processes of the population mainly moved to the coastal areas of Amudaryya. For this reason, the population and density indicators are high in the districts along the Amudaryya River.

Currently, the district with the lowest population density is Moynaq district. Next to it are Kungirod and Takhtakopir districts. The level of socio-economic development in these regions is now more difficult than in other regions. Among these districts, the level of natural growth is significantly lower. In particular, the coefficient of natural growth of Takhtakopir district is 12.8 per million. This indicator is currently the lowest among the districts of the Republic of Karakalpakstan.

Most of the population lives in the Amudaryya delta. A high index of density and growth rate coefficient was returned in Amudaryo, Kegeyli, Qonlikol, Takhyatosh, Khojayli Nukus districts.

If we look at the share of population indicators in the district section. Republic The majority of its population is occupied by residents of Amudaryya, Beruniy, Ellikkala and Kungirod districts and the city of Nukus. (Chart 1)

The rate of natural growth of the population of the republic in 2021 is 16.38 per thousand.

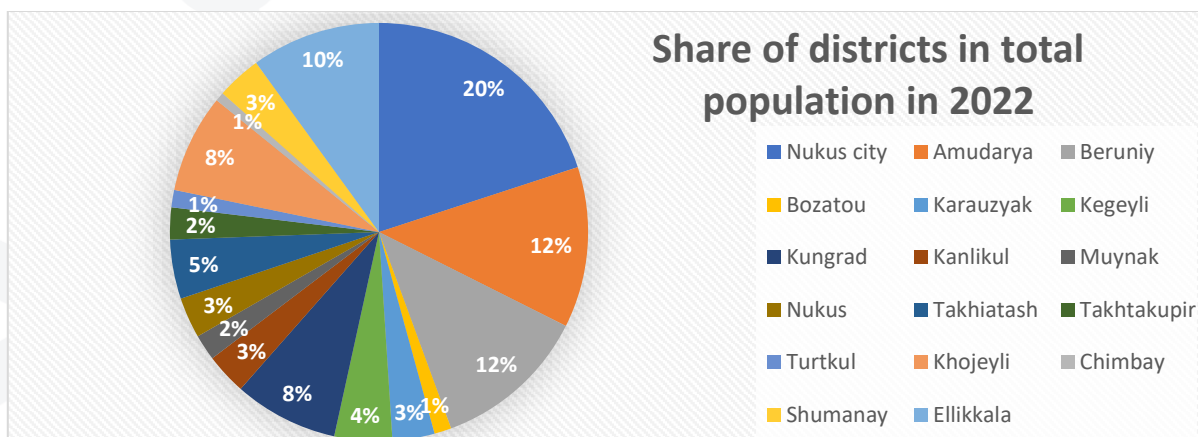
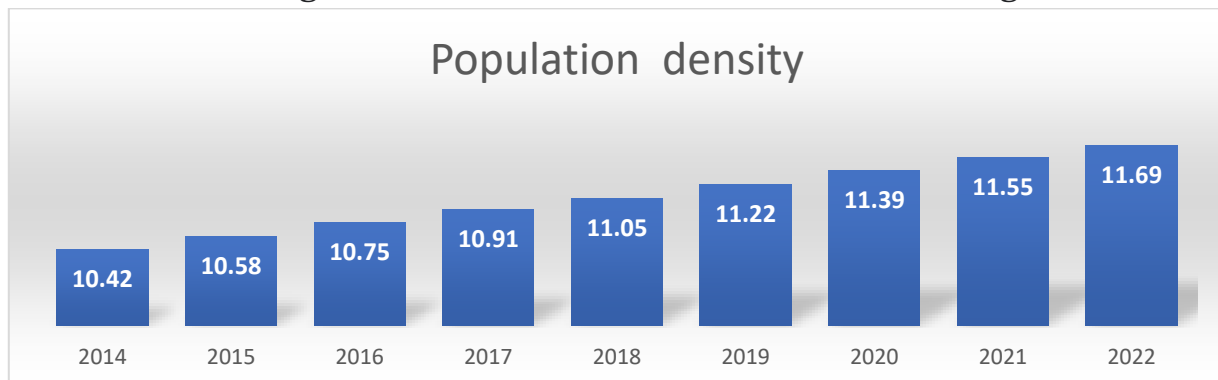


Diagram 1. The share of districts in the population indicators of the Republic of Karakalpakstan in 2022 (formed based on the data of the website www.qrstat.uz)

The period of 2014-2021, if we look at the indicators of population density, it is constantly increasing (Graph 5). This indicator was 10.42 in 2014, and by 2022 this indicator will be equal to 11.69. It can be concluded that the population density is increasing year by year. This shows that in order to improve the social condition of the population, it is necessary to apply various sectors of the economy to the regions.



In addition, considering the small amount of land suitable for agriculture, there is a high demand for the organization of free economic zones in the region.



Graph 5. Population density level (2014-22)

Currently, there is a high need for updated population cards of the Republic of Karakalpakstan. Maps should be developed based on current modern technologies and cartographic methods. We developed a statistical analysis map of the population density map, which we analyzed, based on the data of the Statistics Department of the Republic of Karakalpakstan. Through this analytical map, we cartographically described the current situation of the population of the Republic of Karakalpakstan.

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WEB OF SCIENTIST: INTERNATIONAL
SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 4, Issue 3, Mar., 2023

Matjanova Shynar Kadyrbaevna Tel: +998 90 592 15 08
Mail: matjanova.shinar@gmail.com

Davletov Azamat Madaminovich Tel: +998 97 354 72 98
Mail: Davletov9884@gmail.com

Amanbaev Zafar Rustamovich, Tel: +998907052513
Mail: zafaramanbayev2002@gmail.com



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