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Gender Inequality in Kazakhstan's Education and Research System: Stratification and Leadership Gaps

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Abstract

The question of gender inequality in education and science has emerged as a central focus of international and national development agendas. However, the existence of inequality in academic and administrative structures reveals that equal academic access does not guarantee equal gender treatment. In the context of the given problem, the research aims to outline the structural characteristics of gender inequality in the education and science sector in Kazakhstan in relation to academic degree awarded, age, academic discipline, and administration. The results show that gender inequalities persist. Although women represent a majority of Master's degree holders and a large number of Candidates of Sciences and PhD holders and graduates, they remain underrepresented in substantial numbers in the category of Doctors of Science, thereby creating a strong “leaky pipe” effect. Analysis shows that younger generations have ensured greater gender equality; however, this does not ensure equality for senior academic staff. Horizontal segregation persists; women continue to represent education, health, and social sciences in large numbers, while men continue to represent fields like engineering and ICT. Analysis of senior administrative staff shows that women represent only a marginal number of heads in institutions offering general education and TVET. The results reveal that the inequality between the sexes in education and research in Kazakhstan is institutionally entrenched and cumulative. The study emphasizes that an effective policy for promoting gender equity should target not only access equity but also mobility, senior management, and field choice.

Keywords: Gender, Gender Inequality, Gender Segregation, Education, Higher Education, Educational Leadership, Academic Career, Kazakhstan

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1. INTRODUCTION

Gender equity in education and science has assumed a prominent position in international development strategies, as reflected in the Sustainable Development Goals, UNESCO strategies, and country plans, with a focus on equitable human capital development. Higher education institutions are increasingly recognized not merely for their actions in knowledge and skill production, but also for their prominent positions as institutional settings where social inequalities are addressed and, in turn, drift or are reinforced. In this perspective, equal gender representation in academia is both a norm and a requirement for effective socioeconomic growth and institutional functionality. There has been significant progress towards equal representation of women in education; however, the remaining gender inequalities in academia signify the lack of full equality through equal opportunity.

Kazakhstan provides an especially instructive case for examining these dynamics. Over the past three decades, the country has undergone a series of profound transformations in its education and research systems, shaped by post-Soviet institutional restructuring, integration into the global higher education space, and the adoption of international standards, such as the Bologna Process. Explicit policy commitments to gender equality and women's empowerment have accompanied these reforms through national strategies, sectoral programmes, and legal frameworks that guarantee equal access to education and employment. As a result, women in Kazakhstan have reached very high levels of educational attainment and now comprise the majority of students in higher education. Nevertheless, this quantitative success is accompanied by qualitative inequalities manifest in academic hierarchies, disciplinary segregation, and decision-making structures.

Available evidence suggests that gender inequality in Kazakhstan's education and research system is not a problem of access but rather one of progression, positioning, and power. Women are disproportionately concentrated in teaching-oriented and lower-paid academic roles, while men continue to dominate the senior research positions and leadership posts. Such patterns reflect broader mechanisms of vertical and horizontal gender segregation, in which women's careers are constrained at key transition points despite comparable or superior educational credentials. These mechanisms become institutionalized in norms and promotion criteria, as well as in informal networks that develop over long career cycles. Gender inequality, therefore, emerges as an institutionalized and cumulative process, rather than a temporary imbalance that will resolve itself through generational change.

The relative durability of gender disparities is particularly evident in science, technology, engineering, math, and information and communication technologies, which are critical to the innovation-led development strategy in the Kazakhstani economy. Despite policy measures to enhance the representation of women in these domains, the level of representation remains low, thereby sustaining patterns of segmentation in the labour market along gender lines and gender disparities in earnings. On the other hand, the overrepresentation of the female gender in education, health, and the social sciences, which are undervalued domains, directly contributes to imbalances in the esteem accorded to the various disciplines.

Another important aspect of gender inequality is evident in educational management. Women, who form the backbone of the education sector, are substantially underrepresented in positions of authority in educational institutions. At the general education, technical and vocational education and training, and higher education levels, the top administrative positions are primarily held by men. The gap between the representation of women in the sector and their lack of representation in higher authority is a drawback for diversity, gender-responsive policies, and the long-held perception of leadership. It is important to note that this gap

is a reality that exists over time, which implies that mere participation is not a solution.

A critical examination of these patterns demands an analytic strategy that goes past the indicative rates for enrollment and graduation to uncover the underlying structures of female inequality in the educational life course. Academic degrees are more than mere qualifications or indicators of educational accomplishment; they are the portals through which access to research, as well as to academic leadership and credibility, is made possible. In the same manner, age cohorts are more than mere indicators of generations; the patterns of opportunity structures, fields, and roles tap the dimensions of the system's horizontal and vertical differentiation.

With this context in mind, this study seeks to conduct a systematic analysis of gender inequality in the country's education system. By incorporating census and administrative data, this study examines gender inequities across degree awards, age cohorts, study disciplines, and leadership positions. Whereas gender inequality arises as a byproduct of cultural attitudes, this study seeks to situate it within a broader institutional framework. It should be noted that this contributes to an expanding body of research on gender in higher education in post-Soviet nation-states.

In conclusion, gender inequality issues in the educational and scientific spheres are critical not only from the perspective of equity but also for the development of the knowledge economy of the Republic of Kazakhstan. This study aims to identify indicators of structural challenges and trends among new generations, demonstrating how gender-responsive policies can transform educational equity into educational equality.

2. LITERATURE REVIEW

Nevertheless, the country is still struggling with gender inequality, which is addressed through various strategies, plans, and international documents on equality in general, although it remains deeply embedded in the higher education sector in Kazakhstan. Current research shows that not only is gender-based inequality related to representation in higher education, but numerous studies also show that various aspects, ranging from culture to the labour market, are intricately linked, thereby deepening these inequalities.

An increasing number of empirical reports confirm vertical and horizontal segregation of academic markets. One of the most extensive analyses of gender stratification in the higher education system in this context is provided by Kredina et al. (2023). They showed that women are disproportionately represented in low-paid teaching jobs, while men prevail in top academic and administrative positions, pointing to horizontal and vertical segregation in academic markets. Thus, equal access to education did not result in equal career prospects. Likewise, the role of institutional inertia and the societalization of the traditional view of gender on the part of university management is reflected in Kataeva and her colleagues' work: "Institutional inertia and the internalization of the traditional view of gender by university administrators can restrain the implementation of policies of gender mainstreaming."

Gender inequalities appear more sharply in the fields of science, technology, engineering, and mathematics (STEM). According to a study by Cohen Miller et al. (2021), the major hindrances faced by women in STEM fields stem from their culturally determined roles as caregivers and mothers, resulting in disrupted career trajectories, reduced research output, and limited access to elite grants. This is supported by a study conducted by Makhmutova (2025), which suggested that the number of women enrolling in STEM education in Kazakhstan has plateaued at one-third of total enrollment for several years, despite policies aimed at promoting equal representation in STEM education and employment.

The doctoral level is another important area where gender inequities get entrenched. According to Satpayeva et al. (2024), some gendered obstacles in PhD studies include inequitable mentoring, limited access to

academic networks, and increased pressures to publish. Most female PhD students face such obstacles while managing their academic responsibilities and family roles. However, Shnarbekova (2021) expands this idea by arguing that selecting top schools and top disciplines is a strongly class- and gender-mediated process via family resources, in turn maintaining both class- and gender-driven inequities. These studies together reveal that education is both a skill-development platform and a vehicle for creating social and gender orders.

It is difficult to comprehend the extent of gender inequality in academia without considering the context in which the labour market operates. Studies by Mubarakov et al. in 2025 indicated that segregation in the workforce in Kazakhstan has been increasing since 2015, with women being confined to lower-paid and socially oriented sectors, which include education, healthcare, and social services, among others. While there is some improvement in reducing the pay gap, it has not been reflected in representation in top jobs. From a comparative Central Asian perspective, Yerimpasheva et al. (2023) noted that although Kazakhstan performs relatively better than neighbouring countries on specific gender indicators, there have been systemic barriers to women's career advancement.

Legal and institutional frameworks shape these outcomes. Khamzina et al. (2020) emphasized the poor enforcement of gender equality legislation, particularly in the areas of hiring, promotion procedures, and social protection. Zharkynbayeva et al. (2020) suggested that in Central Asia, formal gender equality policies are undermined by processes of re-traditionalization and the persistence of patriarchal norms. These studies thus confirm that legal frameworks are efficient only if supported by strong institutional mechanisms and cultural transformation.

A substantial number of works have highlighted the impact of sociocultural norms and gender stereotypes on educational trajectories. Quantitatively, Yerimpashaeva et al. (2023) demonstrated that gender stereotypes strongly influence women's educational choices in Kazakhstan, particularly their willingness to pursue STEM disciplines. These stereotypes are often perpetuated through family expectations, school environments, and the media, which contribute to early gendered sorting within the education system.

Internationally, higher education expansion also adds new dynamics to inequalities. Tajik et al. (2021, 2023) investigate English Medium Instruction (EMI) policies in universities in Kazakhstan, concluding that, paradoxically, these policies tend to reproduce pre-existing inequalities rather than increasing global rankings. Access to instruction in English is, in practice, reserved for those from urban, middle-class families who have previous exposure to foreign languages, which are, in turn, disproportionately male. Language policy, therefore, becomes an area that, in practice, is used as an indirect method for the reproduction of both class and gender inequalities.

In a more comprehensive regional study of Muslim-majority states, Shoaib (2025) observed that female students' performance tends to rival that of their male peers, yet they remain underrepresented in administrative positions. This paradoxical situation reveals the institutional character of the gender gap, which transcends performance-related factors.

One of the highly gender-imbalanced sectors in higher education systems is leadership. Kataeva et al. (2025) observe that university leaders tend to shift the blame for gender inequality to cultures. Okutayeva et al. (2025) suggested that efforts to advance women's professional empowerment in gender-imbalanced societies might be facilitated by social entrepreneurship or alternative leadership models that do not rely on academic leadership structures, which are slow to adapt to change. Another area in which gender inequality affects higher education systems is student organizations.

These results are also supported by international evidence. In their study, Brown et al. (2020) revealed the existence of "glass ceiling" and "sticky floor" effects within

academic medicine, indicating that gender inequality at the leadership level is a non-anomalous phenomenon across contexts. These comparative findings emphasize the significance of structural reforms that target promotion standards, productivity measures, and work-life balance practices.

Sectoral studies show that there is no equality in the number of representatives of both genders in different sectors. Kalibayeva et al. (2025) examined the position of women in musical composition in Kazakhstan and demonstrate that the number of female representatives exceeds the global average but is constrained by certain social expectations. Järvinen et al. (2022) highlighted the lack of development of research facilities in nursing education, a female-dominated sector of education.

Lastly, Usupbaev (2021) highlighted the potential of entrepreneurship education as a form of socioeconomic empowerment for women, with non-traditional educational routes possibly serving as a different form of leadership and recognition attainment.

On the whole, the literature agrees that gender inequality in higher education and the academic environment in Kazakhstan is a systemic, multifaceted, and institutionally embedded issue. Thus, although women have reached parity or even comprise the majority of students and academics in specific fields of study, inequalities persist in leadership positions, STEM education, doctoral programs, and access to top institutions. These are maintained through the combined effects of societal norms, institutional settings, and the labour market. While new developments such as internationalization projects or entrepreneurship education programs hold promise for changing existing circumstances, they remain inconsequential in the absence of a complete overhaul.

3. METHODOLOGY

The present research employs a quantitative, descriptive-analytical approach to investigate gender inequality in the education and research system in the Republic of Kazakhstan, focusing on gender differences in educational achievement and professional paths in the education and research sector. This approach is underpinned by gender studies, human capital theory, and institutional analysis, enabling a combined analysis of the structural and demographic dimensions of gender inequality. This analysis relies on secondary data, which is representative and ensures validity and comparison of results.

The empirical basis is represented by data from the Bureau of National Statistics of RK for 2009 and 2021, including detailed information on individuals holding academic and scientific degrees, classified by gender and age. There are also administrative data from the Bureau of National Statistics of RK, including information on the gender distribution of the leadership in general secondary education institutions and the TVET institutions for 2013-2024, and the gender-differentiated indicators for the number of students enrolled and graduated, and the number of expected graduates and fields of education for 2024-2025. By using both census and administrative data, the life cycle of gender inequality can be analysed in a multidimensional manner, from higher education to higher academic qualifications to higher levels of leadership.

The analysis strategy combines three interlinked aspects. In the first aspect, vertical stratification of academia is investigated based on the distribution of men and women across different academic degrees: Candidate of Sciences, Doctor of Sciences, PhD, Profile-based doctorate, and Master's degree. These degrees are viewed as proxies for individuals' general hierarchical positioning in the academic system, as well as for access to research and decision-making. In the second aspect of the research strategy, a life-course perspective is adopted by analyzing the distribution of men and women across age groups from 20 to 24 to 100+. The third aspect of the research strategy, horizontal and institutional differentiation, is investigated by analyzing the segregation of both men and women by study majors and leadership

positions in educational institutions, as well as territorial differences between cities and the countryside.

The gender variable is used as the stratification variable, operationalized as a binary (men/women) variable, mirroring standard statistical categorization. Age is measured in five-year bands and used as a proxy for career stage or generation. The level of academic award is treated as an ordinal variable, indicating vertical stratification within higher education. The field of study is treated as a nominal variable, indicating horizontal stratification, with particular interest in disparities between STEM/ICT and feminised fields of education, health, and the social sciences. Territorial types (urban/rural) and time (for leadership variables) are used as contextual variables.

Statistical processing involves the use of nonparametric descriptive methods appropriate for aggregated data. The structural analysis allows for the determination of the proportions of each gender and of each level of composition within the whole population of graduates. The cohort analysis allows comparison of gender proportions across age groups to identify feminisation or masculinization. Sectoral analysis is used to compare data on male and female enrollments and graduations to determine the horizontal segregation of both genders across various sectors of education. Trend analysis is also used to determine changes in the representation of females in administrative positions in education over the period 2013 to 2024. All computations are performed using standard software.

The interpretation of outcomes is driven by a gender-sensitive analytical framework that includes notions of vertical and horizontal segregation, "leaky pipelines" within academic career tracks, and gender inequality theories within institutions. This methodological approach enables a connection between observed statistical trends and deeper structural and institutional dynamics that underlie gendered trends in education and science. While it is true that the approach relies on aggregate data that cannot be used to draw causal conclusions or to build multivariate models, it does offer a strong methodological approach for discovering structural imbalances and trends towards gender equality in Kazakhstan's educational and scientific system. Table 1 shows a description of the variables used in the study.

Table 1. Description of variables used in the study

Variable	Description	Measurement / Categories
Gender	Biological sex of individuals as reported in official statistics	Men, Women
Age group	Age cohort reflecting life-course and career stage	20–24, 25–29, …, 95–99, 100+
Academic degree level	Highest academic or scientific degree attained	Candidate of Sciences, Doctor of Sciences, PhD, Profile-based doctorate, Master's
Field of study	Educational specialization of students	Pedagogical sciences, ICT, Engineering, Health, Agriculture, Business, Social sciences, Others
Leadership position	Managerial role in education institutions	School head, TVET institution head
Territorial type	Place of residence or institutional location	Urban, Rural
Time period	Year of observation for leadership indicators	2013–2024

Note: compiled by the author

From a methodological point of view, specific attention is paid to the comparability and consistency of the indicators within and across data sources and over time. To ensure the coherence of our analyses, we normalised all variables using common classification systems used in national statistics, and the percentage shares were then determined with respect to well-defined reference groups for each specific stratum of the population, broken down by age, level of education, or field of study. While the lack of person-level microdata makes it challenging to utilize methods based on causal or multivariate analyses, the methodology used has its strong points when applied to the detection of lasting patterns and cohort dynamics and to the institutions hindering the academic and professional careers of women, forming an adequate basis for the gender comparison in the next stage of the policy-coupled research on the topic.

4. RESULTS

The empirical findings uncover sustainable, multidimensional gender asymmetry in the education and research sector in Kazakhstan, which differs across levels and dimensions. The findings reveal and attempt to explain how, despite the significant presence of women in higher education and the early stages of academia, substantial barriers persist at advanced and management levels.

At the aggregated level, census data show that women make up a significant proportion of persons with academic degrees, especially at the Master's and Candidate of Sciences levels. Despite their proportional advantage, women have not gained an equivalent advantage at higher levels of academia. As shown in Table 2, women were overrepresented among the number of Candidates of Sciences and holders of PhDs

Table 2. Gender distribution by academic degree level (%, total degree holders)

No.	Academic degree	Men	Women
1	Candidate of Sciences	68.3	76.2
2	Doctor of Sciences	25.3	16.2
3	PhD	6.4	7.6
4	Profile-based doctorate	0.8	0.9
5	Master's degree	78.5	77.6

Note: compiled by the author

These results confirm the presence of a "leaky pipeline" effect: although women successfully enter and progress through postgraduate education, the probability of reaching the highest academic rank is still far lower than for men. This imbalance reflects not only individual career trajectories but also institutional constraints, including promotion practices, access to research funding, and leadership norms.

In addition, age-cohort analysis shows that gender inequality has changed over time. Younger age cohorts (20–39 years) have smaller inequalities and there are even some kinds of academic degrees for which women outnumber men. For example, in the 25–34 age group, women comprise a slightly higher share of PhD holders and Candidates of Sciences. The implication is that structural reforms in doctoral education, internationalisation, and expanded access to postgraduate studies have had a beneficial impact on women's participation. However, gains are clearly diminished sharply in older cohorts. Among individuals aged 55 and above, men dominated the category of Doctors of Sciences, reflecting historical gender norms and unequal access to academic careers during earlier periods.

This intergenerational difference shows that there is a cohort-specific improvement in gender equality not realized in equal representation at higher academic levels. The academic structure, therefore, perpetuates past inequalities, where older cohorts dominated by men remain in higher administrative positions. Institutional changes, it seems, are occurring at

a slow pace, as one would expect in academia, where career cycles are long.

Horizontal segregation by gender persists as a characteristic feature of the Kazakhstani HE sectors. The number of students for the 2024/2025 year nevertheless shows a high concentration by gender within a given field of education. Thus, women prevail in pedagogical sciences, health and social services, and the humanities; whereas men prevail overwhelmingly in engineering, ICT, and technical specialities. The gender distribution for the broad fields is presented in Table 3 below.

Table 3. Gender composition of students by field of study, 2024–2025 (%)

No.	Field of study	Men	Women
1	Pedagogical sciences	33.0	67.0
2	Health and social services	38.0	62.0
3	Social sciences and humanities	42.0	58.0
4	Business, management and law	52.0	48.0
5	Engineering, manufacturing and construction	70.0	30.0
6	ICT	76.0	24.0
7	Agriculture and bioresources	55.0	45.0

Note: compiled by the author

Strong feminisation in education and healthcare further cements occupational segregation, affecting income distributions, career mobility, and representation across key sectors of the economy. At the same time, it should be noted that gender underrepresentation in ICT and engineering sector jobs further affects women's access to high-growth industries, thereby perpetuating gender gaps within the labour market. It is pertinent to note that this analysis points to these gender differences despite overall improvements in women's educational attainment.

Inequality based on gender is further evident in the leadership of institutions. Data from the period 2013 to 2024 indicates that while the majority of the teaching force comprises women, the proportion of female school and TVET institution heads remains lagging in top administration. Nationally, the proportion of female heads of school and TVET institutions oscillated between 1.6% and 2.6% during the period, and there has not been an evident rise in the proportion of female dominance in the leadership of these institutions, when juxtaposed with the dominance among the teaching force.

Analysis of the territorial distribution also indicates the spatial dimensions of gender inequality. Cities have a marginally higher female presence in the administration of educational institutions than rural regions, but levels remain very low in both regions. In rural regions, women's careers are also constrained by gender conventions and limited mobility. Table 4 presents the gender distribution among educational institutions at the national level.

Table 4. Gender composition of heads of general education and TVET institutions, in %

Year	Men	Women
2013	98.2	1.8
2016	97.4	2.6
2019	98.1	1.9
2021	98.3	1.7
2024	98.4	1.6

Note: compiled by the author

The continued existence of this leadership gap indicates that equal educational access has not been complemented with equal opportunity for growth and promotion within and through educational institutions and programs. Gender dynamics within promotion processes, social networks, and views on who should hold leadership positions seem to form a crucial component within the continued male prevalence at the decision-making level. This educational attainment and leadership deficit is one of the biggest institutional setbacks in addressing educational inequalities between the genders.

Taken together, these results show that inequality in the area of gender in the educational and research sector in Kazakhstan is not ubiquitous but systematically varies along the hierarchy in academia, age, sectors, and levels. On the one hand, younger cohorts of women have made substantial progress toward equality, or even superiority, in postgraduate studies, although these disparities are compensated for over the course of a career in academia. In horizontal segregation, women are concentrated in lower-paid sectors, while in vertical segregation, they are less represented at higher levels in academia.

These results emphasise that the inequality between the sexes in both education and science is a cumulative process rather than an issue of access. Without specific actions being taken regarding these aspects, disparities will continue to persist, even as the number of women in higher education continues to increase.

5. DISCUSSION

The results of this study confirm that there is solid empirical evidence of the structural embeddedness of gender inequality in the education and research sector of Kazakhstan, as well as the existence of vertical and horizontal mechanisms for its realisation. In fact, they have achieved considerable numerical representation of females in the education sector pursuing postgraduate education; however, this has not led to equal representation at the top academic level. Thus, there is evidence that education for females should not be evaluated solely on enrollment indicators.

One of the main results is the observation that vertical gender segregation in higher education persists. The fact that the number of women on the level of Master's and Candidate of Sciences is predominant, but with a notable deficiency in the category of Doctors of Sciences, corresponds perfectly to the "leaky pipe" model, which is primarily used in gender studies, and which stipulates that at every level of professional promotion, the number of women diminishes. Within the context of Kazakhstan, this leakage seems to be shaped by long academic career cycles, historically male-dominated senior cohorts, and institutionalised promotion practices that favour uninterrupted career trajectories. Since the Doctor of Science degree remains one of the key prerequisites for senior academic and administrative positions, women's limited access to this level has serious long-term consequences for governance and agenda-setting within higher education and research institutions.

This generational shift is the striking insight of the cohort analysis. Younger cohorts are closer to gender parity and even female advantage in postgraduate education, especially within the PhD track. The trend reflects the impact of structural reforms, such as the internationalisation of doctoral education and gradual substitution of the Soviet academic degree system. Yet the findings suggest these advances are still not enough to break through entrenched institutional barriers. Unless reforms to the mechanisms of promotion and leadership selection accompany these gains in gender equality for younger women, senior positions will remain dominated by older cohorts.

Horizontal gender segregation across fields of study remains another critical challenge. The strong concentration of women in education, health, and social sciences, together with their low representation in ICT and engineering, reproduces gendered labour-market outcomes and limits women's

participation in strategic, high-growth sectors. This segregation can indeed not be accounted for by mere educational access, given that the overall participation of women in higher education now surpasses that of men. It suggests the influence of gender norms, early socialization, career expectations, and institutional steering within the education system. Such patterns point to the need for policy interventions well before higher education, including addressing gender stereotypes in school curricula and career guidance.

The analysis of educational leadership further reinforces the structural nature of gender inequality. Despite women constituting a majority among teachers, their representation in the ranks of heads of general education and TVET institutions remains exceptionally low and has shown little improvement over more than a decade. This is a clear "glass ceiling" effect: women's mobility is blocked at points of career turnover. The divide between urban and rural areas is a layer of inequality in itself: traditional culture and immobility in the countryside diminish career opportunities for women.

In conclusion, the debate emphasises that the issue of gender inequality within the education and research sector in Kazakhstan has a cumulative, institutionalised effect and is thus not easily affected by participation-based policies. Although there is a need to enhance women's education, the measures are inadequate if other reforms are not made regarding academic promotion requirements, pipelines to leadership positions, and the fields chosen by those affected by the prevailing structures. This is not only vital for ensuring an equal gender share but also essential for ensuring that the education sector is effective.

6. CONCLUSION

This study examined gender inequality in Kazakhstan's education and research system by analysing academic degree attainment, age group, discipline, and leadership level. This feedback provides clear evidence that, despite considerable changes toward better entry for women into post-secondary education and advanced studies, a certain level of gender inequality persists and remains unevenly distributed along the academic ladder in the education and research system. There are still gaps in entry into education, rather than in certain levels that help determine the level of influence on the education and research system.

"One of the main findings is that the inequalities between the genders exist specifically on the vertical axis." It can be concluded that "the gap between the number of men and women is similar for PhDs to that between PhDs and Doctors of Sciences." However, this similarity only applies to these three levels: Master's degrees, Candidates of Sciences, and PhDs. The number of women drops significantly after the level of Doctors of Sciences, which "remains a barrier to entry for senior positions." This vertical stratification reflects the cumulative effects of institutional practices, long career timescales, and historically male-dominated senior cohorts. In the absence of dedicated policy intervention, these structural features run a real risk of reproducing gender inequality as younger, more gender-balanced cohorts enter the academic system.

At the same time, horizontal gender segregation across the fields of study remains a distinctive feature of Kazakhstan's higher education landscape. Women continue to concentrate in pedagogical, health, and social science disciplines, while men dominate engineering, ICT, and technical fields. Such segmentation has far-reaching consequences beyond education itself, as it determines labor market outcomes, income distribution, and women's roles in innovation-driven sectors of the economy. The persistence of horizontal segregation indicates that gender equality policies need to go beyond higher education institutions and also address early educational trajectories, career guidance, and social norms influencing field choice.

An examination of institutional leadership reveals that one of the most significant

disparities is in gender representation. Although women constitute the largest share of educators, they are represented at very low levels among administrators of general education and TVET institutes, and this trend has not changed much over the past decade. There seems to be a lack of balance between women's representation in the education sector and their underrepresentation in its leadership, indicating the presence of a 'glass ceiling' within the country's education sector.

From the results obtained, it is evident that gender inequality in the education and research sectors in Kazakhstan is not a phenomenon that will correct itself over time. The institution has been dealing with gender inequality maintained through criteria for promotion and leadership selection. Although there have been improvements following the reforms and the institution's going global, these have ensured women have a better chance at the initial level of the institution's hierarchy.

From a policy perspective, this research points to the need for a holistic strategy to address the access, progression, and leadership aspects of equality. This strategy would encompass promotion criteria that are open and responsive to gender equity, leadership development opportunities for female personnel, motivators to increase female engagement in science and information and communication technology areas of study, and a system to ensure a balanced gender ratio in academic and managerial posts. Overcoming these imperatives not only represents a moral obligation to achieve greater social justice but is also essential for improving the overall effectiveness and competitiveness of the educational research platform in Kazakhstan.

In conclusion, substantive gender equality in education and science requires shifting participation metrics toward a structural transformation of educational pathways. The evidence in this study may conclusively inform this transformation with a strong empirical base, suggesting that gender-responsive transformation is imperative for establishing a more equitable knowledge economy in Kazakhstan.

AUTHOR CONTRIBUTION

Writing – original draft: Kuralay Nurgaliyeva.
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Data collection, analysis and interpretation: Kuralay Nurgaliyeva.
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