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SOCIO-HYGIENIC ANALYSIS OF THE HEALTH STATUS OF MILITARY PERSONNEL IN THE REPUBLIC OF UZBEKISTAN ANALYSIS OF THE HEALTH STATUS OF MILITARY PERSONNEL OF THE REPUBLIC OF UZBEKISTAN (2015-2020)

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To assess the state of health of the military personnel of the Republic of Uzbekistan, we use the health indicator, which is calculated using the formula:

$UZ=(1-B/P)*100\%$

Where UZ is the level of health;

B is the number of sick military personnel for the period (year). The classes of diseases registered in medical institutions calculate the total incidence of military personnel.

P is the total number of military personnel for the period (for the period 2016-2023 P = 68,000 people [73]).

Based on open data from the Government of the Republic of Uzbekistan, bull calculated the health level of the republic's military personnel (Fig. 1).

Figure 1 – The health level of the military personnel

of the Republic of Uzbekistan for the period 2016-2023, %

The graph in Fig. 1 clearly shows the linear nature of the increase in the level of health of military personnel over the period under review (an increase of 5.7%). The linear nature of the growth is confirmed by the very close to 1 value of the coefficient of determination $R^2 = 0.9475$ of the linear trend equation. When analyzing the schedule, attention is drawn to the fact that the health level of military personnel during the COVID-19 pandemic (2020 – 2021) has not decreased, which is proof of the effectiveness of preventive measures in the Armed Forces of Uzbekistan.

Next, we will calculate the health level of military personnel in the context of the regions of the Republic of Uzbekistan (Table 2).

Analyzing the data in the table, we note that the health levels of military personnel in different regions differ markedly. In 2023, the spread was 10% - from 80.2% in Tashkent to 90.2% in Bukhara region. The increase in the level of health also varies significantly from 0.5% in Namangan region to 15.4% in Samarkand region.

Table 2 – Health level of military personnel in the regional context.

Region (region)	2016	2017	2018	2019	2020	2021	2022	2023	Growth, %
Republic of Karakalpakstan	80,4	81,2	81,8	83,1	85,0	85,4	85,7	86,1	5,7
Andijan	80,0	80,8	81,3	81,4	82,5	82,9	83,9	84,4	4,4
Bukhara	81,9	82,7	83,2	83,4	83,8	83,8	83,1	85,3	3,4

Region (region)	2016	2017	2018	2019	2020	2021	2022	2023	Growth, %
Jizzakh	85,4	86,1	86,4	87,7	90,1	90,3	90,3	90,2	4,7
Kashkadarya	86,4	87,0	87,3	85,6	86,7	88,4	87,2	87,3	0,9
Navoi	86,0	86,6	87,0	87,2	87,6	89,4	89,7	89,3	3,3
Namangan	85,2	85,8	86,2	84,9	86,4	86,9	89,3	85,9	0,7
Samarqand	86,6	87,2	87,5	87,2	87,5	88,0	87,8	87,1	0,5
Surkhandarya	70,5	71,8	72,5	83,4	85,1	85,2	85,7	86,0	15,4
Syrdarya	84,2	84,9	85,3	85,7	88,9	88,9	88,0	89,7	5,5
Tashkent	84,1	84,7	85,2	84,1	88,6	87,9	88,6	89,5	5,4
Ferghana	82,1	82,9	83,3	83,4	84,5	84,6	85,3	85,9	3,7
Khorezms	77,5	78,5	79,1	79,5	83,0	83,3	84,9	84,4	6,9
Tashkent city	79,2	80,1	80,6	80,4	81,9	82,8	83,9	84,5	5,3
Republic of Karakalpakstan	69,9	71,1	71,9	73,8	78,5	78,3	78,5	80,2	10,3

Therefore, it is necessary to select factors characterizing the peculiarities of healthcare in the regions that can explain the observed differences. Since the health level of military personnel is quite high, the most significant explanatory factors are indicators related to polyclinic and outpatient activities of medical institutions in the regions. From the data provided by the Ministry of Health of the Republic of Uzbekistan, the following indicators are the most adequate for the task:

1. The capacity of outpatient clinics in terms of the number of visits per shift per 10,000 people;

2. The number of doctors of all specialties per 10,000 people;

3. The number of doctors with less than 5 years of experience per 10,000 people;

4. The number of secondary medical staff per 10,000 people;

5. The number of examined, in % of the number of persons, subject to professional examinations.

To establish the relationship between the level of health and the regional factors listed above, we will use statistical analysis.

The initial data for statistical analysis are presented in Appendix A.

Since the tools of the SPSS statistical package with their specific requirements for naming variables will be used for statistical data processing, we will designate the relevant factors according to tab. 3.

Table 3 – Designation of variables in the SPSS package

Factor	Designation when

	calculating in SPSS
Health level	Health level
Capacity of outpatient clinics in terms of the number of visits per shift per 10,000 people.	per month see APU
The number of doctors of all specialties per 10,000 people.	Doctors
The number of doctors with less than 5 years of experience per 10,000 people.	The doctor has less than 5 years of experience
The number of nursing staff per 10,000 people.	Average medical staff
Number of people examined, as a percentage of the number of persons subject to professional examinations.	Coverage of occupational examinations

In addition, the Region category (nominal variable) will be introduced, taking 14 values from 1 to 14 according to Tab. 4.

Table 4 – Designation of the Region category.

Region (region)	Designation
Republic of Karakalpakstan	1
Andijan	2
Bukhara	3
Jizzakh	4
Kashkadarya	5
Navoi	6
Namangan	7
Samarqand	8
Surkhandarya	9
Syrdarya	10
Tashkent	11
Ferghana	12
Khorezms	13
Tashkent city	14

Region (region Pic in the cm of the APU of Doctors, my doctor is 5 years of experience, Average medical staff, professional examination coverage

The level of health Pic in the cm of the APU of Doctors, my doctor is 5 years of experience, Average medical staff, professional examination coverage

Table 5 – Average values and standard deviation of variables (by year).

Region (region)		The level of health	The pic is in the cm of the APU.	Doctors,	The doctor has less than 5 years	Average medical staff	Professional examination coverage
1 Republic of Karakalpakstan	Average	82,15	110,26	23,66	4,61	93,76	95,08
	Standard deviation	1,54	5,67	2,33	1,05	1,69	1,90
2 Andijan	Standard deviation	83,40	121,09	21,50	4,35	93,99	96,70
	Standard deviation	0,99	8,58	1,09	1,08	2,82	1,76
3 Bukhara	Standard deviation	88,31	105,23	26,60	4,00	119,40	97,81
	Standard deviation	2,14	11,83	0,62	1,51	2,96	1,89
4 Jizzakh	Standard deviation	86,99	103,48	15,31	1,83	96,31	90,90
	Standard deviation	0,81	9,10	1,26	0,42	11,00	7,15
5 Kashkadarya	Standard deviation	87,85	73,33	15,86	2,31	106,54	95,74
	Standard deviation	1,42	6,33	0,34	0,65	4,23	2,40
6 Navoi	Standard deviation	86,33	103,66	21,05	3,35	123,65	96,53
	Standard deviation	1,36	2,61	0,55	0,90	3,78	4,06
7 Namangan	Standard deviation	87,36	80,40	16,51	1,99	99,79	93,14
	Standard deviation	0,44	5,07	0,54	0,78	3,82	3,74
8 Samarqand	Standard deviation	80,03	76,25	22,33	4,64	75,93	90,29
	Standard deviation	7,04	6,11	1,01	1,66	1,58	3,09
9 Surkhandarya	Standard	86,95	72,83	14,73	1,95	84,01	93,93

| Region (region)		The level of health	The pic is in the cm of the APU.	Doctors,	The doctor has less than 5 years	Average medical staff	Professional examination coverage
	deviation						
	Standard deviation	2,15	5,25	0,60	0,73	2,96	2,26
10 Syrdarya	Standard deviation	86,59	139,71	17,46	2,56	146,64	85,65
	Standard deviation	2,27	12,66	0,59	0,63	3,91	6,85
11 Tashkent	Standard deviation	84,00	148,69	16,58	2,09	101,28	93,60
	Standard deviation	1,29	4,95	0,32	0,61	3,47	4,45
12 Ferghana	Standard deviation	81,28	104,94	18,75	3,48	113,25	94,46
	Standard deviation	2,92	6,62	0,35	0,91	4,06	3,70
13 Khorezms	Standard deviation	81,68	99,99	24,54	4,46	83,81	93,64
	Standard deviation	1,91	6,55	0,42	0,95	2,44	2,26
14 Tashkent city	Standard deviation	75,28	116,13	29,91	4,08	81,28	97,34
	Standard deviation	4,04	8,31	3,66	0,71	9,42	3,55

The table data shows that for each variable there is a significant difference in the average values depending on the region. These differences can be more clearly identified from the graphs in Figure 2-7.

Figure 2 – The health level of military personnel.
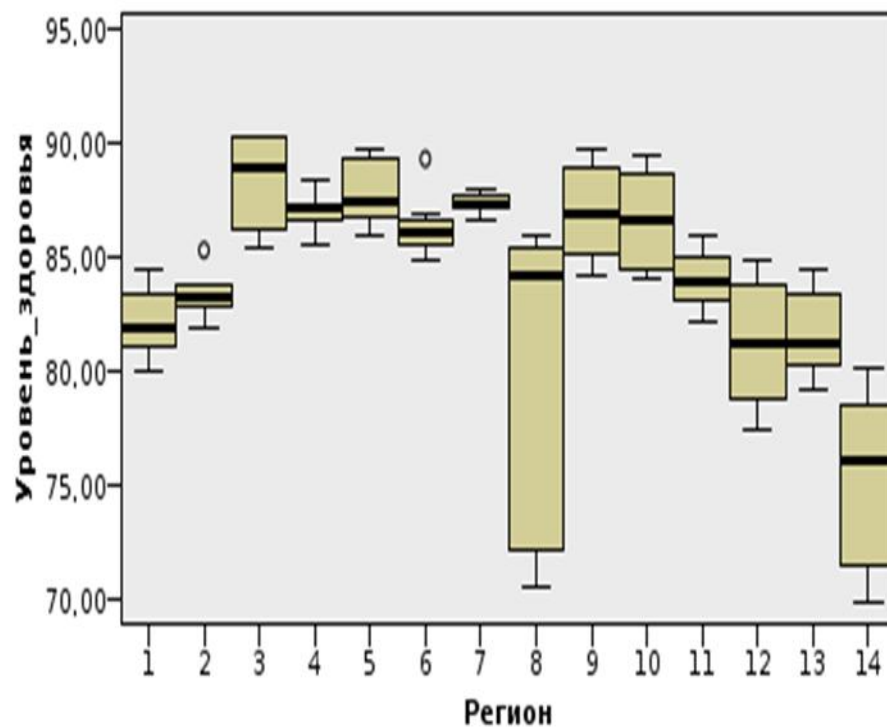
In this figure, each figure corresponding to one of the 14 regions has an average value, and the vertical size of the figure is equal to the increase from the lower edge (value in 2016) to the upper edge (value in 2023). As before, the largest increase corresponds to the Samarkand region (8), and the largest average is the Bukhara region. regions (3).

Figure 3 - Visits per 10,000 APU shift.
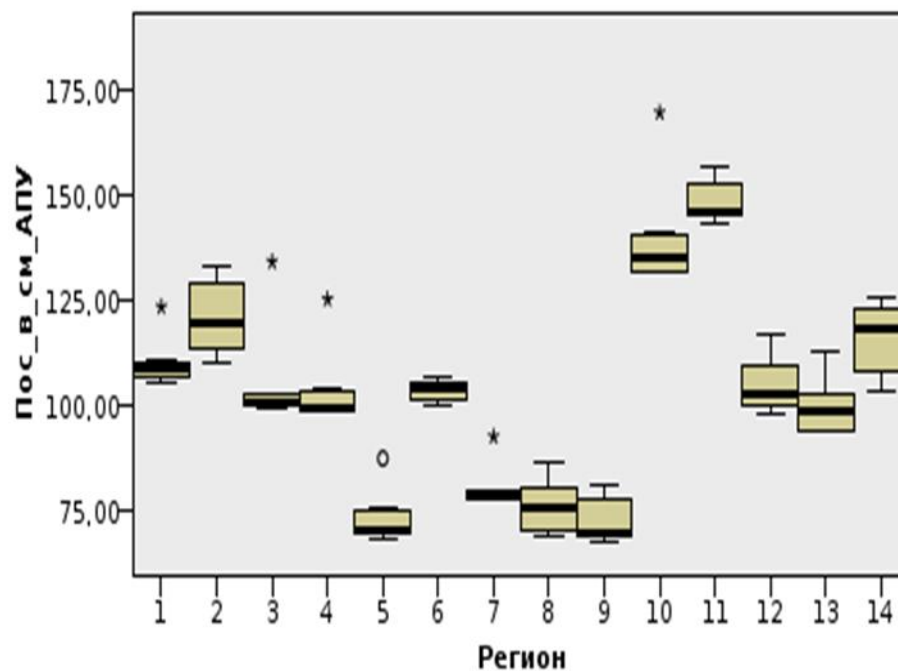
The highest number of visits per shift to outpatient clinics in the Tashkent region (11) is an average of 148.69, and the highest drop is in Bukhara (3, standard deviation = 11.83).

The fact that in each region there is a drop in the indicator for the period 2016-2023 is not surprising, since it plays a significant role in the formation of the indicator. the role of population growth. It follows that with an undoubted increase in the absolute indicator of "Visits per shift of the APU", due to population growth, the value of the indicator of "Visits per shift of the APU per 10,000" is falling.

Figure 4 - Doctors per 10,000 people.
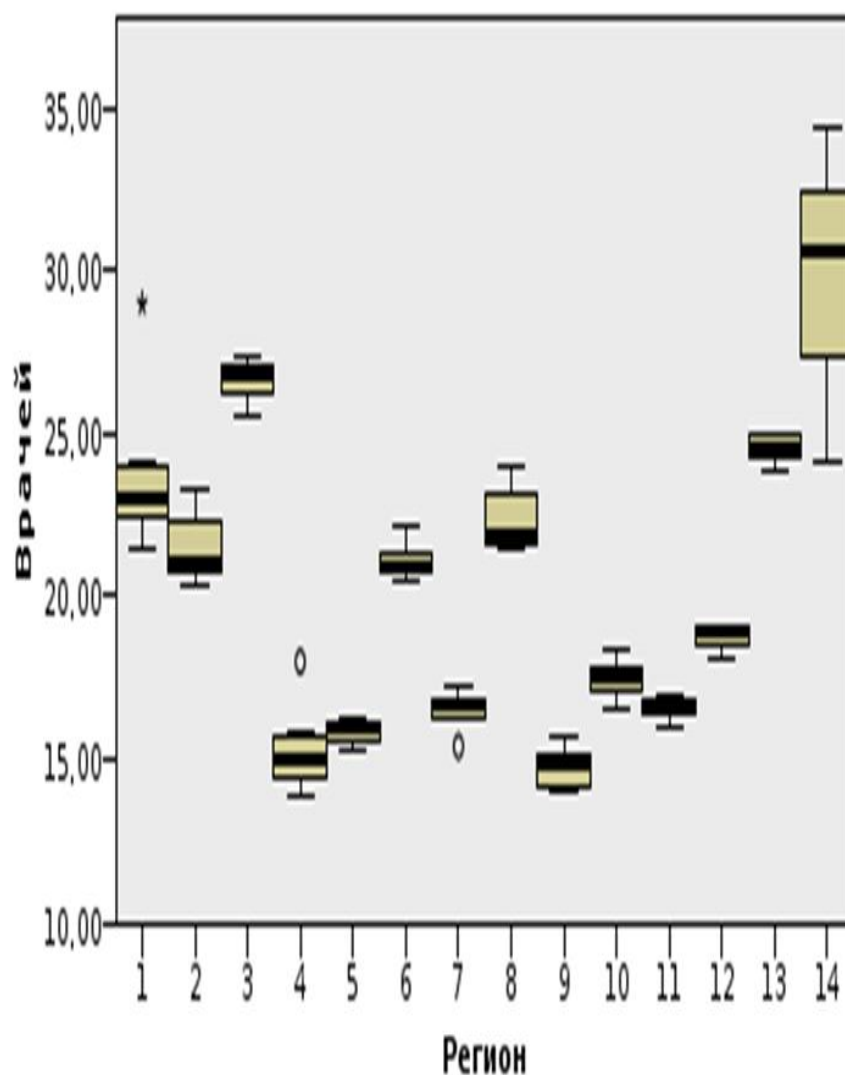
The largest number of doctors per 10,000 people is in Tashkent (14), the average value for the period 2016-2023 is 29.91, and the highest drop in the indicator for the period was recorded in Tashkent (the average deviation is 3.66), with the largest increase occurring at the beginning of the period (the line in the figure is shifted to the top).

**Figure 5 - Doctors (experience < 5 liters) per 10,000 people**
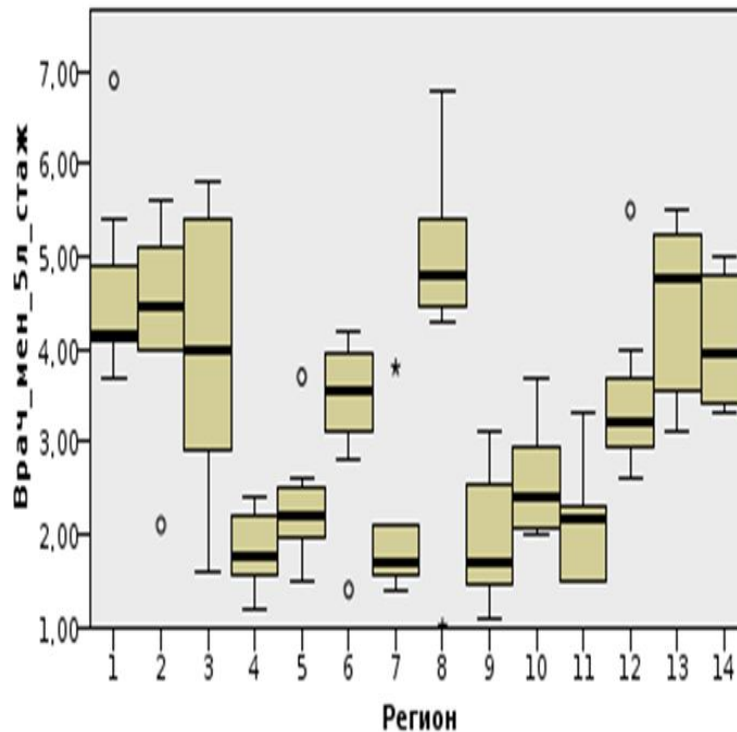
The largest average number of young doctors is in the Khorezm region, and the largest change over the period is in the Bukhara region due to the most significant population growth. The lowest average number of young doctors in the Jizzakh region is 1.83 per 10,000 inhabitants.

Figure 6 - Average medical staff for 10,000 hours
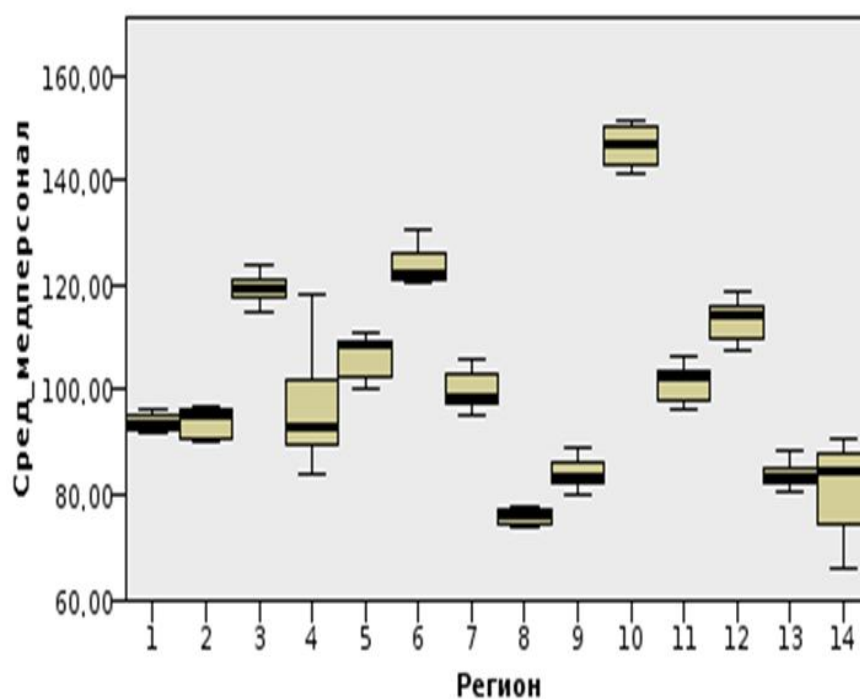
The medical institutions of the Syrdarya region are the most provided with average medical staff (146.64 per 10,000 people), the least – in the Samarkand region (75.93).

Figure 7 - Coverage by professional examination, %
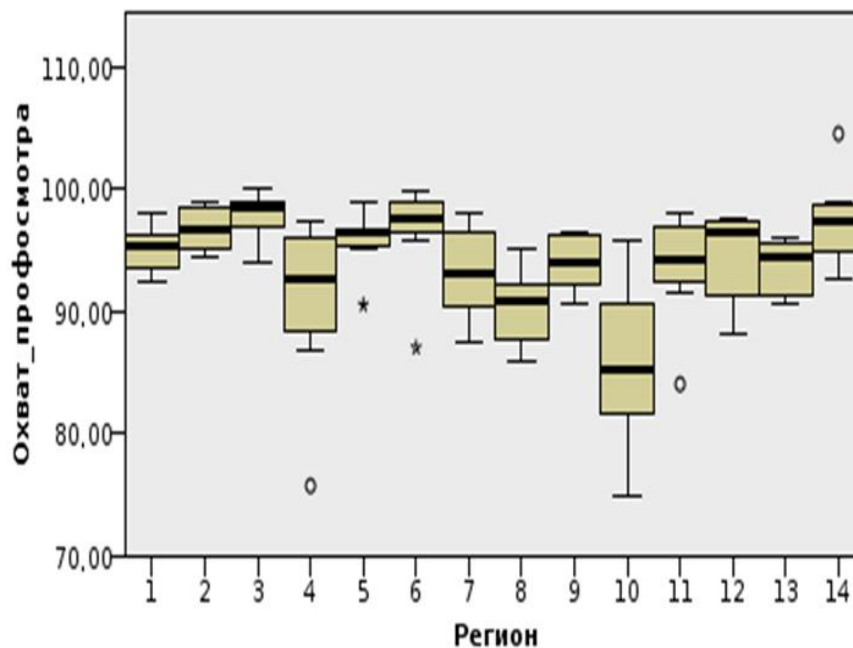
The number of people examined, as a percentage of the number of persons subject to professional examinations, is most common in Tashkent (97.24%), and least in the Syrdarya region (85.65), which is also very significant.

According to all indicators, there are differences in the average values for the regions of the Republic of Uzbekistan. To check whether these differences are not random, but statistically significant, we will use the nonparametric Kruskal-Wallace test.

Table 6 – The Kruskal-Wallace criterion

№	Null Hypothesis	Criterion	Significance	Solution
1	The distribution of the Level of Health is the same for the categories Region.	83,2	,000	The null hypothesis is rejected..
2	The distribution in CM_AP is the same for the Region categories.	98,7	,000	The null hypothesis is rejected.
3	The distribution of Doctors is the same for the Region	105,8	,000	The null hypothesis is

№	Null Hypothesis	Criterion	Significance	Solution
	categories.			rejected..
4	The distribution of the Clinice_men_5l_stage is the same for the Region categories.	66,1	,000	The null hypothesis is rejected..
5	The distribution of Media_medical staff is the same for the Region categories.	103,3	,000	The null hypothesis is rejected..
6	The coverage distribution of the Survey is the same for the Region categories.	46,4	,000	The null hypothesis is rejected..
	The asymptotic signicances are derived. The significance level is ,05.			

According to the calculated criterion, the differences of all factors (for different regions) are not random (the null hypothesis is rejected), but are statistically significant.

Let's determine the influence of the five factors under consideration on the dependent variable Health level using correlation and regression analysis.

Due to the fact that it is more convenient to build the most complete multiple regression models in the GRETL statistical package, we introduce designations for the dependent variable and independent factors (regressors) according to Tab. 7.

Table 7 – Designations used to build a regression model in the GRETL package

Factor	Designation when calculating in GRETL
Dependent variable	
Health Level	UZ
Regressors	
The capacity of outpatient clinics in terms of the number of visits per shift per 10,000 people.	PS

Number of doctors of all specialties per 10,000 people	V
Number of doctors with less than 5 years of experience per 10,000 people	V5y
Number of nursing staff per 10,000 people.	SM
Number of people examined, as a percentage of the number of persons subject to professional examinations	OP

The initial panel data (for 8 years for 14 regions) for further calculations are given in Appendix B.

To do this, we first construct the Pearson correlation matrix.

Table 8 – Correlation coefficients, observations 1:1 - 14:8, 5% critical values (two-sided) = 0.1887 for n = 112

UZ	PS	V	V5y	SM	OP	
1	-0,2351	-0,5092	-0,2921	0,3852	-0,2156	UZ
	1	0,153	0,0221	0,3881	-0,0144	PS
		1	0,6714	-0,1723	0,3307	V
			1	-0,1956	0,1424	V5y
				1	-0,122	SM
					1	OP

The relationship above the average value of 0.5 for the dependent variable UZ is observed only with the regressor V (number of doctors per 10,000 hours), and this relationship is reversed (the "-" sign), which means the following:

- since it was previously established that the health level of military personnel in each of the regions is increasing, the decrease in the number of doctors per 10,000 people is due not to an absolute decrease in the number of doctors, but to an outstripping population growth.;

- the same conclusions are valid for the V5y and OP regressors;

- the most interesting result is a direct relationship with the independent variable SM, which means that the number of average medical staff is growing faster than the population. This fact is favorable, since it is the average medical staff that plays an essential role in conducting medical procedures, medical examinations and professional examinations.

Another fact worth paying attention to when building a multiple regression model is the high relationship between variables V and V5y (0.6714), which may mean that redundancy of variables is possible in the model.

Next, we will build a least squares multiple regression model (OLS model).

LIST OF SOURCES USED

1.   The Law of the Republic of Uzbekistan dated March 27, 2023 №. ZRU-827 "On Amendments to the Code of the Republic of Uzbekistan on Administrative Responsibility in

connection with the establishment of liability for obstructing the legitimate medical activities of a medical worker"

2.   Decree of the President of the Republic of Uzbekistan Sh.M. Mirziyoyev "On comprehensive measures to radically improve the healthcare system of the Republic of Uzbekistan" dated December 7, 2018 [Electronic resource] free access mode https://lex.uz/docs/4143186 (accessed 11/16/2024)

3.   On aPDroval of the regulations on medical and sanatorium-resort provision in the armed forces of the Republic of Uzbekistan. 11.02.2011. Resolution of the Cabinet of Ministers of the Republic   of   Uzbekistan   No.   26. URL:https://www.norma.uz/zdravoohranenie_fizicheskaya_kultura_i_sport_turizm/ob_utverjdeni i_polojeniya_o_medicinskom_i_sanatorno-kurortnom_obespechenii_v_voorujennyh_silah_respubliki_uzbekistan

4.   Regulations on medical examination in the Armed Forces of the Republic of Uzbekistan for peacetime and wartime (APDendix No. 1 to the Decree of the President of the Republic of Uzbekistan dated December 25, 2018 N PD-4076).

5.   Regulations on medical and sanatorium-resort provision in the Armed Forces of the Republic of Uzbekistan, aPDroved by Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated 02/01/2011 No. 26.

6.   Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated 04/30/2024 No. 253 "On aPDroval of the Regulations on the procedure for providing prosthetic and orthopedic products and technical means of rehabilitation to persons in need"

7.   Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated 06/24/2024 No. 352 "On aPDroval of the Regulations on the organization of medical and sanatorium-resort provision in the Armed Forces of the Republic of Uzbekistan".

8.   Resolution of the President of the Republic of Uzbekistan dated December 25, 2018 №. PD-4076 "On aPDroval of the Regulations on medical examination in the Armed Forces of the Republic of Uzbekistan for peacetime and wartime".

9.   Resolution of the President of the Republic of Uzbekistan dated December 25, 2018 №. PD-4076 "On aPDroval of the Regulations on medical examination in the Armed Forces of the Republic of Uzbekistan for peacetime and wartime"

10.   Resolution of the President of the Republic of Uzbekistan dated December 25, 2018 №.PD-4076 "On aPDroval of the Regulations on medical examination in the Armed Forces of the Republic of Uzbekistan for peacetime and wartime" (As amended by Resolutions of the President of the Republic of Uzbekistan dated September 12, 2019 No.PD-4447, December 24, 2019 № PD-4552, Decree of the President of the Republic of Uzbekistan dated 04/22/2020 №UP-5983, Decree of the President of the Republic of Uzbekistan dated 02/27/2021 №PD-5010, Decree of the President of the Republic of Uzbekistan dated 04/30/2021 №UP-6218, Decree of the President of the Republic of Uzbekistan dated 05/04/2021 PD-5102, Decrees of the President of the Republic of Uzbekistan dated 11/29/2021 №UP-26, 04/20/2022 №UP-112, 12/27/2023 №UP-216).

11.   APDendix No. 1 to the Decree of the President of the Republic of Uzbekistan dated 12/25/2018 № PD-4076. Regulations on medical examination in the Armed Forces of the Republic of Uzbekistan for peacetime and wartime.

12.   Paragraph 6.3 of proposal 1 "Organization of voluntary donor activities in organizations of the system of secondary specialized professional and higher educational institutions of the Ministry of Defense and the Ministry of Internal Affairs".

13.   The Charter of the internal service of the Armed Forces of the Republic of Uzbekistan (APDroved by Decree of the President of the Republic of Uzbekistan dated 09.10.1996 N UP-1571)

14.   The concept of development of the healthcare system of the Republic of Uzbekistan for 2019-2025. https://nrm.uz/contentf?doc=570744_&products=1_vse_zakonodatelstvo_uzbekistana

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