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Gender Wage Gaps and Human Capital in Kazakhstan: Evidence from Aggregate Wage Statistics

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Abstract

Gender disparities in labour remuneration remain a significant challenge for the effective utilisation of human capital and the achievement of inclusive economic development in Kazakhstan. This study examines the dynamics of gender wage inequality, assesses earnings differences by educational attainment, and interprets these patterns in relation to labour market structure. The empirical analysis draws on official statistics on average monthly wages by gender for 2015–2024, hourly earnings for 2021–2025, educational wage differentials for 2025, and published microeconometric studies of Kazakhstan's labour market. The methodological framework combines descriptive statistical analysis, Pearson and Spearman correlation coefficients, first-difference sensitivity analysis, subperiod comparisons, and ordinary least squares trend estimation. The findings indicate that the unadjusted monthly gender wage gap declined from 34.1% in 2015 to 21.7% in 2021 before widening to 26.5% in 2024. The hourly wage gap increased to 22.4% in 2025. In the pooled educational comparison, employees with higher and postgraduate education earned 71.8% and 132.2% more, respectively, than employees with secondary education. However, these educational wage premiums cannot be interpreted as gender-specific returns to human capital. The study contributes an integrated analytical framework that distinguishes human capital accumulation, labour market allocation, and remuneration. The results highlight the importance of examining occupational and sectoral employment patterns alongside educational qualifications when assessing gender wage inequality.

Keywords: Gender, Gender Inequality, Gender Segregation, Human Capital, Education, Educational Attainment, Wage Dynamics

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1. INTRODUCTION

Human capital is a fundamental determinant of labour productivity, individual earnings, and sustainable economic development. Investment in education, professional training, and occupational experience contributes to workers' productive capabilities and employment opportunities (Becker, 1964; Mincer, 1974). However, the economic benefits of human capital depend not only on educational attainment but also on access to employment opportunities and the conditions under which acquired qualifications are rewarded. Gender wage inequality demonstrates that comparable educational achievements do not necessarily translate into equivalent labour market outcomes (Blau & Kahn, 2017).

Gender differences in earnings reflect a complex interaction of educational characteristics, occupational segregation, sectoral wage structures, employment histories, and career advancement opportunities. International research indicates that improvements in women's educational attainment alone cannot eliminate persistent remuneration disparities (Blau & Kahn, 2017). This distinction is particularly relevant in economies characterized by substantial differences in wages across industries and occupations.

Kazakhstan provides an important context for examining the relationship between human capital and gender wage inequality. Previous studies have identified gender differences in educational returns, qualification mismatch, and industry-related earnings disparities (Abdulla & Serikbayeva, 2024; Kemelbayeva, 2020; Nurshatayeva, 2017; Serikbayeva & Abdulla, 2022). These findings suggest that labour market outcomes depend not only on accumulated qualifications but also on how workers are distributed across employment opportunities with different remuneration conditions.

Official statistics reveal substantial changes in gender earnings inequality in Kazakhstan (Bureau of National Statistics, 2025; Kuatova, 2021). Between 2015 and 2024, average nominal monthly wages increased from KZT 151,694 to KZT 468,914 for men and from KZT 99,911 to KZT 344,496 for women. Although the unadjusted gender wage gap fell from 34.1% in 2015 to 21.7% in 2021, it widened again to 26.5% in 2024. This reversal demonstrates that increasing nominal wages do not necessarily ensure convergence in relative earnings between women and men.

Educational wage statistics provide an additional perspective on human capital utilisation. In 2025, employees with higher education earned an average of KZT 497,563, compared with KZT 289,673 among employees with secondary education, while postgraduate employees earned KZT 672,493 (Bureau of National Statistics, 2025). These differences correspond to pooled educational wage premiums of 71.8% and 132.2%, respectively. However, aggregate educational comparisons cannot establish gender-specific returns to schooling because they do not control individual characteristics or distinguish earnings by gender within educational categories.

Despite the growing literature on gender wage inequality in Kazakhstan, an important analytical challenge remains: integrating recent aggregate wage dynamics with existing microeconometric evidence without conflating descriptive differences with causal mechanisms. In particular, the renewed widening of the wage gap after 2021 requires examination alongside evidence on education, occupational allocation, and sectoral remuneration structures.

This study assesses gender wage inequality in Kazakhstan, examines aggregate educational wage differentials, and interprets the relationship between human capital and earnings disparities. The analysis addresses changes in monthly wages during 2015–2024, hourly wage differences during 2021–2025, educational wage premiums in 2025, and the relevance of previous microeconometric findings for interpreting aggregate labour market outcomes.

The scientific contribution consists of integrating these indicators within an accumulation–allocation–remuneration framework. This approach distinguishes three interconnected dimensions of human capital realisation: the acquisition of education and professional competencies, the distribution of workers across occupations and industries, and the economic remuneration of accumulated qualifications. By combining descriptive statistics, correlation sensitivity analysis, and trend estimation, the study identifies changes in gender wage inequality while explicitly distinguishing observed statistical relationships from causal explanations.

The findings provide a basis for understanding the limitations of education-centred interpretations of gender wage inequality and highlight the importance of occupational opportunities, qualification matching, and remuneration structures in developing gender-sensitive labour market policies.

2. LITERATURE REVIEW

Researchers have examined gender wage inequality through human capital theory, labour market segmentation, and institutional approaches to wage determination. These perspectives suggest that earnings differences between women and men arise not only from disparities in education and professional experience but also from unequal access to occupations, industries, managerial positions, and remuneration opportunities. This multidimensional interpretation is particularly relevant to Kazakhstan, where substantial sectoral and regional wage differences influence the economic utilisation of accumulated human capital.

Becker (1964) established the theoretical foundations of this research by conceptualising education and professional training as investments in productive capabilities, and Mincer (1974) developed an earnings function linking wages to schooling and work experience. Although these approaches explain the relationship between human capital accumulation and earnings, they do not imply that workers with similar qualifications necessarily receive equivalent remuneration. Differences in occupational allocation, employment conditions, and wage-setting institutions may produce unequal outcomes even when educational attainment is comparable.

Blau and Kahn (2017), synthesising international evidence, demonstrated that improvements in women's educational attainment have reduced the explanatory importance of traditional human capital differences, while occupational segregation, working arrangements, and career progression remain relevant determinants of gender wage inequality. Methodologically, Blinder (1973) and Oaxaca (1973) introduced decomposition approaches that distinguish wage differences associated with observed employee characteristics from those associated with estimated remuneration coefficients. However, the unexplained component cannot automatically be interpreted as discrimination because it may reflect unobserved characteristics, employment selection, and model specification.

Empirical studies of Kazakhstan provide evidence that educational advantages do not necessarily eliminate gender earnings disparities. Nurshatayeva (2017), analysing survey data from 2010, identified relatively higher private returns to higher education among women alongside persistent earnings inequality. Similarly, Kemelbayeva (2020), applying a pseudo-panel approach to household survey data for 2002–2016, found substantial returns to schooling and gender differences in estimated educational coefficients. Together, these studies demonstrate that higher relative returns to education can coexist with lower absolute earnings among women. Their findings also emphasise the importance of distinguishing individual econometric estimates from aggregate wage comparisons.

Beyond educational attainment, the match between qualifications and job requirements influences earnings. Serikbayeva and Abdulla

(2022) examined vertical and horizontal education–job mismatch in Kazakhstan and established its association with lower individual earnings. Their findings indicate that the economic value of human capital depends not only on formal educational credentials but also on opportunities to apply acquired competencies in appropriate occupations. Consequently, policies focused exclusively on educational expansion may be insufficient without improvements in qualification matching and occupational mobility.

Recent research has increasingly emphasised structural and spatial dimensions of gender inequality in Kazakhstan. Nyussupova et al. (2023) examined gender characteristics of the labour market in the context of sustainable development, highlighting persistent disparities in professional distribution, employment opportunities, and regional conditions. Their findings suggest that employment participation does not necessarily translate into proportional gains in women's earnings, particularly when workers are concentrated in economic activities with different remuneration levels.

Sectoral segregation is also evident within education-related employment. Kredina et al. (2023), using statistical indicators for 2016–2021 and the Duncan Index, identified gender segregation in Kazakhstan's higher education employment across regions. Their analysis illustrates how the concentration of women in particular professional activities can coexist with unequal occupational and managerial opportunities. This finding extends the conventional human capital perspective by emphasising the allocation of qualified employees across positions rather than educational attainment alone.

Yemelina et al. (2024) investigated the dynamics of Kazakhstan's gender wage gap during 2011–2019 using decomposition analysis. Their findings revealed a persistent gap of approximately 30% despite improvements in women's observed human capital characteristics. The authors identified rising sectoral segregation as a key mechanism sustaining inequality and documented substantial regional differences. Notably, economically prosperous industrial regions could exhibit larger relative gender gaps than predominantly agricultural regions, indicating that a smaller percentage gap does not necessarily imply higher absolute earnings or more favourable employment conditions.

Complementing this evidence, Abdulla and Serikbayeva (2024) examined gender labour market outcomes in a resource-dependent economy, demonstrating the relevance of industry-related characteristics for earnings disparities. These findings suggest that gender inequality cannot be interpreted independently of sector-specific wage structures. Changes in employment composition and remuneration across industries may affect aggregate earnings differences, although identifying their quantitative contributions requires appropriately disaggregated data.

Occupational hierarchy and managerial advancement constitute another dimension of inequality. Kenzheali et al. (2024), combining statistical indicators for 2009–2022 with a survey of 652 respondents, investigated gender differences in managerial positions, wages, education, and soft skills. Their findings highlight the relevance of employment stereotypes and career opportunities. Nurbatsin and Kurmasheva (2024) additionally examined gender wage inequality and occupational segregation in Kazakhstan, reinforcing the importance of employment distribution when interpreting earnings differences between workers with different qualifications.

More recent investigations confirm the persistence of structural disparities. Bekbossinova and Vasa (2025) examined gender wage inequality in Kazakhstan during 2013–2023, documenting a decline in the wage gap from 32.2% to 25.7%, with its minimum of 21.7% observed in 2021. Their analysis identified a negative correlation between women's higher educational attainment and the gender wage gap ($r = -0.71$), while highlighting the importance of occupational and sectoral segregation. However, this association should not be interpreted as

evidence of a causal impact of education on wage convergence.

Gamidullaeva and Anessova (2025) investigated institutional, structural, and spatial barriers to women's access to quality employment. Their research identified women's concentration in education, healthcare, and trade, as well as limited representation in certain high-income industries. The authors also documented considerable regional wage disparities, including the Atyrau Region, where average female and male earnings in 2023 amounted to KZT 399,015 and KZT 738,421, respectively. These findings emphasise the need to assess both relative wage differences and absolute remuneration levels.

International research provides additional explanations for persistent inequalities. Cukrowska-Torzewska and Matysiak (2020), through a meta-analysis of the motherhood wage penalty, demonstrated the relevance of employment interruptions and family responsibilities for women's earnings trajectories. Meanwhile, Organisation for Economic Co-operation and Development (OECD, 2023, 2024) comparative education reports document substantial differences in earnings across educational attainment groups. Nevertheless, these international patterns cannot be directly interpreted as gender-specific returns to schooling in Kazakhstan without individual-level statistical evidence.

Taken together, the reviewed studies reveal three interconnected mechanisms shaping gender earnings inequality. First, human capital accumulation determines educational qualifications, competencies, and professional experience. Second, labour market allocation influences access to occupations, industries, regions, and hierarchical positions in which these competencies are employed. Third, remuneration structures determine the monetary rewards associated with qualifications and employment conditions. The resulting accumulation–allocation–remuneration framework explains why improvements in women's educational attainment may coexist with persistent gender wage disparities.

Despite substantial empirical contributions, an important methodological distinction remains between evidence derived from individual-level econometric research and conclusions supported by aggregate national wage statistics. Existing microeconometric studies estimate conditional relationships and decomposition components, whereas aggregate statistics describe observed wage differences without controlling individual characteristics. The present study addresses this interpretative gap by examining recent monthly and hourly wage dynamics alongside pooled educational wage premiums and using previous empirical research to contextualise, rather than causally explain, the observed patterns. This approach provides an integrated basis for assessing gender wage inequality in Kazakhstan.

3. METHODOLOGY

The study combines descriptive comparisons, correlation analysis, and ordinary least squares (OLS) trends within the accumulation–allocation–remuneration framework. Bureau of National Statistics provides monthly wages for 2020–2024, hourly wages for 2021–2025, and educational wage averages for 2025. Table 1 shows structure and analytical characteristics of the empirical database.

Table 1. Structure and analytical characteristics of the empirical database

Indicator	Observation period	Number of observations	Analytical purpose
Average monthly wages of men and women	2015–2024	10 annual observations	Analysis of gender-specific wage dynamics
Female-to-male monthly wage ratio	2015–2024	10 annual observations	Assessment of relative earnings differences

Monthly gender wage gap	2015–2024	10 annual observations	Measurement of unadjusted gender wage inequality
Average hourly wages of men and women	2021–2025	5 annual observations	Comparison of hourly remuneration
Hourly gender wage gap	2021–2025	5 annual observations	Assessment of recent hourly wage inequality
Average wages by educational attainment	2025	3 educational categories	Calculation of pooled educational wage premiums
Annual changes in monthly wages	2016–2024	9 annual changes	Correlation sensitivity analysis
Gender wage gap trend models	2015–2024; 2021–2024; 2021–2025	10; 4; 5 observations	Descriptive estimation of temporal trends

Note: compiled by the authors

Monthly wages are annual aggregates from the labour reporting system. Wage-structure indicators concern employees covered by the annual April survey. The series differ in reference periods and coverage and are analysed separately. The historical monthly series excludes small enterprises engaged in entrepreneurial activities (Kuatova, 2021). All amounts are nominal Kazakhstan tenge (KZT) and no inflation adjustment is applied. Formula (1) defines the monthly gender gap and female-to-male wage ratio using male earnings as the denominator:

$$G_{M,t} = 100\left(1 - \frac{W_{F,t}}{W_{M,t}}\right);\ R_{W,t} = 100\frac{W_{F,t}}{W_{M,t}} \qquad (1)$$

where:

$W_{F,t}$ and $W_{M,t}$ – female and male monthly wages;

$G_{M,t}$ and $R_{W,t}$ – expressed as percentages.

The hourly gap and pooled educational premium are calculated in formula (2):

$$G_{H,t} = 100\left(1 - \frac{H_{F,t}}{H_{M,t}}\right), \quad P_E = 100\left(\frac{W_E}{W_S} - 1\right) \quad (2)$$

where:

$H_{F,t}$ and $H_{M,t}$ – female and male hourly wages;

W_E – the average wage for the educational group being compared;

W_S – the secondary-education benchmark

Educational premiums pool genders and do not estimate individual returns to schooling. The monthly series is divided into 2015–2019, 2020–2021, and 2022–2024. These are descriptive intervals, not statistically identified structural breaks. Formula (3) gives the arithmetic mean of annual gaps for an interval containing n observations:

$$G_M = \frac{1}{n}\sum_{t=1}^{n} G_{M,t} \qquad (3)$$

As a sensitivity check, each mean gap is compared with the gap calculated from subperiod mean wages. The latter implicitly weights annual wage ratios by male wage levels. All calculations use unrounded ratios.

Pearson and Spearman coefficients measure co-movement in monthly wage levels. Because shared nominal growth can inflate level correlations, Pearson correlation is also calculated for the nine annual changes defined in formula (4):

$$\Delta W_{s,t} = W_{s,t} - W_{s,t-1},\ s \in \{F, M\} \qquad (4)$$

Formula (5) estimates a separate linear trend for the monthly gap in 2015–2024 and 2021–2024, and the hourly gap in 2021–2025:

$$G_t = \alpha + \beta t + u_t \qquad (5)$$

where:

G_t – the gap;

t – time in years;

α – the intercept;

β – the annual change in percentage points;
u_t – the residual.

The ten-, four-, and five-observation models describe temporal associations; they do not test causal mechanisms, establish structural breaks, or produce forecasts. Aggregate data cannot control worker characteristics, identify gender-specific educational returns, or separate industry composition from within-industry wage changes. Earlier microeconometric research supplies interpretative context, not causal estimates for these series.

4. ANALYSIS AND RESULTS

The empirical analysis begins with an assessment of gender differences in average monthly earnings in Kazakhstan over the period 2015–2024.

Attention is paid to identifying changes in wage inequality, comparing the growth trajectories of male and female earnings, and examining whether increases in nominal wages were accompanied by a narrowing of the gender wage gap. The analysis provides a descriptive basis for evaluating long-term patterns of earnings inequality and identifying periods of convergence and divergence in relative remuneration.

Between 2015 and 2024, male wages rose from KZT 151,694 to KZT 468,914, representing cumulative growth of approximately 209.1%. Female wages rose from KZT 99,911 to KZT 344,496, a growth of about 244.8%. Thus, women's earnings increased proportionally faster over the full observation period, although their absolute remuneration remained substantially below that of men.

Table 2 presents annual average monthly wages, the female-to-male wage ratio, and the unadjusted gender wage gap for 2015–2024.

Table 2. Average monthly nominal wages and gender wage gap in Kazakhstan for 2015–2024

Year	Male wages, KZT	Female wages, KZT	Female-to-male wage ratio, %	Gender wage gap, %
2015	151,694	99,911	65.9	34.1
2016	169,352	116,108	68.6	31.4
2017	179,575	121,793	67.8	32.2
2018	195,959	129,039	65.8	34.2
2019	222,514	150,779	67.8	32.2
2020	243,524	182,679	75.0	25.0
2021	281,239	220,160	78.3	21.7
2022	355,072	265,643	74.8	25.2
2023	418,788	311,217	74.3	25.7
2024	468,914	344,496	73.5	26.5

Note: compiled by the authors

The female-to-male wage ratio rose from 65.9% to 73.5%, while the unadjusted gender wage gap fell from 34.1% to 26.5%, an overall reduction of 7.6 percentage points. Nevertheless, this improvement was uneven. During 2015–2019, the gap fluctuated between 31.4% and 34.2%, reflecting relatively persistent inequality. The gap narrowed more sharply in 2020–2021, falling to 25.0% and then reaching a low of 21.7%.

The subsequent development revealed a reversal. The gap widened to 25.2% in 2022, 25.7% in 2023, and 26.5% in 2024. Consequently, gender wage inequality increased by 4.8 percentage points between 2021 and 2024. This deterioration occurred despite continued nominal wage growth among women, whose monthly earnings increased from KZT 220,160 to KZT 344,496 during the same period. Male earnings rose from KZT 281,239 to KZT 468,914, producing faster relative growth among men and a widening difference in average remuneration.

To examine differences between stages of the observed trajectory, the monthly wage series was divided into three descriptive subperiods. Table 3 compares average earnings and two approaches to calculating the gender wage gap.

Table 3. Subperiod comparison of average monthly earnings and gender wage inequality

Period	Male wages, thousand KZT	Female wages, thousand KZT	Mean annual gender gap, %	Gap calculated from mean wages, %
2015–2019	183.8	123.5	32.83	32.80
2020–2021	262.4	201.4	23.35	23.23
2022–2024	414.3	307.1	25.80	25.86

Note: compiled by the authors

Table 3 confirms substantial differences between the three intervals. During 2015–2019, the average annual gender wage gap was 32.83%, while the alternative calculation yielded 32.80%. These closely corresponding estimates indicate that gender differences remained relatively high throughout the initial period.

The 2020–2021 interval was characterised by a marked reduction in inequality. The average annual gap decreased to 23.35%, approximately 9.48 percentage points below its 2015–2019 level. The estimate derived from average wages was 23.23%, confirming the same direction of change. This improvement was followed by renewed widening in 2022–2024, when the mean annual gap increased to 25.80%, exceeding the preceding interval by 2.45 percentage points.

The two aggregation methods therefore support the same sequence: persistently high inequality, narrowing in 2020–2021, and renewed widening. However, the selected intervals are descriptive, and the comparison does not establish structural breaks.

Monthly earnings reflect both remuneration and paid working time. To provide a complementary assessment, the analysis considers average hourly wages during 2021–2025. The corresponding indicators are presented in Table 4.

Table 4. Average hourly wages and unadjusted gender wage gap in Kazakhstan, 2021–2025

Year	Male hourly wages, KZT	Female hourly wages, KZT	Female-to-male wage ratio, %	Gender wage gap, %
2021	1,427	1,179	82.6	17.4
2022	1,802	1,486	82.5	17.5
2023	2,235	1,800	80.5	19.5
2024	2,307	1,871	81.1	18.9
2025	2,637	2,046	77.6	22.4

Note: compiled by the authors

Table 4 shows that average hourly remuneration increased for both genders between 2021 and 2025. Male hourly earnings rose from KZT 1,427 to KZT 2,637, while female earnings increased from KZT 1,179 to KZT 2,046. Nevertheless, the female-to-male hourly wage ratio declined from 82.6% to 77.6%, indicating a deterioration in women's relative earnings position.

The hourly gender wage gap remained relatively stable in 2021–2022, at 17.4% and 17.5%, respectively. It then rose to 19.5% in 2023, fell moderately to 18.9% in 2024, and reached 22.4% in 2025. The overall increase amounted to 5.0 percentage points, consistent with a widening disparity in remuneration per paid hour.

Over the overlapping years, the hourly gap remained below the monthly gap: 17.4% versus 21.7% in 2021 and 18.9% versus 26.5% in 2024. Different survey populations, reference periods, and measurement

procedures prevent interpreting these differences as an estimate of working-time effects. Hourly gaps also do not measure unequal pay for identical work.

The next stage examines educational wage differentials as an indicator of the economic value associated with accumulated human capital. Unlike the preceding comparisons, which distinguish male and female earnings, the educational statistics describe pooled average wages across qualification groups. Table 5 presents average remuneration and educational wage premiums for 2025.

Table 5. Average wages and pooled educational wage premiums in Kazakhstan in 2025

Educational attainment	Average wage, KZT	Secondary education = 100	Educational wage premium, %
Secondary education	289,673	100.0	0.0
Higher education	497,563	171.8	71.8
Postgraduate education	672,493	232.2	132.2

Note: compiled by the authors

The educational comparison in Table 5 indicates a substantial positive relationship between formal qualifications and average earnings. Employees with higher education earned KZT 497,563, exceeding the average wage of employees with secondary education by KZT 207,890. The corresponding educational wage premium was 71.8%.

Employees with postgraduate education received the highest average remuneration, reaching KZT 672,493. This exceeded the secondary education benchmark by KZT 382,820 and corresponded to a pooled wage premium of 132.2%. The considerable difference between educational categories is consistent with the general human capital proposition that higher qualifications may be associated with greater earning opportunities (Becker, 1964; Mincer, 1974).

Nevertheless, these premiums should not be interpreted as causal returns to schooling. Differences between educational groups may also reflect variation in professional experience, age composition, occupational positions, and industry-specific wage structures. Furthermore, the published averages combine female and male employees and therefore cannot establish whether equivalent educational qualifications produce equal earnings across genders.

A different pattern emerges for 2021–2024. The estimated coefficient becomes positive at 1.495 percentage points per year, with an R^2 of 0.831. This result characterises the renewed widening of monthly wage inequality following the minimum observed gap in 2021. The contrasting coefficients demonstrate why a single long-term linear trend may conceal changes in the direction of inequality during shorter intervals.

The hourly wage model provides complementary evidence. During 2021–2025, the estimated coefficient was 1.143 percentage points per year, with an R^2 of 0.790. This positive slope is consistent with the descriptive increase in the hourly gender wage gap from 17.4% to 22.4%. Thus, both recent-period specifications indicate an upward trajectory, though they use different wage measures and observation windows.The analysis subsequently examines whether male and female nominal wages followed similar trajectories during 2015–2024.

Figure 1 presents the correlation matrix for male earnings, female earnings, and calendar time.

Both also correlate positively with calendar time, reflecting shared nominal growth. These correlations do not establish convergence: wage levels may rise together while their relative gap widens.

To assess the relationship more systematically, Table 6 reports Pearson and Spearman coefficients for wage levels and the Pearson correlation calculated from annual first differences.

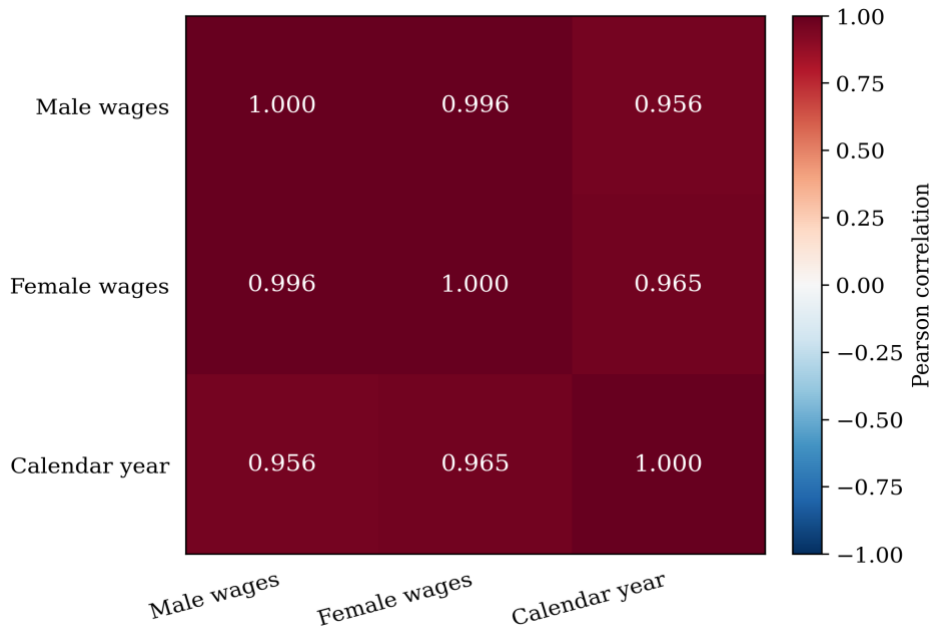


Figure 1. Correlation matrix of male monthly wages, female monthly wages, and calendar time for 2015–2024

The Pearson coefficient of 0.996 indicates close linear co-movement. Spearman correlation equals 1.000 because both wage series increase in every successive year. Yet the monthly wage gap widens after 2021, demonstrating that identical rankings do not imply continuous convergence. After replacing wage levels with annual changes, the Pearson correlation decreases to 0.884.

To assess the relationship more systematically, Table 6 reports Pearson and Spearman coefficients for wage levels and the Pearson correlation calculated from annual first differences.

Table 6. Correlation analysis of male and female monthly wages, 2015–2024

Statistical comparison	Number of observations	Correlation coefficient
Pearson correlation, wage levels	10	0.996
Spearman correlation, wage levels	10	1.000
Pearson correlation, first differences	9	0.884

Note: compiled by the authors

The association remains strongly positive, but its magnitude depends on whether levels or changes are compared. This sensitivity supports evaluating both transformations without treating either correlation as evidence of gender wage convergence. The final empirical stage estimates linear trends in the gender wage gap using OLS. Three specifications distinguish the full monthly series, the shorter period following the minimum observed gap in 2021, and the recent hourly wage series.

For the full monthly series covering 2015–2024, the trend coefficient was −1.141 percentage points per year, indicating an overall fitted reduction in the gender wage gap. The coefficient of determination was 0.597, meaning the linear time trend accounted for about 59.7% of the observed variation in the gap in this specification.

Table 7 summarises the estimated coefficients and model characteristics.

Table 7. Descriptive OLS estimates of gender wage gap trends in Kazakhstan

Dependent variable and period	n	Trend, pp/year	SE	R^2	RMSE, pp
Monthly gender gap, 2015–2024	10	−1.141	0.332	0.597	2.694
Monthly gender gap, 2021–2024	4	1.495	0.476	0.831	0.753
Hourly gender gap, 2021–2025	5	1.143	0.341	0.790	0.834

Note: compiled by the authors

These estimates require cautious interpretation. The monthly model for 2021–2024 contains only four observations, while the hourly specification includes five. Such limited samples constrain the reliability of conventional standard errors and make estimated coefficients sensitive to individual years.

The results indicate an overall narrowing of monthly wage inequality over 2015–2024, a reversal after 2021, and widening hourly inequality over 2021–2025. Substantial pooled educational premiums coexist with these gender differences, but this does not demonstrate how education affects gender convergence. Aggregate data cannot quantify the contributions of sectoral segregation or occupational allocation identified in previous research (Abdulla & Serikbayeva, 2024; Bekbossinova & Vasa, 2025; Gamidullaeva & Anessova, 2025; Kenzheali et al., 2024; Yemelina et al., 2024).

5. DISCUSSION

The first important finding concerns the divergence between long-term and recent wage inequality trends. The monthly gender wage gap declined from 34.1% in 2015 to 26.5% in 2024 but increased by 4.8 percentage points after reaching its minimum in 2021. This finding complements the research of Yemelina et al. (2024), who identified persistent gender earnings inequality during 2011–2019 despite improvements in women's human capital characteristics. Bekbossinova and Vasa (2025) similarly documented a decline in gender wage disparities up to 2021 followed by renewed widening. The present study extends this evidence by examining monthly wage dynamics through 2024 and hourly remuneration through 2025. Nevertheless, differences in statistical coverage and analytical methods prevent directly attributing these developments to identical underlying mechanisms.

One potential explanation involves the uneven distribution of female and male employment across industries with different wage structures. Abdulla and Serikbayeva (2024) demonstrated the relevance of industry-specific characteristics for gender labour market outcomes in a resource-dependent economy, while Yemelina et al. (2024) emphasised the persistence of sectoral segregation. Gamidullaeva and Anessova (2025) further documented women's concentration in education, healthcare, and trade alongside their more limited representation in certain high-income economic activities. These findings suggest that changes in industrial employment composition or sector-specific wage growth may influence aggregate gender earnings differences even when educational attainment improves.

However, available national wage statistics do not allow quantification of the contribution of sectoral segregation. The widening observed after 2021 may reflect changes in within-industry remuneration, shifts in employment composition, or interactions between these processes. Accordingly, the structural mechanisms identified in previous studies should be regarded as empirically motivated explanations requiring further investigation rather than demonstrated causes of the recent increase in inequality.

A related mechanism concerns occupational segregation and unequal access to managerial positions. Kenzheali et al. (2024) highlighted the relationship between gender

stereotypes, professional competencies, and managerial advancement opportunities, while Nurbatsin and Kurmasheva (2024) examined the relevance of occupational distribution for gender wage disparities. These findings indicate that formal educational qualifications may generate different economic outcomes depending on access to professional, technical, managerial, and other relatively high-paying positions. Consequently, the effective utilisation of human capital depends not only on accumulated competencies but also on employment allocation and career progression.

The educational wage comparison provides further evidence of this distinction. In 2025, pooled wage premiums for higher and postgraduate education reached 71.8% and 132.2%, respectively. These substantial differences are consistent with human capital theory (Becker, 1964; Mincer, 1974), but they cannot establish whether women and men receive equivalent returns to comparable qualifications. Nurshatayeva (2017) and Kemelbayeva (2020) previously demonstrated that relatively higher estimated returns to women's education may coexist with lower absolute earnings. Similarly, Serikbayeva and Abdulla (2022) showed that education–job mismatch is associated with differences in individual earnings.

Spatial differences represent another relevant dimension. Nyussupova et al. (2023) and Gamidullaeva and Anessova (2025) emphasised territorial disparities in gender employment outcomes, while Kredina et al. (2023) identified regional heterogeneity in gender segregation within higher education employment. Such evidence suggests that similar educational qualifications may be associated with different earnings opportunities across regional labour markets. Moreover, a relatively small percentage wage gap in a low-income region does not necessarily indicate favourable employment conditions, particularly when average earnings remain low for both genders.

Working-time arrangements and employment continuity may also influence gender differences in remuneration. The hourly wage gap increased from 17.4% in 2021 to 22.4% in 2025, indicating that recent inequality was not confined to monthly earnings. However, because monthly and hourly indicators may represent different survey populations, their difference cannot be directly interpreted as a working-time effect. International evidence from Cukrowska-Torzewska and Matysiak (2020) identifies employment interruptions and motherhood-related wage penalties as potentially relevant mechanisms, although their magnitude in Kazakhstan requires separate empirical assessment.

The correlation and trend results provide an additional methodological insight. Extremely strong positive correlations between male and female nominal wages did not imply continuous convergence in relative earnings. Likewise, the negative fitted trend for 2015–2024 contrasted with positive trends in the shorter monthly and hourly series after 2021. These findings demonstrate that shared nominal wage growth should not be interpreted as evidence of declining gender inequality. They also highlight the importance of distinguishing descriptive temporal associations from causal relationships, particularly when the number of annual observations is limited.

The findings have several implications for labour market policy in Kazakhstan. Educational investment should be complemented by measures improving qualification matching, professional mobility, and women's access to higher-paying occupations and managerial positions. Gender-sensitive wage monitoring should extend beyond national averages to include earnings by education, occupation, industry, region, and working-time arrangements. Greater transparency in remuneration criteria and systematic comparisons within comparable employment categories could also improve the identification of potentially unjustified wage differences.

The accumulation–allocation–remuneration framework distinguishes acquiring qualifications from obtaining

suitable employment and receiving remuneration. It provides an interpretation of the findings, not an estimated decomposition. Aggregate averages cannot identify differences between otherwise comparable workers, educational statistics do not distinguish earnings by gender, and nominal wages do not measure purchasing power. Differences in survey coverage and the small number of annual observations further limit inference.

Future research should use individual-level or consistently disaggregated longitudinal data on earnings, working hours, education, experience, occupations, industries, regions, and employment interruptions. Extended Mincer earnings functions and Oaxaca–Blinder decomposition can distinguish observed characteristics from estimated remuneration coefficients, without equating the unexplained component with discrimination (Blinder, 1973; Mincer, 1974; Oaxaca, 1973). Decomposing wage changes into within-industry differences and employment-composition effects would help investigate the post-2021 widening.

6. CONCLUSION

This study assessed gender wage inequality and human capital utilisation in Kazakhstan using aggregate monthly wages for 2015–2024, hourly earnings for 2021–2025, and educational wage averages for 2025. The monthly wage gap decreased from 34.1% to 26.5% over the full period, but widened by 4.8 percentage points after reaching 21.7% in 2021. The hourly gap increased from 17.4% to 22.4% between 2021 and 2025.

Employees with higher and postgraduate education earned pooled wage premiums of 71.8% and 132.2% relative to secondary education. These differences cannot establish gender-specific educational returns. Likewise, strong co-movement in male and female nominal wages did not imply continuous convergence, and the estimated direction of the wage-gap trend depended on the observation window.

The contribution is an integrated interpretation that separates human capital accumulation, labour market allocation, and remuneration. The findings support examining qualification matching, occupational mobility, access to higher-paying jobs, and transparent remuneration alongside educational investment. More detailed gender-disaggregated statistics would improve monitoring.

The aggregate design cannot identify causal effects or quantify the mechanisms behind the recent widening. Individual-level research is needed to distinguish worker characteristics, employment composition, and remuneration differences. Policy implications should therefore be treated as priorities for further assessment rather than as effects established by the present analysis.

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REFERENCES

Abdulla, K., & Serikbayeva, B. (2024). Gender gaps in labor market outcomes in a resource-dependent country. *Resources Policy, 90*, 104685. https://doi.org/10.1016/j.resourpol.2024.104685

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. Columbia University Press. https://www.nber.org/books-and-chapters/human-capital-theoretical-and-empirical-analysis-special-reference-education-first-edition

Bekbossinova, A. S., & Vasa, L. (2025). Gender pay gap in Kazakhstan: The impact of social factors and structural segregation. *Eurasian Journal of Gender Studies, 2*(2), 40–54. https://doi.org/10.47703/ejgs.v2i2.40

Blau, F. D., & Kahn, L. M. (2017). The gender wage gap: Extent, trends, and explanations. *Journal of Economic Literature, 55*(3), 789–865. https://doi.org/10.1257/jel.20160995

Blinder, A. S. (1973). Wage discrimination: Reduced form and structural estimates. *The Journal of Human Resources, 8*(4), 436–455. https://doi.org/10.2307/144855

Bureau of National Statistics. (2025). Official statistical data. Retrieved August 25, 2026 from https://stat.gov.kz/en

Cukrowska-Torzewska, E., & Matysiak, A. (2020). The motherhood wage penalty: A meta-analysis. *Social Science Research, 88–89*, 102416. https://doi.org/10.1016/j.ssresearch.2020.102416

Gamidullaeva, L., & Anessova, A. (2025). Women's access to quality employment in Kazakhstan: Institutional, structural and spatial dimensions. *Eurasian Journal of Gender Studies, 2*(4), 20–37. https://doi.org/10.47703/ejgs.v2i4.82

Kemelbayeva, S. (2020). Returns to schooling in Kazakhstan: An update using a pseudo-panel approach. *Eurasian Economic Review, 10*(3), 437–487. https://doi.org/10.1007/s40822-020-00148-z

Kenzheali, Y., Kenzhegulova, G., Kireyeva, A., & Ainakul, N. (2024). Assessing gender differences in managerial roles, wages, education, and soft skills in Kazakhstan. *Problems and Perspectives in Management, 22*(3), 341–357. https://doi.org/10.21511/ppm.22(3).2024.27

Kredina, A. A., Vasa, L., & Nurgaliyeva, K. O. (2023). Analysis of the gender segregation of labor in higher education of Kazakhstan: Regional aspect. *Economics: The Strategy and Practice, 18*(1), 227–240. https://doi.org/10.51176/1997-9967-2023-1-227-240

Kuatova, D. (2021). Zanyatost' i oplata truda v Kazakhstane: Est' li gendernoe ravenstvo? [Employment and remuneration in Kazakhstan: Is there gender equality?]. *Ekonomika i statistika*, (2), 120–129. (In Russ.). https://stat.gov.kz/upload/iblock/338/2km31z8r4gtwtqvxhp7qwrzn9o7p3tox/ЭиС%202%202021.pdf

Mincer, J. A. (1974). *Schooling, experience, and earnings*. National Bureau of Economic Research. https://www.nber.org/books-and-chapters/schooling-experience-and-earnings

Nurbatsin, A., & Kurmasheva, M. (2024). Gender wage inequality and occupational segregation in Kazakhstan. *Eurasian Journal of Gender Studies, 1*(2), 40–53. https://doi.org/10.47703/ejgs.v1i2.12

Nurshatayeva, A. (2017, April 28). *Gender gap in private returns to higher education in Kazakhstan* [Paper presentation]. American Educational Research Association Annual Meeting, San Antonio, TX, United States. https://eric.ed.gov/?id=ED595275

Nyussupova, G., Aidarkhanova, G., Kenespayeva, L., & Kelinbayeva, R. (2023). Gender features of the Kazakhstan labour market in the context of sustainable development. *Hungarian Geographical Bulletin, 72*(1), 59–74. https://doi.org/10.15201/hungeobull.72.1.4

Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review, 14*(3), 693–709. https://doi.org/10.2307/2525981

Organisation for Economic Co-operation and Development. (2023). *Education at a glance 2023: OECD indicators*. OECD Publishing. https://doi.org/10.1787/e13bef63-en

Organisation for Economic Co-operation and Development. (2024). *Education at a glance 2024: OECD indicators*. OECD Publishing. https://doi.org/10.1787/c00cad36-en

Serikbayeva, B., & Abdulla, K. (2022). Education-job mismatch: Implications for individual earnings and aggregate output. *Social Indicators Research, 163*(2), 723–752. https://doi.org/10.1007/s11205-022-02912-x

Yemelina, N., Kemelbayeva, S., & Roshchin, S. (2024). Dynamics of gender wage gap in Kazakhstan for 2011–2019. *The Indian Journal of Labour Economics, 67*(1), 47–71. https://doi.org/10.1007/s41027-024-00483-8

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