"Regional and sectoral wage disparities as a reflection of inequality: The case of Kazakhstan"

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REGIONAL AND SECTORAL WAGE DISPARITIES AS A REFLECTION OF INEQUALITY: THE CASE OF KAZAKHSTAN

Abstract

In today's world, many countries, including Kazakhstan, are facing growing income inequality, poverty, and an increasing polarization of society. These challenges threaten social stability and make it difficult to achieve the Sustainable Development Goals. The purpose of this study is to investigate the size and trends of regional and sectoral wage disparities in Kazakhstan, as well as to create a typology based on the average wage levels in different regions and to provide recommendations for reducing income inequality. The study tested hypotheses about the relationship between the average nominal wage and the level of GRP, level of education, industry specialization, type of ownership, and size of enterprises. The methods of expert survey, correlation, and cluster analysis were used. The study revealed the tendency of increasing inequality of labor income. The largest differences between wages in extractive industries and agriculture were revealed in the Atyrau (11.5) and Mangystau (9.2) regions and Astana (7.2). Differences in average wages between regions were estimated at 1.7 to 7.8 times. The most significant factors affecting the level of average wages are gross regional product per capita and the share of gross value added of the quasi-public sector in the gross regional product. In order to reduce differences in wages, it is recommended to introduce progressive taxation, apply regional increasing coefficients, and calculate the minimum wage based on the hourly wage rate.

Keywords	wages, employment, region, inequality, income, disparities, Kazakhstan
JEL Classification	J31, O15, R58

INTRODUCTION

Social tensions have increased in many countries due to complex economic and geopolitical environments and worsening epidemiological and environmental situations. The reasons are the growing inequality of people's access to resources, large differences in opportunities and incomes due to a decline in production, job losses, disruption of international economic ties and technological chains during pandemics, military conflicts, natural and man-made disasters, which makes it difficult to achieve the global Sustainable Development Goals (UN, 2015). Therefore, more attention has been paid to solving problems of social inequality and poverty issues and studying factors and conditions of increasing differences in income level, including labor income of different population segments in different countries and regions.

The problem of inequality remains very acute, even though the phenomena of extreme poverty have been practically overcome. In Kazakhstan, the differentiation of labor incomes persists. The share of the population with income below the subsistence minimum has increased during the beginning of the pandemic from 4.3% in 2019 to 5.3% in 2020, and in rural areas from 6.6% in 2019 to 7.6% in 2020

(BNS, 2024). Correspondingly, the depth of difference between poor and rich segments of the population is increasing, and inequality in living standards and quality of human capital is increasing.

Besides, Kazakhstan belongs to the countries with a large territory, with regions differing in natural and climatic conditions, resource potential, structure and specialization of the economy, infrastructure provision, transport accessibility, and, consequently, access to effective jobs and level of labor income of the population. For example, in the Turkestan region, the share of poor reached 9.0% in 2023; in Abay region – 8.0%, and in Mangystau – 7.0% (BNS, 2024). Due to inequality in labor incomes, consumer demand decreased, which is known to be the engine of economic growth and social stability. All this makes the study of regional and sectoral wage differences in Kazakhstan relevant, as well as the development of measures to reduce inequality.

1. LITERATURE REVIEW AND HYPOTHESES

Social inequality and its forms remain a pressing research issue. The study of the origins, factors, and consequences of inequality is still a matter of debate. Stiglitz (2012) sees the causes of inequality in the weakness of the middle class, in its inability to support consumer spending, invest in the future, in preferential taxation of speculative transactions, and in the frequency and depth of cycles. Krugman (2013) expresses only agreement regarding the impact of inequality on the loss of human talents and financial crises.

The decline in the share of wages in the GDP is a factor and a reflection of growing inequality. UNDP (2019) noted that the differentiation of labor income is not as great as the differences in capital income, but the reduction in the share of labor income leads to an increase in inequality. UNECE (n.d.) data show that the share of labor in GDP has been increasing in most developed countries but declining in less developed countries. In Kazakhstan, the share of wages in GDP has decreased to 30%. Zhusupova (2021) believed that to reduce inequality, the government of Kazakhstan should expand social support measures and extend their effect. Hammer et al. (2023) and Rosero-Bixby (2024) find that an efficient tax system and job creation help reduce inequality, while an unjustified increase in social benefits can lead to a further increase in income gaps. These measures can generate and increase dependency sentiments; therefore, it is necessary to increase the share of wages in GDP using distribution policy instruments, encouraging labor.

Alesina and Rodrik (1994) examine the impact of policies on income distribution and economic growth using a simple endogenous growth model, where labor and capital are the main factors of production. In this study, inequality is defined by how poor the median voter is relative to the average. The main conclusion is that policies aimed at maximizing growth are optimal only for a government that cares exclusively about pure "capitalists". Dorjnyambuu and Galambosne (2024) note that income from permanent employment contracts, as well as average wages at the bottom of the wage distribution, are crucial for reducing wage inequality. Alesina and Rodrik (1994), Makdissi and Mussard (2008), Howarth and Kennedy (2016), and Yang and Zhang (2024) justify the need to develop a new policy of income distribution and tax policy by differentiating taxes to reduce inequality.

According to Krumm (1983), differences in wages may be compensation for differences in the specific conditions of the region. Bucci (1993), Gilbert et al. (2003), and Ananian and Dellaferrera (2024) note that 79% of the world's poor live in rural areas, and wages are, on average, 24% lower. They associate the wage gap with a lack of quality jobs in the rural labor market and informal employment, and half of the gap is associated with education and professional training. There are opposing positions in assessing the factors that narrow the gap between urban and rural residents. Jumambayev and Kozhakhmetova (2019) conclude that in Kazakhstan, internal migration leads to narrowing the gap. However, Zhang et al. (2016) and Xu and Li (2014) note a growing income gap between urban and rural residents in China, which contradicts theoretical assumptions about the possibility of narrowing the gap between urban and rural areas through migration.

Leamer et al. (1999), Berisha et al. (2021), Gemicioglu et al. (2024), and Kim et al. (2020) note that oil-rich regions are more vulnerable to rent-seeking behavior. Negative aspects include from-due to weak institutions, corruption, the concentration of resources in the hands of certain groups, which can negatively affect the income distribution gap, and commodity price shocks, which can increase income inequality. This is reflected in the growing wage gap between CEOs and workers of oil companies (Bailout Watch, 2021). In this regard, it is interesting to consider the polarization of labor, which means a growing concentration of employment in professions with the highest and lowest wages. Jaimovich and Siu (2018), Cantarella and Kavonius (2024), and Barany and Siegel (2018) match labor polarization with structural changes in the economy, decreasing employment in routine, disappearing medium professions, and the redistribution of employment in the services sector.

Cowell and Fiorio (2011), Nord (1980), Taresh et al. (2021), Sulemana et al. (2019), Marcus et al. (2015), Wan and Zhou (2005), Apostu (2018) use the decomposition method of factors by sources based on regression. Wang and Lu (2021) and Brauksa (2013) have developed applications of cluster methods.

This literature review showed a complex interaction of factors causing wage differences and wage inequality. Such factors include a decline in the share of wages in the GDP, income distribution and taxes, differences between agrarian and industrial regions, the impact of the abundance of natural resources, and the structure of the regional economy, non-financial corporations, and the public sector. Reducing sectoral and regional imbalances in wages is necessary to increase the share of labor income and improve fiscal policy. However, the scale, dynamics, and factors of wage imbalances in regional and industry aspects have not yet been sufficiently studied.

The purpose of this paper is to investigate the size and trends of regional and sectoral wage disparities in Kazakhstan, as well as to create a typology based on the average wage levels in different regions and to provide recommendations for reducing income inequality. The following hypotheses were put forward:

H1: *The specialization by industry has a close relationship with the level of average nominal wage in the region.*

H2: *The presence of large industrial enterprises influences the level of average nominal wage in the region.*

H3: *The share of gross value added of quasi-public sector enterprises in the gross regional product of the region influences the level of average nominal wage.*

H4: *The level of average nominal wage in the region depends on the level of the gross regional product.*

H5: *The gross regional product per capita affects the level of average nominal wage in the region.*

H6: *Share of employed people with higher education correlates with the level of income level in the region.*

H7: *The share of employed people with secondary technical and vocational education influences the level of the average wage in the region.*

H8: *The level of average nominal wage in the industry depends on the presence of large industrial enterprises.*

H9: *The level of education of the population influences the level of average nominal wage in the industry.*

H10: *The form of ownership of enterprises influences the level of average nominal wage in the industry.*

2. METHODOLOGY

The study of the of labor income imbalances in regional and sectoral aspects, identification and assessment of influence main factors of wages in Kazakhstan were conducted according to the following algorithm:

- forming the list of possible factors influencing the level of wages (regional and sectoral);

- surveying experts to identify significant factors;

- grouping the factors;

- assessing research information base;

- collecting statistical data for economic-statistical, correlation, factor and cluster analysis;

- assessing correlation dependence of the level of wages on factors (regional and sectoral);

- doing cluster analysis, typology of regions by wage level;

- developing recommendations.

The indicative method was used to identify the inequality of labor income of the population of Kazakhstan. The method of expert questionnaire survey, correlation analysis, factor analysis, cluster analysis, and typology were used to identify factors affecting wages and assess the degree of their influence. Available statistical data on the size and dynamics of wages were used to assess regional and sectoral imbalances. The indicator of nominal average wage corresponded to these requirements and the chosen methodological approach. The study results were obtained based on the use of literary and Internet sources, scientific developments on the problem of income inequality, and analysis of data from the Bureau of National of Kazakhstan. A limitation of the study was the lack of absolute values of real wages in the regions of Kazakhstan, as well as changes in the administrative-territorial structure of the country in 2018 and 2022, because of which comparable data were not available for the newly formed regions.

An expert survey was conducted to determine the extent of the influence of factors on wage levels in regional and sectoral contexts. Two questionnaires were developed for these purposes, including 18 questions on potential regional factors and 12 on industry factors. The respondents included 12 economists whose research interests focus on labor and wage issues, income inequality, and social problems (Table 1).

Table 1. Information on interviewed experts

Characteristics	Frequency
Age	
30-40 years old	22
40-50 years old	35
50-60 years old	16
Over 60 years old	14
Gender	
Male	55
Female	32
Field of activity	
Public administration	38
Business	37
Science	12
Professional experience	
10-20 years	6
20-30 years	28
30-40 years	32
40-50 years	17
More than 50 years	4
Leadership experience	
Top-level management	24
Mid-level management	47
First level management	16

Additionally, representatives from government bodies and business structures across 20 regions of the country participated in the survey. All experts have significant experience and a strong research background on the topic, as well as a high level of expertise, which substantiates the quantitative adequacy of responses from 87 respondents and the representativeness of the sample. The primary criterion for forming the sample was the qualitative characteristics of the interviewees.

Table 2 presents the selection of the most significant factors and their grouping by importance for subsequent quantitative analysis of the degree of their influence. The next stage of the study was to assess the availability, completeness, and reliability of information support with the necessary official statistical data for further economic and mathematical analysis. The central hypothesis of the study was the assumption that the size of regional and sectoral imbalances in labor income depends on a significant number of factors. Several hypotheses were additionally put forward to select the most significant factors and assess the degree of their influence on average wages in regional and sectoral aspects.

Table 2. List of indicators

	Factors	Influence level	Analyzed indicators	Code
Factors of regional influence	Level of specialization	Very strong influence	Coefficient of specialization by share of dominant industry	LS
	Size and form of ownership of enterprises	Very strong influence	Number of large operating enterprises	NLE
			Share of large enterprises in the total number of enterprises	SLE
			GVA of the quasi-public sector in the gross regional product	GVAQPS in GRP
			GVA of the quasi-public sector	GVAQPS
	Gross Regional Product	Strong influence	Gross Regional Product per capita	GRPPC
			Gross Regional Product, billion KZT	GRP
	Level of education of the population	Strong influence	Share of employees with HPE in the total number of employees, %	SHPE
			Share of employees with secondary technical and professional education (TPE), %	STPE
Factors of industry influence	Size and form of ownership of enterprises	Very strong influence	GVA of large enterprises of the quasi-public sector	GVALEQPS
			Share of GVA of large enterprises of quasi-public sector,%	SGVALEQPS
	Level of education of the population	Strong influence	Number of employees with higher and postgraduate education, people	NHPE
			Number of employees with secondary technical and professional education, people	NTPE
			Share of employees with HPE in the total number of employees, %	SHPE
			Share of employees with secondary technical and professional education, %	STPE

Note: The quasi-public sector includes state enterprises, national companies, limited liability partnerships, and joint-stock companies, in which the state is a founder, participant, or shareholder.

To identify the dependence of wage level on the analyzed factors, a correlation analysis based on the calculation of the Pearson correlation coefficient was used:

$$r_{xy} \frac{\sum \left(x_i - \overline{x} \right) \cdot \left(y_i - \overline{y} \right)}{\sqrt{\sum \left(x_i - \overline{x} \right)^2 \cdot \left(y_i - \overline{y} \right)^2}}, \tag{1}$$

where r_{xy} is the Pearson correlation coefficient; x_i is the values of variable X; y_i is the values of variable Y; $\overline{x}$ is the arithmetic mean for variable X; $\overline{y}$ is the arithmetic mean for variable Y.

The study sets the following tasks for correlation analysis:

- assessing interdependent factors affecting the level of average nominal wages in the region;

- identifying key factors contributing to the level of GRP;

- testing hypotheses about the existence of key factors.

When interpreting the results of the correlation analysis, the following groups of Pearson correlation coefficients were used: $r>0.01 \leq 0.29$ – weak positive relationship; $r>0.30 \leq 0.69$ – moderate positive relationship; $r>0.70 \leq 1.00$ – strong positive relationship; $r>-0.01 \leq -0.29$ – weak negative relationship; $r>-0.30 \leq -0.69$ – moderate negative bond; $r>-0.70 \leq -1.00$ is a strong negative bond.

3. RESULTS AND DISCUSSION

The labor share of GDP provides information on what proportion of output is paid out as compensation to workers compared to the proportion paid out to capital. It is obvious that the share of labor in Kazakhstan's GDP is decreasing, and therefore the problems of distribution of labor income are becoming increasingly acute. Significant regional differences in the level of economic development and quality of life of the population in Kazakhstan are due to the wide variety of natural and climatic conditions and existing industrial specialization of the regions. Regional differences in economic development are most clearly demonstrated by the analysis of the GRP per capita indicator, which is

Labor share of GDP, %
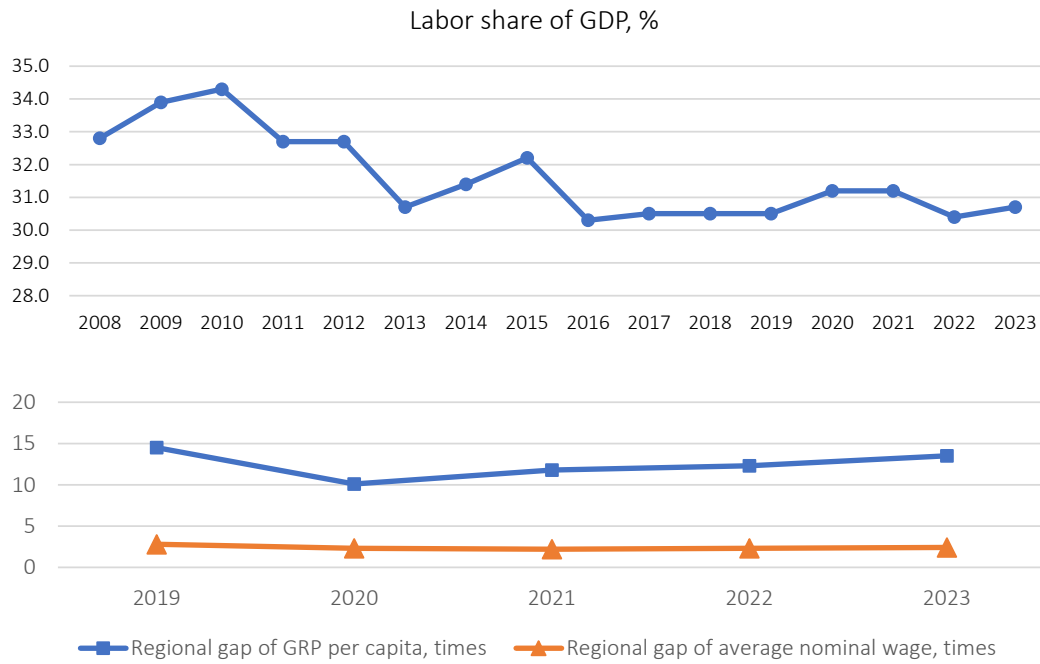
Figure 1. Dynamics of labor share in GDP and regional differences
by GRP per capita and average nominal wages

the average nominal wage by region (Figure 1). Therefore, regional differences in GRP per capita are from 14.5 to 13.5 times. Oil-producing regions have the highest indicators of GRP and GRP per capita, but the largest wage imbalances.

The ratio of median and modal wages to the average wage requires attention. The largest gap between the median and average wages is in the Atyrau and Mangistau regions and Astana city, from 51% to 62%. In 16 regions, the modal wage is less than 40% of the average wage, of which in eight regions, it is less than 30% of the average wage (Figure 2). The increasing inequality in labor income and polarization of labor are obvious in all regions.
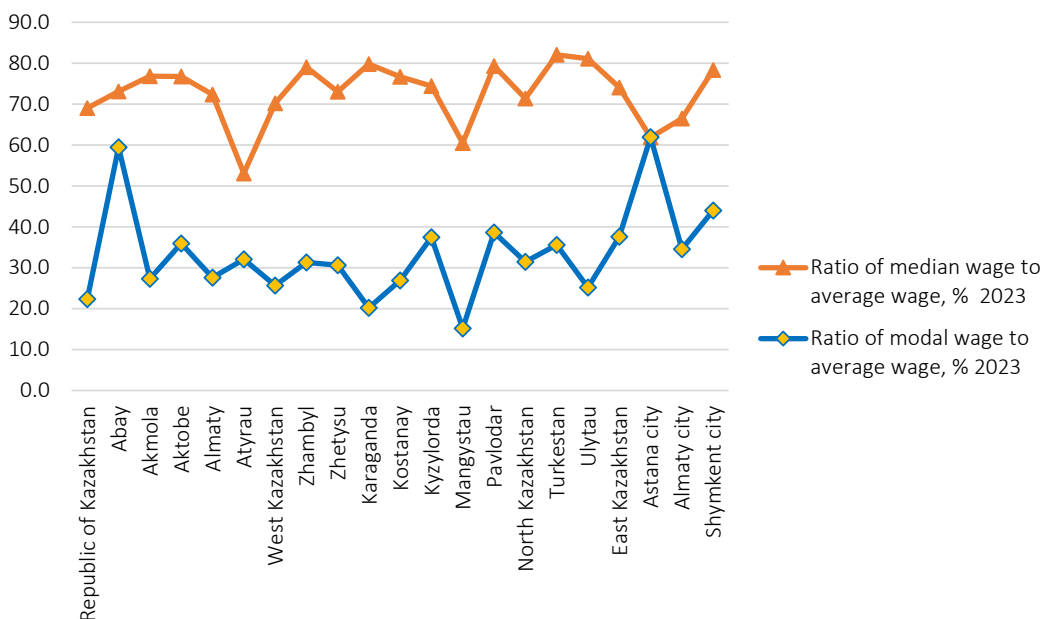
Figure 2. Ratio of median and modal wage to the average wage in Kazakhstan, %

This situation causes great concern because the labor market in Kazakhstan is extremely distorted, and there are significant imbalances. This can have different consequences:

1. Social conflicts and protests that regularly take place in oil-producing regions.

2. Demographic consequences due to labor emigration and replacement by low-skilled migrant workers, as evidenced by migration data.

3. Consequences for economic growth due to stagnation in the quality of the labor force.

Differences in labor income are also observed at the sectoral level. Sectors of the economy, due to technological features, differ significantly in labor intensity and wages. Therefore, the paper studied sectoral differentiation in wages by region but included indicators only for the main sectors of the economy for comparison (Appendix A). The analysis showed that regions of Kazakhstan are also characterized by sectoral differentiation of average wages. The highest level is in mining, professional and technical, financial, and insurance activities. The lowest wages are in agriculture.

Besides, income is also generated through personal subsistence farming and other types of self-employments in rural areas. As calculations have shown, the sectoral wage differentiation was 3.3 times. The highest differences in wages were between the mining industry and agriculture in the Atyrau, Mangystau, and Astana regions. In the Atyrau and Mangystau regions, the difference was

11.5 and 9.2 times, respectively, and in Astana, it was 7.2 times. Regional and sectoral wage disparities are also significant, ranging from 1.7 times to 7.8 times the average wage. This is due to the specialization of different regions of Kazakhstan in certain sectors of the economy. The disparity in wages in the agricultural sector compared to industry and services in Kazakhstan is apparent. This plays an important role in the size of disposable income in urban and rural areas. The income of 12.3% of the urban population and 24.7% of the rural population does not exceed the national average subsistence level (Figure 3).

External migration also plays a significant role in shaping the structure of the labor force, polarization of employment, and wage differentiation in Kazakhstan (Figure 4).

Since 2013, there has been a negative migration situation in Kazakhstan, and the external outflow of the population has increased. In the outflow structure, a significant share was occupied by specialists with higher education, and in the inflow structure – by migrants with secondary education; that is, for a long time, there was a process of talent loss. Additional analysis was conducted according to the developed methodology to investigate the reasons for the significant regional and sectoral differences in wages and to evaluate the impact of the most critical factors.

The results of the correlation analysis indicate a strong positive dependence of the level of average nominal wages in the regions with the value of GRP per capita (0.846) and the share of GVA of

Figure 3. Distribution of population by the size of average per capita monetary income
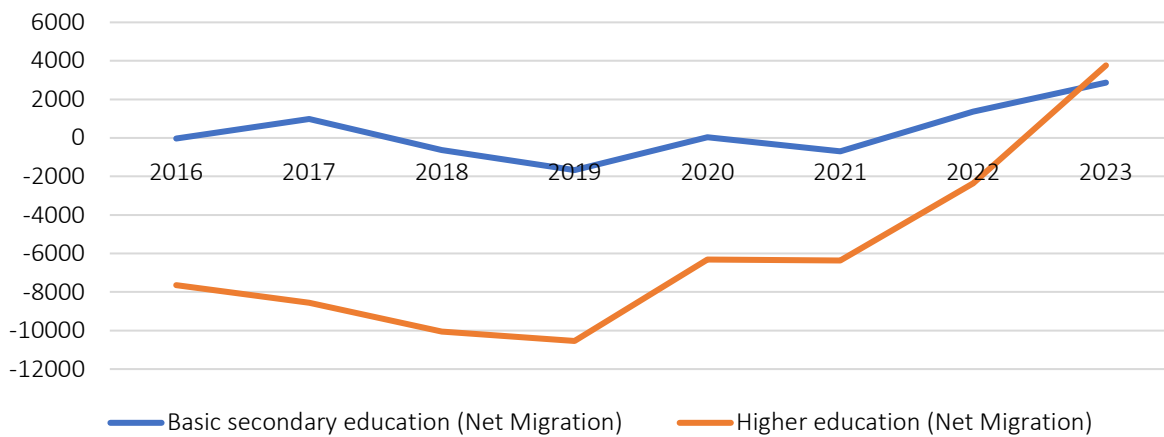
Figure 4. External migration of the population over 15 years of age by level of education

the quasi-public sector in the GRP of the region (0.854) (Table 3).

The high degree of correlation is also confirmed by the significance coefficients of the obtained dependencies (0.000), which meet the requirement ($p <$ 0.05). Significant factors in the industry aspect are the GVA of large enterprises of the quasi-public sector (0.602) and the share of GVA of large enterprises of the quasi-public sector (0.601). In all other cases, the level of this coefficient also indicates the absence of correlation. The logic of the correlation analysis is as follows: an increase in GRP per capita contributes to an increase in the level of average wages in the region; the higher the level of gross value added of the quasi-public sector in the GRP of the region, the higher the average wage in the

region. Calculations have shown that an increase in the GVA level of the quasi-public sector in GRP and its share contributes to an increase in average nominal wages in sectors of the economy (Table 4). Thus, the correlation analysis confirms H3, H5, H8 and H10, showing a significant positive relationship.

The advantage of using correlation analysis is the use of many factors, determining the significance of a particular factor at the time of study. This method of analysis allows one to additionally identify and consider factors of great importance, since their influence is currently maximum and, thus, to reduce the number of indicators selected for further analysis that affect the level of average nominal wages. The need for cluster analysis is due to the dynamism of factors affecting the level

Table 3. Correlation matrices of the dependence of the average nominal wage on factors in the regional aspect

Correlation results		Factors								
		Specialization	Size and form of ownership of enterprises				Gross Regional Product		Level of education of the population	
		LS	NLE	SLE	GVA QPS in GRP	GVA QPS	GRP PC	GRP	SHPE	STPE
2021										
ANW	Pearson correlation	0.271	0.118	0.314	0.388	0.854	0.846	0.165	0.287	0.157
	Value (double-sided)	0.276	0.642	0.205	0.112	0.000	0.000	0.514	0.248	0.535
	N	18	18	18	18	18	18	18	18	18
2022										
ANW	Pearson correlation	0.404	0.095	0.350	0.373	0.783	0.814	0.143	0.145	0.044
	Value (double-sided)	0.069	0.682	0.120	0.096	0.000	0.000	0.537	0.532	0.849
	N	21	21	21	21	21	21	21	21	21

Note: Calculated in SPSS.

Table 4. Correlation matrices of the dependence of average nominal wages on factors in the industry aspect

Correlation results		Factors					
		Size and form of ownership of enterprises		Level of education of the population			
		GVALEQPS	SGVALEQPS	NHPE	NTPE	SHPE	STPE
2021							
ANW	Pearson correlation	0.602	0.601	−0.145	−0.199	−0.146	−0.199
	Value (double-sided)	0.006	0.006	0.554	0.415	0.552	0.415
	N	19	19	19	19	19	19
2022							
ANW	Pearson correlation	0.641	0.641	−0.185	−0.152	−0.184	−0.151
	Value (double-sided)	0.003	0.003	0.449	0.535	0.450	0.537
	N	19	19	19	19	19	19

Note: Calculated in SPSS.

of wages and significant differences in their levels across the regions of the country. In this regard, based on cluster analysis, the homogeneity of the regions was compared according to the factors that had the greatest impact on regional wages in 2016 and 2022, which made it possible to identify the changes in dynamics. The following indicators were identified as determinants. The cluster analysis was carried out in seven steps:

1. The object of the study was determined: 16 regions in 2016 and 20 regions in 2022, including Shymkent, three new regions of Abay, Zhetysu, and Ulytau.

2. Selected indicators include three items (average nominal salary, GRP per capita, and the share of quasi-public sector GVA in GRP).

3. Metric of similarity of objects was determined; the method of measuring distance is the Squared Euclidean distance:

$$d(X,Y) = \sum_{i=1}^{m}(X_i - Y_i)^2, \qquad (2)$$

where $d(X,Y)$ –is the distance between objects X and Y.

4. Method of cluster analysis was defined – intergroup linkage (between-groups linkage), i.e. the distance between clusters, which is equal to the average value of all distances between all possible pairs of points from both clusters.

5. Optimal number of clusters was determined – 5 (Figure 5).
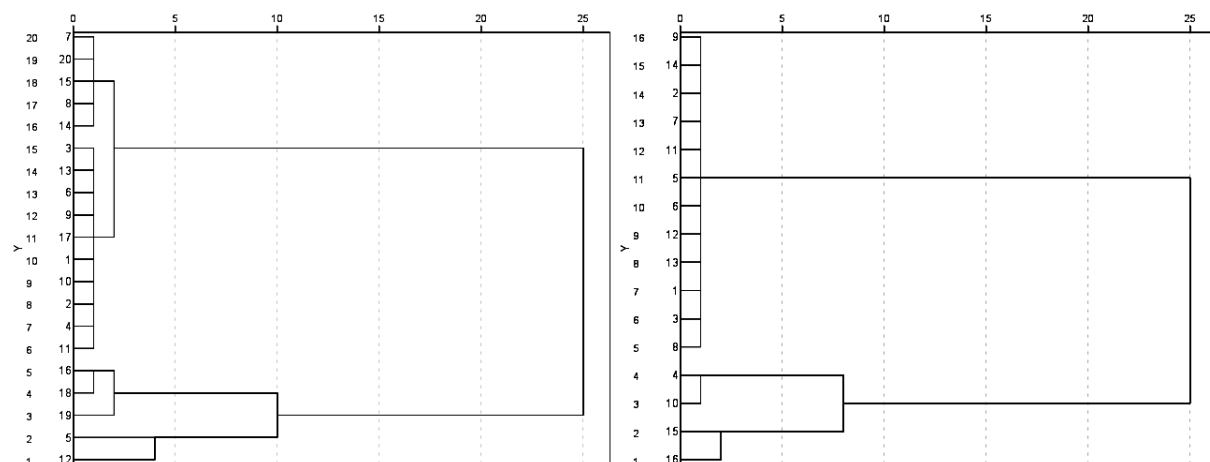
Note: Calculated in SPSS.

Figure 5. Dendrogram with the use of the intergroup linkage method

6. Clusters were analyzed, and the conclusions were formulated.

The results of cluster analysis in 2016 and 2022 indicate noticeable changes in the field of wages by region: structural, quantitative, and qualitative changes in clusters were noted due to a decrease in their homogeneity, the allocation of new regions (Abay, Zhetysu, Ulytau, and Shymkent), as well as significant differences in analyzed factors in the regions. Cluster typology of regions explained the belonging of regions to the clusters obtained by the influence of factors on the level of average nominal wages in 2016 and 2022 (Table 5).

According to 2016 data, three clusters have been allocated. The highest results are typical for the second cluster, which unites the Atyrau and Mangystau regions, leading to two analyzed indicators (the level of GRP and GRP per capita). In terms of the share of gross value added in the quasi-sector in GRP, the third cluster is in the lead, which includes Astana and Almaty. This cluster holds the second position in the other two indicators. Most of the regions are assigned to the third cluster, which shows the lowest indicators for all the analyzed indicators.

According to 2022 data, the situation in the country has changed markedly: the number of types of regions has increased to five. The Atyrau and Mangystau regions, which are included in cluster 5, have retained their leadership; moreover, they demonstrated the highest results in all three indicators. The second position in the overall ranking falls on the third cluster, which includes the Ulytau region and Astana, which occupy second place in terms of the level of average nominal wages and the share of gross value added in the quasi-sector in GRP. In terms of GRP per capita, this cluster occupies the third position, behind Almaty, which has become a separate independent cluster 3. This metropolis also entered the top three in other analyzed indicators. The indicators of the second cluster, which included 10 regions of the country, are noticeably lower. The regions of this cluster occupy the fourth line in the ranking by all indicators. And finally, the cluster 1 rating list is completed, showing the worst result and uniting five regions: Zhambyl, Turkestan, North Kazakhstan regions, Shymkent, and the Zhetysu region. Thus,

cluster analysis identified the main clusters of regions, which makes it possible to analyze specifics of the formation of average nominal wage level and identify existing similar problems and ways to solve them. The identified cluster differences should be considered when developing additional growth points for regional economies and ensuring greater balance in household incomes.

The analysis showed that the main results are consistent with the findings of other researchers (Barany & Siegel, 2018; Cowell & Fiorio, 2011; Nord, 1980; Taresh et al., 2021) on the issues of regional and sectoral differentiation of wages and incomes. The strong influence of the oil factor and the quasi-public sector in Kazakhstan ensures a high level of average wages in the oil regions – the Atyrau and Mangistau regions and Astana. However, these regions have different manifestations of income inequality. Thus, the Mangistau region has the lowest level of modal wages and inequality. In Astana, modal and average wages are the same. In Atyrau, modal wages are more than 2 times higher than the average national level of modal wages.

In agricultural regions (North Kazakhstan, Zhambyl, Turkestan, and Kostanay regions), the lowest level of average wages is observed. In agricultural regions located in the zone of influence of two megacities – Almaty and Astana – the level of wages is below average. The metropolis of Shymkent demonstrates a relatively low level of average wages, which is due to spatial-demographic and migration features, namely its location in the labor-surplus southern region, which was confirmed by cluster analysis.

A study of the impact of regional and industry factors showed that the level of average nominal wages by region is directly dependent on the value of GRP per capita and the share of gross value added of the quasi-public sector in GRP. Cluster analysis for three indicators – average nominal wages, GRP per capita, and the share of GVA of the quasi-public sector in GRP – revealed a change in the typology of regions. In 2022, the fifth cluster consisted of non-regional regions with the highest indicators, ahead of Almaty (cluster 4) and Astana (cluster 3). The first cluster consisted of five regions (Zhambyl, Turkestan, Zhetysu, North Kazakhstan regions, and the city of Shymkent)

Table 5. Cluster typology of regions in Kazakhstan

Cluster No.	Regions	ANW, KZT	GRP per capita, USD	GVA share of quasi-public sectors in GRP, %
			2016	
Cluster 1	Kyzylorda	118963	4971.7	14.2
	East Kazakhstan	118736	5862.8	19.7
	Aktobe	117446	7203.9	4.5
	Karaganda	96044	3105.9	2.4
	Pavlodar	122633	7619.0	8.9
	West Kazakhstan	136675	9293.3	2.6
	Zhambyl	96044	3105.9	4.3
	North Kazakhstan	97344	4737.5	5.2
	Turkestan	99182	2850.4	16.6
	Akmola	104816	5313.9	3.9
	Almaty	104903	3256.4	4.5
	Kostanay	107997	5047.3	3.4
Average indicator of Cluster 1		**110065.25**	**5197.33**	**7.5**
Cluster 2	Atyrau	268441	25289.6	54.4
	Mangystau	250787	11341.5	18.8
Average indicator of Cluster 2		**259614.0**	**18315.55**	**36.6**
Cluster 3	Astana	212848	15411.8	71.9
	Almaty	178678	17940.4	17
Average indicator of Cluster 3		**195763.0**	**16676.1**	**44.5**
			2022	
Cluster 1	Zhambyl	234526	4918.3	2.9
	Shymkent	234729	5840.0	2.3
	Turkestan	237189	3619.3	5.6
	Zhetysu	229760	4312.7	3.9
	North Kazakhstan	227021	8591.7	2.2
Average indicator of Cluster 1		**232645.00**	**5456.40**	**3.4**
Cluster 2	Aktobe	274401	10152.4	3.4
	Pavlodar	273505	12006.8	4.7
	West Kazakhstan	276191	13942.8	1.6
	Karaganda	283803	14153.5	1.4
	East Kazakhstan	287063	11571.4	18.3
	Abay	250155	8210.1	6.3
	Kostanay	250943	10853.7	1.6
	Akmola	258941	9259.0	2.4
	Almaty	261228	6183.3	1.5
	Kyzylorda	265738	6132.7	7.4
Average indicator of Cluster 2		**268196.8**	**10246.57**	**4.9**
Cluster 3	Ulytau	402561	16438	3.0
	Astana	406920	17117	33.3
Average indicator of Cluster 3		**404740.50**	**16777.25**	**18.2**
Cluster 4	Almaty	354 860	19424.9	8.8
Average indicator of Cluster 4		**354 860**	**19424.9**	**8.8**
Cluster 5	Atyrau	523 210	44608.2	47.3
	Mangystau	459 953	11635.3	15.5
Average indicator of Cluster 5		**491581.50**	**28121.75**	**31.4**

Note: Calculated in SPSS.

Table 6. Hypothesis testing results

	Hypothesis	Result	
H1	The specialization by industry has a close relationship with the level of average nominal wage in the region	LS → ANW	No
H2	The presence of large industrial enterprises influences the level of average nominal wage in the region	NLE → ANW, SLE → ANW	No
H3	The share of gross value added of quasi-public sector enterprises in the gross regional product of the region influences the level of average nominal wage	GVAQPS → ANW	Yes
H4	The level of average nominal wage in the region depends on the level of the gross regional product	GRP → ANW	No
H5	The gross regional product per capita affects the level of average nominal wage in the region	GRPPC→ ANW	Yes
H6	Share of employed people with higher education correlates with the level of income level in the region	SHPEVANW	No
H7	The share of employed people with secondary technical and vocational education influences the level of the average wage in the region	STPEVANW	No
H8	The level of average nominal wage in the industry depends on the presence of large industrial enterprises	GVALEQPS → ANW	Yes
H9	The level of education of the population influences the level of average nominal wage in the industry	SHPEVANW, STPEVANW	No
H10	The form of ownership of enterprises influences the level of average nominal wage in the industry	SGVALEQPS→ ANW	Yes

with the lowest indicators. The second cluster consisted of 10 regions with more stable indicators (Aktobe, Pavlodar, West Kazakhstan, Karaganda, East Kazakhstan, Kostanay, Akmola, Almaty and Kyzylorda, Abay regions). Thus, the economic-statistical, correlation, factor, and cluster analysis methods showed similar results in assessing the significance of factors and differences in the level of wages between the regions of Kazakhstan. Future research on wage and income inequality needs to take a deeper look at the impact of the quality of external migration on labor market polarization, as new trends in youth labor emigration have emerged in Kazakhstan. The results of the hypothesis testing are presented in Table 6. As can be seen from the table, four of the ten initially formulated hypotheses were confirmed.

The analysis showed the influence of the size of enterprises and the form of ownership on the level of inequality in wages in industries and regions, while GRP per capita has an impact at the regional level.

CONCLUSION

The purpose of this study was to investigate the size and trends of regional and sectoral wage disparities in Kazakhstan, as well as to create a typology based on the average wage levels in different regions and to provide recommendations for reducing income inequality. The analysis has shown a decrease in the wage share of GDP, reflecting growing inequality and a distribution of production outcomes favoring capital, as well as an exacerbation of wage inequality issues. This is reflected in the dynamics of inequality in wages by regions and industries, the gap between the average and modal wages. The highest wages are typical for the extractive industries and the smallest – for agriculture.

The largest differences in wages are observed between the mining industry and agriculture in Atyrau, Mangistau, and Astana. Correlation analysis revealed a strong positive relationship between the level of average nominal wages and the value of GRP per capita and the share of GVA of the quasi-public sector in the GRP of the region, and in the sectoral aspect, a close relationship is found with the presence and contribution of large enterprises of the quasi-public sector. The large impact of the GVA of the quasi-public sector on the level of labor income is explained by the fact that this sector is home to the largest enterprises, including those in the oil and gas industry, with high wages. The cluster analysis results revealed increasing heterogeneity in wages across regions and differences in factors.

Significant regional and inter-sectoral wage disparities could be reduced through a set of wage regulation measures. These include enhancing fiscal policy tools, particularly shifting from a flat tax rate to a progressive one, based on the experience of many countries. An important direction should be the improvement of labor relations legislation, mechanisms for resolving labor disputes, and industry agreements between employers and employees on types and amounts of compensatory and incentive payments and wage bonuses. To mitigate wage inequality, applying regional climate coefficients for areas with extreme natural and climatic conditions would be advisable.

AUTHOR CONTRIBUTIONS

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APPENDIX A

Table A1. Regional and sectoral disparities s of the average monthly nominal wage in Kazakhstan, USD

Regions	Agriculture	Mining	Manufacturing	Construction	Trade	Transportation and warehousing	Information and communication	Financial and insurance	Professional, scientific, and technical activities	Public administration and defense; social security	Coefficient of sectoral differences by regions, times (max/min)
Republic of Kazakhstan	354	1183	649	706	511	686	799	1093	889	490	**3.3**
Akmola	415	783	543	498	478	521	463	621	441	419	**1.9**
Aktobe	278	762	586	524	394	649	508	744	543	437	**2.7**
Almaty	374	505	650	492	413	589	431	615	357	410	**1.8**
Atyrau	243	2806	1043	1022	494	895	551	890	2030	484	**11.5**
West Kazakhstan	312	2857	486	671	396	593	428	688	446	440	**9.2**
Zhambyl	234	698	428	429	328	559	477	607	492	425	**3.0**
Karaganda	386	856	785	610	419	604	667	640	503	462	**2.2**
Kostanay	313	707	456	459	391	538	456	639	423	441	**2.6**
Kyzylorda	263	890	389	371	365	638	676	698	594	541	**3.4**
Mangystau	345	1831	878	801	387	855	511	841	776	482	**5.3**
Pavlodar	364	705	666	515	392	554	524	639	492	468	**1.9**
North Kazakhstan	284	697	387	441	315	578	492	729	340	441	**2.5**
Turkestan	417	854	302	360	353	677	324	680	478	444	**2.8**
East Kazakhstan	506	882	771	590	416	514	531	614	638	418	**2.1**
Astana	434	3120	765	736	593	859	1078	1540	1353	830	**7.2**
Almaty	300	1438	603	706	657	848	866	1386	965	561	**4.8**
Shymkent	345	401	457	403	396	566	460	623	438	461	**1.8**
Coefficient of regional and sectoral, times (max/min)	**5.1**	**7.8**	**2.7**	**2.8**	**2.1**	**1.7**	**3.3**	**2.5**	**6.0**	**2.0**	