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Eurasian Journal of Gender Studies (EJGS) is a double-blind peer-reviewed publication dedicated to disseminating scientific research on gender issues. These issues encompass a range of topics including encouraging the submission of original research, theoretical frameworks, and review articles that explore gender intersections with cultural, social, economic, and political contexts in the Eurasian region.

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Address: Kazakhstan, 050010, Almaty, 8a Abay Ave.

Phone: +7 (727) 259-80-33

Email: info@ejgs.com

Website: <https://ejgs.com>

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Aims: to contribute to the scholarly discourse on these and related topics by publishing rigorous research, case studies, reviews, and theoretical analyses that provide insights into the complex dynamics of gender issues in the Eurasian region.

Key topics covered in the journal: Issues of Gender Pay Gap, Career Development Models, Gender Perspectives in Business Management, Access to Leadership Positions, Gendered Aspects of Environmental Policy, Gender in Political and Religious Contexts, Geographic and Regional Perspectives on Gender.

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RESEARCH ARTICLE

The Impact of Information and Communication Technologies on Gender Aspects in the Health System: A Systematic Review

Lazat Spankulova^{1*}Zhuldyz Asanova²

¹ Al-Farabi Kazakh National University, Almaty, Kazakhstan

² University of International Business named after K. Sagadiyev, Almaty, Kazakhstan

Corresponding author:

*Lazat Spankulova – Doc. Sc. (Econ.), Professor, Al-Farabi Kazakh National University, Almaty, Kazakhstan.

Email:

lyazzat.spankulova@kaznu.kz

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Abstract

This article explores the use of information and communication technologies (ICT) and mobile healthcare technologies (mHealth) to manage performance in medical institutions and promote social transformation, focusing on gender aspects. ICT helps to optimize decision-making processes, increase transparency, and enhance analytical capabilities. However, the introduction of these technologies can both reduce and increase gender inequality, depending on their design and context of use. The aim of the study is to identify the opportunities and risks associated with the use of ICT and mHealth in the context of gender dynamics. A systematic literature review method was applied within the study's framework, including articles selected following the PRISMA methodology used in systematic reviews and meta-analyses. Of the 610 publications found on the Scopus platform, 48 articles directly related to ICT and PMM in the health sector were selected and analyzed. ICT and mHealth technologies significantly improve operational efficiency and expand healthcare access. Persistent gender barriers, such as limited technical skills and unequal access to technology, hinder women's participation in mHealth programs. The data was updated in November 2024. Today, the possibilities of using ICT to support various processes in medical organizations are highly diverse. Managers at all levels must understand and can evaluate how each technology contributes to the fulfillment of specific tasks and increases overall efficiency.

Keywords: Digital Technologies, Information and Communication Technologies, Mobile Healthcare Technologies, Gender Inequality, Performance Management, Performance Measurement, Healthcare

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1. INTRODUCTION

The modern healthcare system faces several challenges, including improving the quality of services, reducing costs, and ensuring equal access for all population groups. Information and communication technologies (ICT) play a key role in solving these problems by providing tools for data analysis, process automation, and decision support. However, the social context, including gender relations, is often left out of consideration when developing and implementing such technologies. The study examines the dual roles of ICT and mHealth: their potential for women's empowerment and the risk of exacerbating existing gender imbalances (Aceto et al., 2018).

One of the key aspects of the evolution of PMM in recent decades has been the active introduction of information and communication technologies (ICT). Using digital tools such as big data systems, artificial intelligence, cloud technologies, and blockchain allows you to automate management processes, collect and analyze large amounts of data, and integrate various systems to ensure the continuity and consistency of medical services. However, the scientific literature must be more comprehensive in studying how ICTs can support the entire performance management cycle - from measuring indicators to making strategic decisions.

Research has shown that mHealth initiatives or health programs complemented by mobile phone technology can contribute to women's empowerment. However, there is growing concern that mobile programs targeting women may exacerbate gender inequality. Despite the active research on healthcare technologies, the focus is on the clinical aspects of their application, such as telemedicine, diagnostics using artificial intelligence, or procedure automation. Management processes, including their digital transformation, need to be more publicized. There are significant gaps in understanding how ICTs contribute to the development and

implementation of multidimensional PMM systems that can consider not only traditional accounting indicators but also concepts such as value-based healthcare, sustainability, and resilience (Banta, 2003).

New public administration reforms were initiated in the 1990s, and crises such as the COVID-19 pandemic have accelerated the digitalization of medical management, heightening the importance of applying technology to improve efficiency. Research shows that digitalization improves the quality of medical care, increasing operational efficiency and strengthening public confidence in medical institutions. However, the successful implementation of ICT requires strategic planning, consideration of institutional features, and alignment of goals at the organizational and system levels.

This study is a systematic review of the literature to identify the opportunities and risks associated with using ICT and mHealth in the context of gender dynamics. The research methodology was based on the PRISMA approach, which ensured transparency and objectivity in the selection and analysis of publications. After analyzing 48 relevant articles, the authors seek to fill the existing knowledge gap by providing a holistic view of how digital technologies can be integrated into performance management processes.

This review details the key technologies and tools used to support PMM, their impact on management decision-making, and the limitations associated with implementation. The proposed structure of the analysis can become the basis for further research and practical developments in the field of digital transformation of healthcare. Thus, the article's purpose is to expand the scientific base for understanding how ICT and mHealth can contribute to achieving strategic goals in healthcare, ensuring the sustainable development of medical organizations, and reducing gender inequality.

2. LITERATURE REVIEW

The first wave of ICT research in healthcare

focused on improving technical and operational processes. However, since the 2000s, the focus has shifted to studying the impact of technology on social aspects, including gender relations. According to research, mHealth technologies, such as mobile health apps, have improved women's access to health services, increasing their autonomy and involvement in making decisions about their health. For example, programs that provide women with mobile phones for consultations have improved communication between partners. Nevertheless, such initiatives have sometimes provoked family conflicts related to changing traditional roles.

The gender dimensions of ICT and mHealth use also include issues of the digital divide. Men often have more opportunities to access technology, which limits women's participation in such programs. Studies have shown that women's lack of digital literacy increases their dependence on men for technology use, which can hinder the achievement of gender equality goals.

Management and Performance Assessment (PMM) systems are structured processes and methodologies that use data to help an organization achieve strategic goals within its mission and strategy (Ouchi, 1979). Performance measurement involves collecting and analyzing data, selecting appropriate metrics, and calculating metrics to assess an organization's ability to achieve strategic goals. In turn, performance management uses collected information to support decision-making (Lebas, 1995; Bititci et al., 2012).

A study conducted by Tatichiet and co-authors (2010) identified three key stages in the creation of PMM systems: the definition of performance indicators that reflect the ability to evaluate specific aspects of an organization's activities, the development of measurement systems that structure data and indicators within an overall evaluation system; and the integration of data to support management decision-making.

PMM plays a key role in medical institutions, ensuring decision-making based

on objective data (Preneestini & Noto, 2023). This helps managers focus on the facts, avoiding subjective judgments and assumptions. After the New Public Administration reforms, PMM systems became widespread in the Western public sector and healthcare to limit the previously adopted bureaucratic Weber model (Hood, 1991; Nuti et al., 2018).

The first PMM systems implemented in healthcare organizations-controlled objects associated with traditional accounting indicators, such as input data (for example, financial and human resources) and output data (for example, the volume of services provided) (Nuti et al., 2018). After 2000, certain limitations and undesirable consequences of the original PMM model were identified, which required a revision of its approaches (Bevan & Hood, 2006; Wadmann et al., 2013). In response to these challenges, a new line of PMM systems was developed, featuring a more straightforward measurement approach that covered a wide range of parameters. These systems facilitate inter-organizational interaction and coordinated work of various departments of medical institutions (Kaplan & Norton, 2005; Bititci et al., 2012; Nuti et al., 2018). Achieving such results required introducing new tools to coordinate goals, share information, and facilitate collaboration between healthcare providers, which led to significant changes in healthcare management.

Information and communication technologies began to be applied in healthcare in the 1990s, significantly increasing the accessibility, efficiency, and quality of medical processes (Aceto et al., 2018). The COVID-19 pandemic has become a catalyst for the digital transformation of medical organizations, accelerating adaptation processes similar to trends in other sectors. Although the topic of the introduction of ICT in health care is being actively studied, there still needs to be more in the literature. Most studies focus on using technology to solve specific clinical problems, while the impact of ICT on management processes still needs to be better understood (Bechkami & Daim, 2012).

Of particular interest to researchers is the PMM, given its importance in both theoretical and practical aspects. The development of ICT and specialized software for PMM in the late 1980s and early 1990s played an important role in accelerating the development of innovative performance assessment tools and systems (Paolini, 2022).

Medical ICTs are digital technologies used in healthcare to optimize management, improve accessibility and delivery of medical services, and facilitate communication between patients and medical organizations (De Rosis et al., 2020; Wyers, 2024). This technological advance aims to improve the accuracy and efficiency of data presentation and measurements and predict the impact of actions on the final results based on cause-and-effect relationships (Noto et al., 2023). According to a study by Porter and Theisberg (2006), ICTs serve as a tool for collecting, analyzing and using data on patients, procedures, methods, costs and results. However, their goal is not to use the technology itself but to apply the principles of value-based healthcare, combining clinical, administrative, and financial information. The introduction of multidimensional PMM systems required the support of integrated ICTs that help manage the complexities of PMM, ensuring data quality and accuracy and facilitating the establishment of cause-and-effect relationships (Tortorella et al., 2020). Modern ICTs such as big data, artificial intelligence, blockchain, cloud computing, and other technologies continue transforming PMM systems. However, many studies focus only on certain technologies without offering a comprehensive approach. This indicates the need to develop strategies that will facilitate the implementation of ICT in healthcare.

3. METHODOLOGY

A systematic approach was used to analyze the relationship between PMM and modern ICT. This helped minimize bias and implement a transparent analysis process. The method made it possible to identify the study's results

for selecting relevant publications. Although effective, this approach can sometimes exclude essential materials. To solve this problem, we have applied a flexible article selection process, considering it an auxiliary tool. The research protocol included three key stages: literature selection, analysis, and peer review.

At the first stage, we selected publications from two leading databases - Scopus (351) and Web of Science (238), which together resulted in 589 publications. To eliminate duplicate entries, a deduplication process was carried out. During this process, 142 articles were deleted, leaving 447 unique publications for further analysis. Then, the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method filtered the first set of articles twice based on their scientific content at the selection stage. The main objective was to assess the relevance of the research topic, as well as to exclude publications that dealt with aspects not directly related to PMM and ICT in healthcare. These publications also lacked sufficient scientific input, such as short reviews or unpublished materials. In particular, as soon as the set of articles was determined, we read their annotations, which led to the exclusion of 279 articles.

At the second stage, a full text analysis of the remaining 168 articles was carried out. The selection criteria included the presence in the article of empirical data, practical examples of the use of ICT and mHealth in healthcare. The reliability of the research methodology. All selection steps and results are presented in the PRISMA diagram (see Figure 1).

This study demonstrated the chronological distribution of publications on using ICT and mHealth technology in the healthcare sector. Figure 2 shows the number of publications in this field from 2011 to 2022. It is noteworthy that the graph shows a significant jump starting in 2020. This can be explained by the increased demand for efficiency improvements in the health sector after the effects of the COVID-19 pandemic. In 2022, the most significant number of publications emphasized integrating operational excellence with healthcare 4.0 technologies.

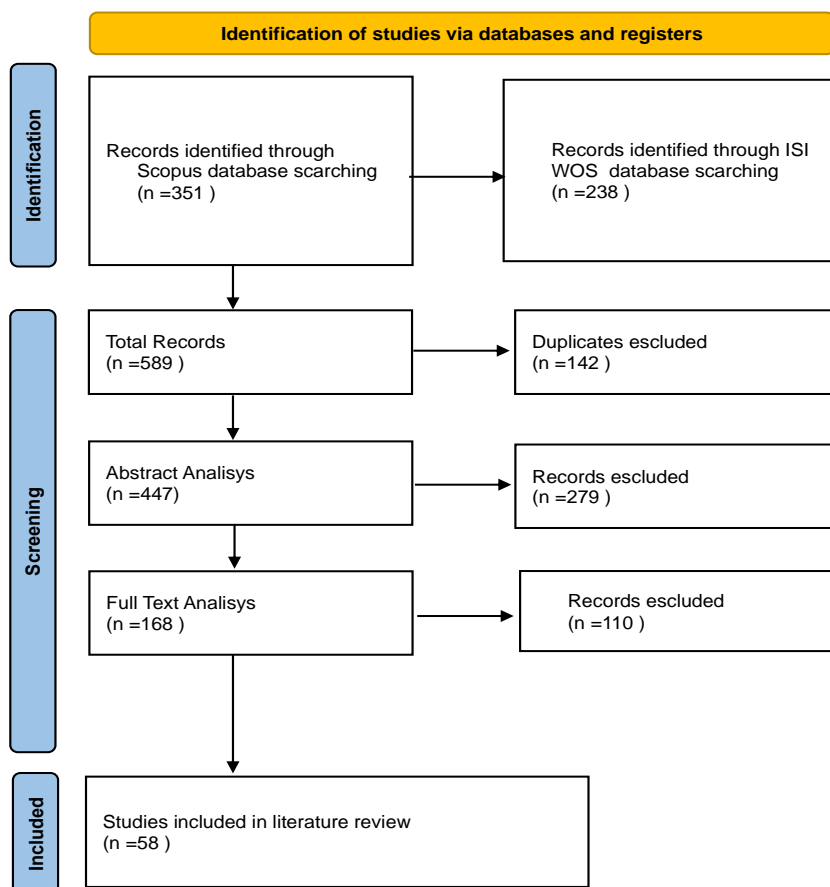


Figure 1. A selection of relevant literature using the PRISMA method

Note: compiled by the authors

4. RESULTS

Conducting a systematic review of the literature, we analyzed the number of published articles according to the year of their publication, which determines the study's contribution to the relationship between RMM and ICT in the health sector. Notably, the early 2000s marked the initial rise in publications, likely driven by advancements in mobile technology and ICT infrastructure. However, the most remarkable growth occurred in the post-pandemic era, reflecting the increased focus on remote healthcare solutions necessitated by global health crises.

Figure 2 illustrates the evolution of scientific publications addressing the

application of ICT and mobile health (mHealth) solutions in healthcare from 1995 onwards, using data sourced from Scopus and Web of Science.

In Figure 2, we see that research on the relationship between RMM and ICT has been conducted since 1995, and the first publication is the work of Bomb et al. (1995). Studying historical trends, we noticed that in 2015, there was more interest in exploring this topic. An article by Rosen and co-authors (2015) on using sensors to measure the effectiveness of teamwork in healthcare has become one of the most cited in our sample. Over the past five years (2020-2024), scientific achievements in this field have increased, which may have been facilitated by the COVID-19 pandemic.

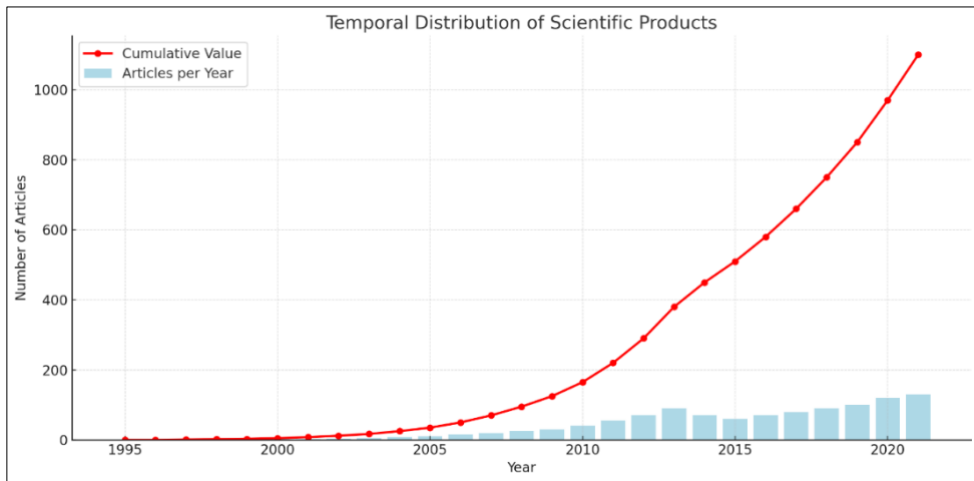


Figure 2. Distribution of scientific results over time

Note: compiled by the authors

In 2022, most of the studies reviewed were published in management journals such as Span'o and Ginesti (2022), Tortorella et al. (2022), and Srivastava and Srivastava (2022). A similar trend may be observed in 2023 (Ippolito et al., 2023; Korhonen et al., 2023). In 2024, the publication on this research topic was also active since the concept of healthcare development until 2026 provides for further infrastructure development and digitalization of the healthcare system.

geographical location of the research from the point of view of the countries where the universities of the authors conducting the research are located. This analysis gives us an idea of how scientific interest is distributed depending on territorial boundaries. We identify countries and can thus identify researchers who make the most significant contribution to the scientific literature. Figure 3 shows the distribution of articles made by research area, from 1993 to 2023.

The following analysis is related to the

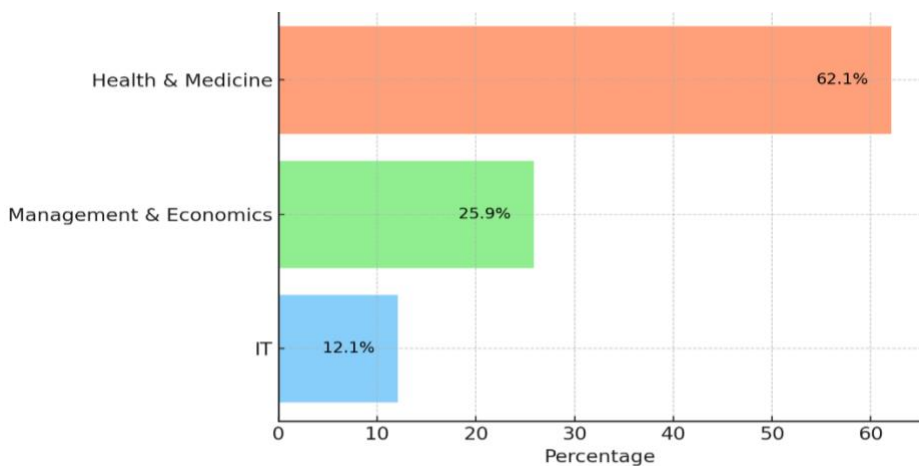


Figure 3. Distribution of articles by research area (1993-2023)

Note: compiled by the authors

The following analysis is related to the geographical location of the study in terms of the countries where the universities of the authors conducting the study are located. This analysis gives us an idea of how the scientific

interest of researchers is distributed depending on the territorial boundaries in the scientific literature.

Figure 4 illustrates geographical distribution of research for 1993-2023

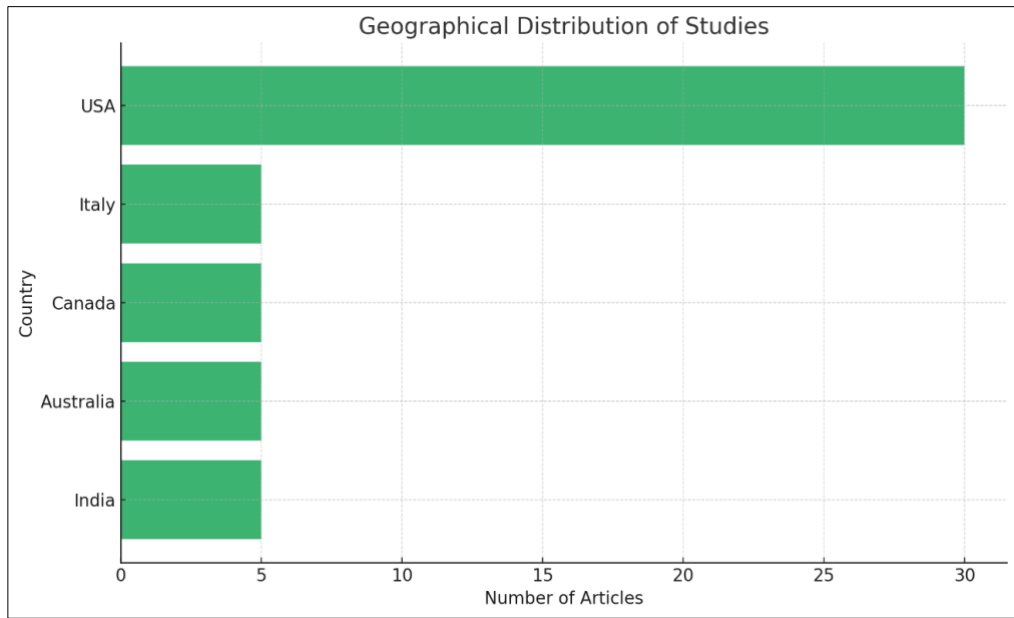


Figure 4. Geographical distribution of research for 1993-2023

Note: compiled by the authors

The graph shows the number of published articles by country, highlighting the significant imbalance in their geographical distribution. Thus, the United States leads in publications, which significantly exceeds the figures of other countries. Next, countries that have made the most significant contribution to the development of modern literature and published five or more publications include Canada, Australia and India. The findings reflect uneven global participation in research activities, with the dominant role played by the United States highlighted. Lower activity in other countries may be due to differences in funding, infrastructure, and access to resources. Broader international initiatives are needed to ensure a more balanced scientific activity globally.

The chart shows gender differences in access to technology, participation in mHealth programs, and digital literacy (Figure 5).

The data for 2022 reflect the gender gap in three key categories: access to technology, participation in mHealth, and digital literacy. Men perform significantly better in all categories, with a gap remaining at 20%. The most pronounced differences are seen in digital literacy, where men's rates reach 75%, while women's reach 55%. These results highlight the advantage men have in developing digital skills needed for active participation in the technological environment. A similar trend is seen in access to technology where a 20% gap reflects structural barriers women face. A similar dynamic is also seen in the use of mHealth technologies which indicates women's insufficient involvement in mobile health programs despite their potential for improving quality of life. Thus, the data presented demonstrate a persistent gap that requires targeted efforts to increase women's access to modern technology and digital tools.

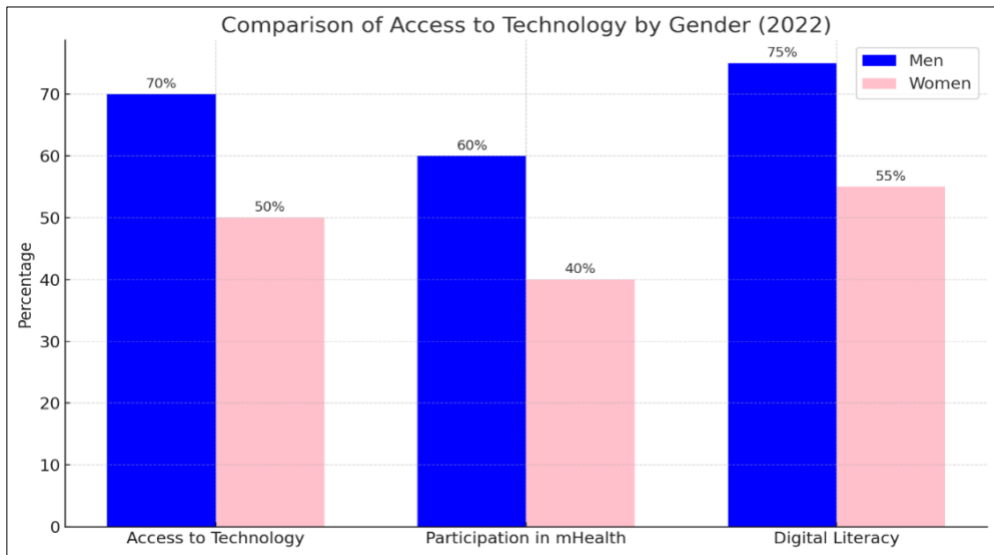


Figure 5. Comparison of access to technology by gender for 2022

Note: compiled by the authors

Such differences may be related to unequal access to resources, educational barriers, as well as social and cultural factors that hinder women's active participation in the technological environment. Lack of resources and technical skills also create significant

constraints for women, indicating the need to consider barriers in more detail. Furthermore, gender barriers to participation in mHealth programs illustrate the main obstacles for men and women, such as social pressure, lack of resources and technical skills (Figure 6).

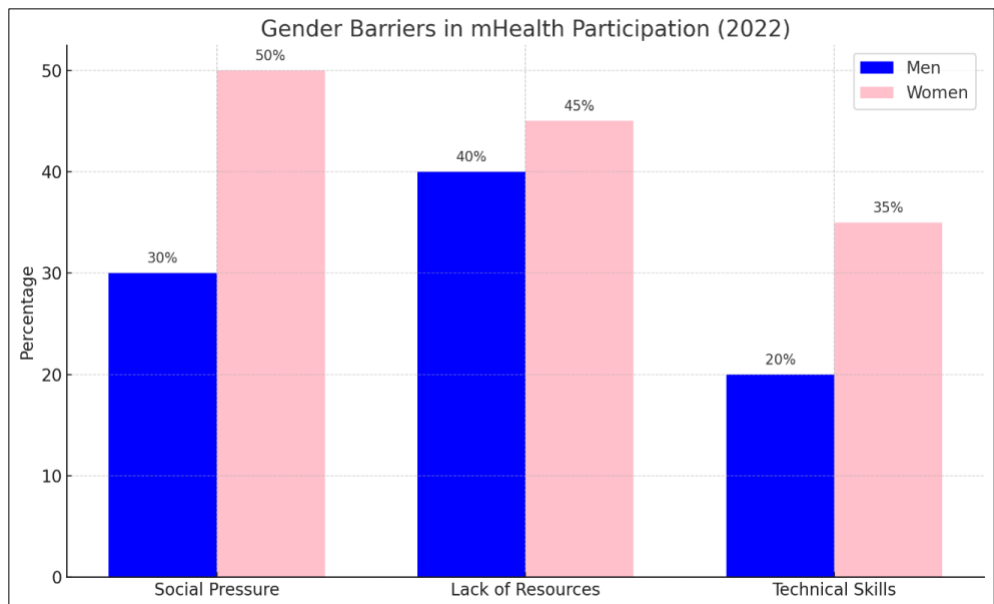


Figure 6. Gender barriers in mHealth program participation

Note: compiled by the authors

The chart shows the difference between men and women regarding access to technology, mobile healthcare, and digital literacy in 2022. It is clear that men have a major advantage in all these areas. Their access to technology was 70% compared to 50% for women. When it comes to mobile healthcare, men's participation was 60%, while women's was only 40%. Men had a higher level of digital literacy at 75% compared to women at 55%. These numbers show that there is still a big gap between men and women when it comes to using technology.

5. CONCLUSIONS

Initially, ICT research focused on technical aspects such as process automation and service quality improvement. However, since the 2000s, attention has been paid to social aspects, including gender relations. Men often have more access to technology, which limits women's participation in mHealth programs. Studies have shown that women's lack of digital literacy increases their dependence on men when using technology, which hinders the achievement of gender equality goals.

The main conclusions are as follows:

1. The role of ICT and mHealth in healthcare: ICTs increase transparency and analytical abilities, which contribute to more informed decision-making in healthcare management. mHealth technologies can expand access to medical services for different segments of the population, including women, who traditionally face great barriers to access to medicine.

2. Impact on gender inequality: ICT can both reduce and increase gender inequality, depending on the technology's design and the context of its use. For example, women's

limited access to technology or lack of digital skills may exacerbate the existing gap. At the same time, well-designed programs aimed at developing digital literacy among women can reduce this gap.

3. Gender barriers to using mHealth: The main barriers include social pressure, lack of resources and technical skills. Women are more likely to face these problems, which indicates the need for gender-oriented initiatives in the development and implementation of mHealth.

The study confirms that information and communication technologies can significantly improve the effectiveness of management in healthcare. However, their implementation must take gender aspects into account. In the process of implementing technology, certain risks are identified, such as women's limited access to digital tools and low digital literacy levels, which may exacerbate existing gender imbalances, especially in the case of mobile technologies. These technologies, on the one hand, can increase access to health services but, on the other, can also strengthen gender barriers if social and cultural factors are not considered. Programs aimed at supporting women, for example, may provoke resistance from conservative communities due to their violation of traditional roles and expectations.

The study highlights the need for further work in this direction, including a detailed study of the impact of ICT and mHealth on social structures and the development of practical recommendations for the implementation of these technologies in various cultural and social settings. The introduction of such solutions could be an important step towards creating a healthcare system that is effective, sustainable, and fair.

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AUTHOR BIOGRAPHIES

* **Lazat Spankulova** – Doc. Sc. (Econ.), Professor, Al-Farabi Kazakh National University, Almaty, Kazakhstan. Email: lyazzat.spankulova@kaznu.kz, ORCID ID: <https://orcid.org/0000-0002-1865-4681>

Zhuldyz Asanova – PhD student, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: zhulduzasanova@mail.ru

RESEARCH ARTICLE

Holistic Health, Yoga and Social Change Among Young Women in the Arabian Gulf Post-COVID-19

Osama M. Rajkhan^{1*}

¹ American University of Sovereign Nations, Riyadh, Saudi Arabia.

Corresponding author:

*Osama M. Rajkhan – PhD,
Professor, American University of
Sovereign Nations, Riyadh, Saudi
Arabia.

Email: osamarajkhan@gmail.com

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Abstract

The environment guides human imagination and steers life processes. In times of adversity, like during the COVID-19 pandemic, the imagination of both sexes was stimulated and formed new experiences in the mind that reshaped the way of social interaction and order between all members of society. In the pursuit of survival and staying well, many young adults in the Arab Gulf region, mostly female, explored holistic health to prevent infection with inspired creativity. As women face more challenges in life than men and have different future needs, COVID-19 appears to have stimulated the social acceptance of gender empowerment. In large part this was due to a combination of two elements - national female empowerment projects; provided by increased market opportunities and certain freedoms, like driving an automobile and the freedom to live alone; and interest in Holistic Health preventions, imagined as an efficient way not only for preventing infection and family chronic diseases in old age but also increasing intergenerational social harmony. Outdoors Yoga was such an intervention independently sought by YAW. Based on personal conversations (N=800, ages between 21 yrs. and 31 yrs.) in three Arab Gulf countries between 2022 and 2023, this paper reviews the effect of the imagination on gender behavioral choices for staying alive and well in the new environment of uncertainty. It found that Covid-19 unequivocally strengthened the female element's role in society's affairs.

Keywords: Holistic Health, Mental Resilience, Public Health, COVID-19 Pandemic, Women's Health, Social Change, Arabian Gulf

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1. INTRODUCTION

The health crisis caused by COVID-19, a disease that disrupts cellular structures, created unprecedented struggles for survival worldwide. The pandemic measures, particularly during the lockdown years, reshaped societal norms, stimulating imagination and challenging traditional gender roles in the Arabian Gulf region. These shifts were driven by local needs and realities, which amplified the rethinking of life processes and behavioral patterns.

Gender roles are typically given by society as a way to structure and organize the orderly social and economic interaction between its members (Eccles, 1987). These roles, usually assigned by age and sex to maintain family and social harmony, provide a conventional or legal framework for women and men in which their rights and responsibilities are made clear in a public context (Eagly & Wood, 2012; Araújo-Pinzón et al., 2017). In the Gulf region, it is customary for extended or nuclear families to live under one roof, fostering economic security, strengthening kinship, and preparing younger generations for their roles in society. Although the traditional family model has been adopted since antiquity, the COVID-19 pandemic exposed fractures in this model, surfacing psychological tensions and moral dilemmas that undermined its effectiveness.

The challenges brought by the pandemic were affected by the emotional and economic strain of medical solutions—ranging from controversial vaccinations to claustrophobic isolation and the overwhelming burden of care for both young and elderly family members (Schliehe et al., 2022). These conditions highlighted existing gender inequalities, with women bearing a disproportionate share of responsibilities. Already economically empowered through market participation policies, many young adult women (YAWs) in the Gulf region sought solace and solutions through imagination, which became a driving force for transformative change.

The pandemic accelerated shifts in lifestyle and family structures. Rising rates of family

conflict, including violence against women and a notable 35% increase in divorces in 2020 compared to 2019, underscored the urgency of change (Lanchimba et al., 2023). Empowered by newly granted freedoms, such as the ability to drive and live independently, many YAWs turned to nature and holistic health practices as means of self-empowerment and emotional renewal. Outdoor yoga emerged as a prominent choice, enabling them to envision and achieve lifestyles centered on well-being and independence. Common phrases shared during interviews, such as "live the moment," "exercise outdoors," and "do something different to make your life happier," revealed an emerging ethos among YAWs. This shift in mindset not only surprised societal observers but also validated the resilience and agency of these women in adapting to post-pandemic realities. This study aims to explore how young adult women in the Arabian Gulf reimagined holistic health and embraced yoga as a tool for wellness and self-empowerment during the COVID-19 pandemic.

2. LITERATURE REVIEW

Holistic health practices, particularly yoga, have gained increased attention as practical tools for managing stress, anxiety, and overall well-being, especially during the COVID-19 pandemic. Existing literature combines practices within the scope of mental health, imagination, and gender dynamics, all while reflecting the distinct challenges faced by young adult women.

The COVID-19 pandemic, as highlighted by Almeida et al. (2020), had diverse effects on women, especially on mental health globally, with stressors including caregiving burdens, economic instability, and exposure to domestic violence being amplified during lockdowns. According to observations by Connor et al. (2020), the pandemic caused exacerbation of preexisting gender-based health disparities during the pandemic, thereby creating unique vulnerabilities for women in reproductive, mental, and social health contexts.

Yoga, with its deeply rooted traditions and modern adaptations, has evolved into a global practice intricately tied to health and well-being. Anne-Cécile Hoyez (2007) describes yoga as a therapeutic landscape and a product of global cultural exchange. Her analysis of yogic spaces in India and France illustrates how these landscapes blend physical, emotional, and spiritual healing, making yoga an adaptable global practice. This dependence between local traditions and global practices is further emphasized by Shaw and Kaytaz (2021), who contextualize modern postural yoga as a practice shaped by transnational influences, promoting health and wellness through physical postures, breathing techniques, and meditation. Leledaki (2012) delves into the narratives of modern yoga practitioners, revealing how personal health stories are intertwined with embodied practices. Her work highlights the role of yoga as both a discipline and a tool for self-actualization, aligning with neoliberal ideals of individualism and self-improvement. Similarly, Hauser (2021) introduces the "health imaginary" concept, illustrating how modern yoga combines personal health care and spiritual aspirations. Such dynamic practice resonates across diverse social and cultural contexts for addressing individual and collective health needs. Yoga also emerges as a prominent intervention during crises, combining physical postures with mindfulness practices to alleviate stress and promote resilience. Sahni et al. (2021) demonstrate that yoga practitioners reported significantly lower levels of anxiety, depression, and stress during lockdown periods compared to non-practitioners, positioning yoga as an effective self-management strategy for maintaining mental health. Similarly, Kulkarni et al. (2022) synthesized evidence from systematic reviews to underline the positive effects of yoga on mental health, particularly in reducing symptoms of anxiety and enhancing emotional stability during isolation. Holistic health, a concept that elegantly intertwines well-being's physical, mental, and spiritual dimensions, has gained remarkable prominence in recent years.

Healers in Africa, who in their practice rely on holistic approaches to women's health, paint a vivid picture of how emotional and spiritual well-being remain inseparable from physical health and are a fine example. Thus, Nelms and Gorski (2006) eloquently uncovered the necessity of harmonizing traditional and modern health practices, particularly for marginalized communities with scarce resources and high stakes. The delicate relationship of imagination and health deepens this view, offering a transformative lens through which one can grasp the profound mechanisms at work. Margolin et al. (2011) shed light on how meditation and visualization—hallmarks of yoga—not only enhance self-awareness but also serve as powerful antidotes to anxiety, particularly for women navigating heightened stress. Nagarathna et al. (2021) discussed that there are two functions yoga provides, both a physical discipline and a mental refuge. The ability of this approach to fortify physical endurance while nurturing mental resilience presents yoga as a sustainable path to offset the heavy psychological toll of restrictive environments like pandemic lockdowns. Coppola et al. (2021) captured the essence of spiritual practices as a lifeline during the COVID-19 pandemic. Thus, spiritual rituals emerge not as mere traditions but as vital coping mechanisms that reduce stress and foster mental resilience, even amidst prolonged isolation. Extending this thread, Boccaccio et al. (2024) delve into mental imagery, illustrating its ability to facilitate emotional regulation and cognitive reframing. Through this lens, imagination transcends its abstract nature to become an empowering tool that enables individuals to confront crises with renewed agency and adaptive strength.

However, as Larki et al. (2021) observe, structural barriers such as limited access to health services and entrenched sociocultural norms continue to hinder women's ability to engage with such practices fully. The pandemic exposed gaps in healthcare access and reproductive rights, further emphasizing the need for inclusive and adaptable health

interventions. In synthesizing these perspectives, it becomes evident that the convergence of yoga, imagination, and mental health presents a transformative opportunity for addressing the unique challenges faced by women during the pandemic. These practices offer immediate relief from stress and lay the groundwork for long-term resilience, underscoring their relevance in contemporary health strategies.

3. METHODOLOGY

This study adopts a qualitative research design to explore how young adult women (YAW) in the Arabian Gulf region reimagined holistic health and engaged in yoga during and after the COVID-19 pandemic. Between 2022 and 2023, 800 semi-structured personal conversations were conducted with women aged 21 to 31 across Oman, Saudi Arabia, and the United Arab Emirates. Participants were purposively sampled based on their engagement with yoga or holistic health practices during this period. Ethical approval was secured, and participant anonymity was maintained throughout the study.

Thematic analysis was employed to identify key patterns, focusing on the concept of holistic health, its emergence during the review, the role of imagination, and the changes in perceptions and practices since COVID-19:

- concept of holistic health: foundational principles of holistic health are explored, emphasizing its integration of physical, mental, and spiritual dimensions. The stage is set for understanding how the concept resonates with the experiences of young women in the Arabian Gulf;

- emergence during the review: the prominence of holistic health practices, particularly yoga, during the pandemic is examined. Socio-cultural and psychological factors driving this shift are highlighted;

- role of imagination: cognitive and emotional mechanisms through which imagination supported adaptation to the challenges of COVID-19 are analyzed. Its role

in fostering resilience and redefining wellness practices is emphasized;

- changes since COVID-19: transformations in health perceptions, lifestyle choices, and gender roles prompted by the pandemic are reflected. Connections to broader themes of social change and public health are drawn.

The approach aligns with similar studies, such as Kulkarni et al. (2022), which investigated yoga's benefits during COVID-19 in India, highlighting the relevance of qualitative methods for understanding health-related behaviors in diverse cultural contexts.

4. RESULTS AND DISCUSSION

This section explores the impact of COVID-19 on adopting holistic health practices among young adult women (YAW) in the Arabian Gulf. The analysis begins by defining holistic health and its core principles and examining how these practices gained prominence during the pandemic. The role of imagination as a cognitive tool for adapting to uncertainty is then discussed, culminating in a reflection on the transformations in health perceptions and lifestyle changes since COVID-19.

What is holistic health?

Holistic health is a biophysical science that integrates nutrition principles and movement-based healing arts, such as exercise, Tai Chi, Qi Gong, reflexology, homoeopathy, meditation, and Yoga. It emphasizes the connection between breathing fresh air and physical movement. When COVID-19 struck - a severe upper respiratory disease largely contracted indoors - the world became increasingly receptive to outdoor Yoga, a global movement already embraced by billions, particularly young women.

The pandemic shifted Yoga practices from indoor studios to outdoor spaces, visibly transforming the experiences of Young Adult Women (YAW) who participated in Yoga classes worldwide. Widely appreciated,

holistic health helped many understand that while humans can survive for months without food and days without water, they cannot survive more than a few minutes without air, highlighting its critical importance. Yoga incorporates this principle, improving immunity against respiratory diseases like COVID-19 by emphasizing deep breathing and fresh air. Consequently, Yoga classes had to move outdoors, away from urban environments with high noise and pollution levels.

Automobile ownership became a crucial enabler for YAW to access these outdoor classes in deserts and beaches. National empowerment initiatives that granted women greater freedoms, including the right to own and drive cars, facilitated their participation in the market and health-focused activities. This newfound mobility empowered women to imagine and pursue better lifestyles, reaching serene locations on the outskirts of cities where air quality was significantly better. Holistic health techniques rest on three fundamental principles:

1. health is innate, and individuals are responsible for their well-being;
2. health combines physical, mental, spiritual, and environmental factors;
3. healing involves treating the whole person, not just addressing symptoms;

In practice, holistic health revolves around two primary elements: nutrition and movement. Unlike plants, which produce energy internally through photosynthesis, humans must obtain nutrients and energy externally. Holistic health emphasizes the importance of balanced food intake and physical activity to maintain well-being

How did Holistic health come up during the review?

Although the idea of holistic health has existed for some time, it was not until COVID-19 that Young Adult Women (YAW) in the Gulf countries adopted it en masse. Their imagination linked holistic health with outdoor Yoga, driven partly by their disillusionment with the persistent side effects of the “pill for

every ill” and partly by the death toll of the pandemic.

One participant shared her experience: “It gave me indigestion,” said a 31-year-old YAW from Lebanon after a beach yoga class in Dubai (April 2023). She added, “COVID-19 was the best thing that happened to me. As you cannot find health in a bottle, COVID-19 motivated me to explore holistic health, which led me to beach Yoga.”

YAWs are increasingly aware that all prescription drugs have side effects. Observing how their parents’ generation suffered, many now believe that drugs are insufficient to cure chronic diseases or combat viral infections effectively. History supports this belief, as past pandemics like the Spanish flu killed more people than World War I, illustrating the devastating impact of viruses.

“Women are more intuitive than men; they anticipate and take preventive measures,” said a 29-year-old YAW of Indian origin, interviewed after a Yoga class. She explained, “I grew up hearing about Yoga in my family but never practiced it until COVID-19 set in. The pandemic took away my freedom and a couple of loved ones, painfully.” She also revealed that she had never been to the Arab world before but, during the lockdown, decided to buy a one-way ticket to Dubai after feeling she had “lost control” of her life.

“It was a silver lining,” she said. The uncertainty of the pandemic made her feel sad but also willed her to take charge of her life and make a move. Arriving in Dubai was a relief, and from then onward, life began to rebuild itself around her. She described the experience as a “lifestyle changer, ” bringing about positive transformation.

Gender is often considered society's soft face. Therefore, it can be assumed that for her, gender empowerment involves fostering peace during times of fear and tension. As holistic health becomes a prominent feature of social life in many Arab countries, it has significantly shaped YAWs' imagination and encouraged them to envision a better future.

What is imagination?

Cognitive science and philosophy suggest the human mind can construct real or imagined experiences. Most people tend to think in one of two ways: standard thinking, which involves perceiving things "as is," and imaginative thinking, which goes beyond the physical to incorporate emotional, environmental, social, psychological, spiritual, transcendental, and economic elements. The latter is often used as a creative tool to visualize desirable outcomes and activate the subconscious to achieve them.

During the COVID-19 pandemic, the SARS-CoV-2 virus became a powerful stimulus for imaginative thinking. For many, the virus was mentally visualized as exhaled breath mist spreading invisibly indoors, leading to diminished immunity and potential infection when inhaled by others. This vivid mental image made the risk tangible and drove a shift toward outdoor interactions to avoid exposure.

Standard thinking, by contrast, is rooted in routine and predictability. It involves paying bills, maintaining relationships, and raising a family—actions often require little imagination. Over-reliance on standard thinking can lead to stagnation, slowing personal growth and reducing adaptability. Imaginative thinking, however, is intuitive and spontaneous. It arises in response to adversity, helping individuals overcome fear and navigate challenges by visualizing innovative solutions. The pandemic catalyzed imaginative thinking,

particularly for Young Adult Women (YAW). Many began questioning traditional medical authority and reexamining their lifestyles. COVID-19 acted as a "brain booster," inspiring them to adopt new habits and take transformative life steps. For example, Yoga practitioners, particularly women, embraced imaginative thinking to see the world holistically. They connected the pandemic to physical health, family, social interaction, the environment, and even life's spiritual and transcendental aspects.

In contrast, men were more likely to engage in standard thinking, viewing COVID-19 as an isolated condition disconnected from broader life elements. While women perceived the pandemic as entangled with the environment—bees, birds, weather, and germs—men often fit it into preconceived notions, focusing narrowly on its immediate physical implications. This gendered difference in thinking styles highlights how women were more deductive, drawing on imagination to conserve energy, help others, and guide themselves independently.

This transition from standard to imaginative thinking during the pandemic is illustrated in Figure 1, which contrasts Botticelli's *The Birth of Venus*—symbolizing harmony and balance—with Picasso's *Guernica*—representing complexity, chaos, and transformation.



think of Botticelli's Frescos vs. Picasso's
Cubism: The birth of Venus vs. Guernica

Figure 1. Imagination vs. standard thinking: A visual metaphor for change

Note: compiled by the authors

The shift reflects how the adversity of COVID-19 spurred creativity and holistic understanding, fostering personal and collective growth among YAW. The visual contrast between Botticelli's *The Birth of Venus* and Picasso's *Guernica* reflects the shift in thinking brought about by COVID-19. Before the pandemic, the emphasis was on standard thinking—structured, routine, and linear. Afterwards, imagination inspired a more creative, diverse, and holistic perspective, helping many young women, particularly those practicing yoga, to reframe their experiences and find resilience during the lockdown. This contrast symbolizes the transition from static perceptions of life to a dynamic, interconnected view encompassing emotional, social, and environmental dimensions.

This means that while before COVID, the emphasis was on standard thinking, after COVID, the focus was more on creative, diverse, and holistic ways of thinking, with the help of the imagination, a tendency to see things more holistically. Imagination and thoughts about holistic health helped many Yoga girls view their helplessness during the lockdown in a new way.

What is that way, and what changed since Covid-19?

Many Yoga practitioners interviewed reflected on their challenges and obstacles during the pandemic and the accompanying restrictive measures. They spoke candidly about the mental anguish caused by COVID-19, including the loss of income and the strain on their well-being. The pandemic undoubtedly had a profound impact on their thinking.

However, amidst the adversity, there emerged a silver lining. The forced introspection and stimulation of imagination prompted by the pandemic led many to reevaluate deeply held beliefs. For instance, they questioned the assumption that working hard and constantly pursuing external

achievements would bring happiness. Instead, they concluded that happiness begins internally—with self-acceptance, pursuing activities that inspire, and finding intrinsic motivation. This shift in perspective significantly influenced their imagination and outlook on life.

Indeed, much has changed since COVID-19. The environment was one of the primary beneficiaries of the global slowdown. During the pandemic, animal populations began to recover, floods abated, radiation levels decreased, CO2 emissions were significantly reduced, vegetation flourished, methane levels declined, plastic waste diminished, and human traces in many ecosystems faded. These changes underscored humanity's impact on the planet and provided a glimpse of what could be achieved through conscious effort.

The human organism, too, experienced positive transformations. YAW became more imaginative, creative, and introspective. They also developed greater confidence in expressing their thoughts and feelings about social life. Below are some notable gender-related developments that emerged from these conversations.

1. Be your health advocate and ask questions about everything: too much of a good thing can be bad

"COVID-19 policy was slightly mixed up with the Middle Ages," remarked a Yoga practitioner with a PhD in biology. "It was a bit too much for me. Too much of a good thing is bad." This sentiment reflects the challenges of navigating the pandemic's excessive measures. As life now resembles an open highway with seemingly endless options, she emphasized the importance of being one's health advocate: "No one better than you can take care of you."

Science supports the idea that health can regenerate with behavioral changes, challenging societal norms that suggest individuals should succumb to illness or decrepitude by the age of 50 or 60 and pass away by 70 or 80. Older, healthier individuals are also shown to have a lower carbon

footprint, as they tend to have fewer vices and a deeper appreciation for nature, making less of an impact on the planet than younger generations.

Young Adult Women (YAW) advocate for social policies that focus on increasing life spans and enhancing health spans. They argue that living a healthy old age benefits both individuals and the planet, and society should work toward this goal.

2. *Marriage can be a disadvantage for women. Depends!*

Many Yoga practitioners expressed nuanced views on marriage, with some noting its disadvantages for women. "Women become prettier after divorce," one remarked, emphasizing how commitment to relationships and children often leaves little time for self-care or personal growth. This idea aligns with a broader pattern of thought stimulated by COVID-19: the "beauty theory of singlehood," which highlights how freedoms post-divorce can limit emotional and physical health problems.

After separation, many YAWs began questioning the practical realities of marriage. "*Does marriage ruin women?*" was a recurring theme. Several explained that marriage often involves a domineering partner who imposes control due to a fear of abandonment. This dynamic can lead to personality conflicts and eventually push women (and some men) toward divorce. For many women, the resulting liberation improved their health and decision-making capacity. One YAW summarized her experience succinctly: "Why did I ever get married?"

While common in the West, Prenuptial agreements are less prevalent in the Gulf region. One YAW noted that she would never split assets acquired during her marriage as part of a divorce settlement, reflecting cultural differences in attitudes toward financial independence and marital contracts.

How does (Western) social policy explain the above?

Western social policies, while designed to address gender inequalities, often fall short in practice. Research shows these policies only partially mitigate social divisions between men and women and sometimes inadvertently reinforce them. Divorce, in contrast, can reverse these dynamics by liberating women from relationships where they feel burdened by "adult men behaving like children." One YAW observed, "COVID-19 proved this point. A man with a paid job is safe during a pandemic, but not a dependent married woman with children."

The situation is slightly better for women with paid employment, whether in formal or informal care work, as they retain a sense of individuality beyond their roles as mothers. However, the pandemic exposed significant gaps in social policies that fail to account for women's future needs. Social insurance and housing protection rules, for instance, were found to discriminate against women, particularly elderly women, leaving many outside the protection system during and after the lockdown.

Marriage and motherhood bring unique challenges for women, including pregnancy, weight gain, menopause, and hormonal changes, all of which impact their quality of life. "Do you want to take her?" joked a 30-year-old YAW from Italy, referring to her difficult 2-year-old daughter. "In my next life, I want to return as a man and never have to care for a child again."

Another YAW, a 31-year-old from Ukraine, shared how she moved to Dubai to seek paid work after her home and shop in Kyiv were destroyed while she cared for her mother and daughter. Despite their differing circumstances, many YAWs agreed that social protections often overlook the specific needs of women, especially elderly women. The COVID-19 lockdown exposed these gaps, leaving many women without adequate support during a period of heightened vulnerability.

3. *"If you can't put up, shut up."*

Arab YAW, like their sisters from Europe and Asia, said young women are reshaping

their mental beliefs about social life because now they realize men cannot do everything for them as they claim before marriage. Thus, she must learn to be more practical by becoming financially independent from males, whether her father or husband.

This means social policy can help expand market opportunities for YAWs today by focusing on increasing income options with skills and opportunities that pay now and, in the future, irrespective of the marital situation, and lead them to learn more about their personal health needs in the future and physiology.

4. Helping minorities as a belief

Yoga girls were more transcendental. They felt society must help all minorities improve their quality of life, regardless of color, creed, or background. The first step towards this was to talk positively about minorities, and they were helping by organizing free and inclusive social events, like beach yoga and fashion shows.

5. More satisfaction with sleep

Several YAWs said they used to take sleeping pills and other medication to improve sleep quality and developed a dependency. However, since COVID-19, thanks to the new Government's gender policy, she bought a car and joined a Yoga and meditation class in the desert near Jeddah.

As a result, her sleep improved and became less distorted. Soon after, she kicked that habit, which reinforced the importance of movement in her imagination. "Now," she said, "I can sleep like a young adult should, heavy, so I move my body every 30 minutes when I am awake." Her dreams also became less memorable (i.e., less bizarre).

Indeed, for many YAWs between the ages of 21 and 31, women in the Gulf countries today have more opportunities to depend on themselves if they wish. This releases men from the many burdens of support and dangers of over-dependency, which, according to the data, is a desirable development because it helps keep families together.

6. Yoga helps increase awareness of rights and responsibilities

The above option puts Arab YAWs in an "envious position," a young woman from Croatia said, commenting on the many life options Arab Gulf women have in their countries. Although the COVID policy was slightly mixed up with what happened in Europe during the Middle Ages, she explained that the UAE successfully sorted out the social life of its people, especially young women.

"In the West, women have to work and raise children." By contrast, "in Arabia, women can choose one over the other or both. They are no longer caught between the two like in the West. It is really up to them," she added. Thus, yoga classes helped YAWs enjoy their rights and increased their awareness of the importance of movement. The freedom to do so seems to have enabled a healthy reassessment of gender roles.

The combination of policy, infection worry, and traditional social pressures has undoubtedly played a critical role in this reassessment and, subsequently, transformed women's lives for the better in the Arabian Gulf, essentially changing their lives to what they prefer for themselves without undue external influence.

7. City life is nice, but the pressure can be overwhelming

What happens to the mind and body is a private show, and with the freedom to choose, to be outdoors and breathe clean air, for instance, mental health improved. Yoga practice outdoors releases neurotransmitters that help not only with sleep but also thinking and mood. Many said they can now see and analyze what is inside their lifestyle traps. Many became more forgiving; one even said that she now makes her bed (instead of leaving it to the maid) and listens to the music she likes.

8. Expand the cultural horizon

"You are more interested in trying old and new remedies from other cultures," one Yoga practitioner noted, referring to treatments like boiled herbs, beach Yoga, and desert mountain

meditation—practices previously unimagined from the depths of personal knowledge. COVID-19 motivated many to explore alternative treatments, breathing new life into Yoga across the region, from Egypt and Saudi Arabia to Oman and Iran.

Although Yoga has ancient roots in India, its widely recognized health benefits have reached a global audience. Young adults increasingly imagine Yoga as a potential defense mechanism against COVID-19 infection and chronic diseases, integrating it into their lives as part of a broader approach to holistic health.

The revival of beach Yoga and outdoor sports as a health remedy appears to be a milestone toward the road to gender changes along with gender empowerment policy, with characteristic liberal-mindedness expanding and transforming the role of women in society into what they prefer for themselves, now that their market participation rates have risen significantly since the pandemic (to 34.5% in the first quarter of 2023 in Saudi Arabia).

9. *Better ability to cope with stress*

Stress triggers the release of cortisol into the bloodstream, but spending time at the beach serves as a natural antidote, Yoga practitioners observed. “And if you practice beach Yoga, you will likely become addicted to it,” one noted, “because of the numerous mental and physical health benefits you’ll experience.”

Beach yoga proved to be a fascinating therapy that not only prevents COVID-19 infection but also helps heal it once contracted and cure its symptoms, like fatigue and morning headaches. By the beach, the air is full of salts that can also treat many other health issues and help calm the person down. The closer the person is to the water, the better. The color blue of the sea is also therapeutic, as many YAWs have found out by practice. Many

lost weight by just meditating and doing yoga next to the water before sunset. The sea breath and the setting sun combine with the salts in the air, and the spaciousness and semi-secluded white sands with ease of access come together to deliver a “hospital of wonders” to personal health for free.

5. CONCLUSIONS

Based on personal conversations in three Gulf countries, this paper found that the image of uncertainty was persistent in the minds of many young adult women in the Gulf during the lockdown years – 2020 to 2022.

COVID-19 changed their minds' picture of health and well-being from the hospital to holistic health. The awareness of its global dimension triggered a different imagination of life together, an imagination of lifestyle standards that differed from the established social structure and the traditional model of the family with its wide range of functions, like regulating sexual activity, protecting economic survival during hard times, and preparing children for the future by making clear their rights and responsibilities.

Mindful of their health vulnerability and not wanting to be exploited by the medical system, what happened to YAWs during lockdown was essentially a reassessment of the currency of these given rights and expected responsibilities by society. So strong was this feeling that some became depressed, living in a catatonic state of hibernation to expend the least amount of energy needed to sustain life while self-pitying themselves. By contrast, young women with strong wills and extroverted personalities told themselves they were powerful enough to outlive COVID-19 and experience all that life offers. Yoga was just the beginning of change.

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AUTHOR BIOGRAPHIES

***Osama M. Rajkhan** – PhD, Professor, American University of Sovereign Nations, Riyadh, Saudi Arabia. Email: osamarajkhan@gmail.com ORCID ID: <https://orcid.org/0009-0008-1060-3434>

RESEARCH ARTICLE

Child Poverty and Educational Access: A Gender Perspective in Kazakhstan

Elvira Nurekenova^{1*}Ayaulym Baitekova²

¹ D. Serikbayev East Kazakhstan Technical University, Oskemen, Kazakhstan

² University of International Business named after K. Sagadiyev, Almaty, Kazakhstan

Corresponding author:

*Elvira Nurekenova – Cand. Sc. (Econ.), D. Serikbayev East Kazakhstan Technical University, Oskemen, Kazakhstan.

Email: emadiyarova@mail.ru

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Abstract

Access to education for girls is among the global challenges strongly linked to poverty reduction, economic development, and social equity. Despite progress in narrowing gender disparities, significant gaps persist in regions where economic and demographic pressures prevail. In Kazakhstan, these challenges are compounded by uneven access to education, income disparities, and demographic dynamics. The current study explored the socio-economic and demographic factors influencing poverty levels and access to education. Six hypotheses were developed to analyze relationships between demographic structures, household income and expenditures, and educational access focusing on girls. Multivariate and univariate analyses assessed their impact on poverty depth and severity, preschool and secondary education coverage, and enrollment rates. The findings revealed that boys aged 0–14 significantly influenced poverty levels, while girls in the same age group showed no comparable effect. This reflects societal norms prioritizing boys' education due to their perceived role as breadwinners, while girls are often deprioritized. Household income was also confirmed as a key determinant of access to education, particularly at the primary level, which forms the foundation for future opportunities. The results highlight the necessity of establishing strong social values and institutions that promote gender equality and women's empowerment. The absence of such an environment hinders progress toward achieving the goals of gender equality.

Keywords: Gender Equality, Women Empowerment, Household Income, Gender Stereotypes, Sociocultural Barriers, Child Poverty, Education

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1. INTRODUCTION

Poverty and inequality remain among the most pressing challenges on the global stage, particularly in developing and transitioning economies. Poverty reduction and gender equality are foundational pillars of the Sustainable Development Goals. According to the World Bank, as of 2022, more than 9% of the global population - approximately 700 million people - live on less than \$2.15 per day, with children and women disproportionately affected. Girls and women often face restricted access to education, healthcare, and employment opportunities. Addressing child and gender poverty can have transformative effects, improving individual outcomes and broader societal prosperity.

In this context, education is important as both a driver of and a solution to poverty reduction. Access to quality education, especially for girls, affects health and income levels. Nevertheless, significant disparities persist; UNESCO reports that as of 2021, 129 million girls worldwide remain out of school, with poverty being the primary barrier. Regions where economic growth is uneven, social support systems have insufficient access to education, and gender equality are bridge gaps in access to education.

In Kazakhstan, the issue of poverty with a focus on gender and education is particularly salient. According to the Bureau of National Statistics, the poverty rate in Kazakhstan increased from 4.3% in 2019 to 5.3% in 2021, primarily due to the economic shocks of the COVID-19 pandemic (Duisenbekova et al., 2024). Annually, women's educational earnings increase by approximately 10%, directly contributing to GDP growth and reducing poverty at the household level. However, barriers such as limited access to affordable preschool education, high out-of-pocket costs for households, and disparities in income between rural and urban areas remain significant.

Recognizing these pressing issues, the present study aims to explore relationships between socio-economic and demographic

factors and their impact on poverty and education access, focusing on girls and women in Kazakhstan.

2. LITERATURE REVIEW

The relationship between socio-economic factors, demographic dynamics, and poverty has been extensively studied. Existing research discusses the role of education as a critical pathway out of poverty, particularly for women and girls. Demographic shifts, particularly changes in the working-age population, have also been identified as key drivers of economic stability and poverty reduction. Additionally, differences in retirement ages between men and women potentially exacerbate poverty risks for families with children. Expenditures on education and basic needs are often shown to play a mitigating role in navigating economic challenges.

The global importance of gender equality in education is placed on reducing poverty and fostering sustainable development. Education acts as a transformative tool, providing girls with better opportunities and equipping them to contribute effectively to economic and social progress. Hence, education equips individuals with essential skills and knowledge to improve their socioeconomic standing; education for all, particularly girls, is imperative for poverty reduction (Burnett, 2008; Awan et al., 2011). Tyer-Viola and Cesario (2010) stated that there is a strong relationship between education, poverty, and gender equality, enhancing women's health and well-being along with strengthening societal resilience. Therefore, access to early and foundational education for girls is an essential indicator of societal commitment to gender parity. Somani (2017) further defined delayed marriage, reduced child mortality, and higher earnings as crucial outcomes of access to education for breaking intergenerational poverty cycles. Wei et al. (2021) extended that decision-making power and access to economic resources come with access to education and significantly reduce income and multidimensional poverty.

The relationship between demographic dynamics and economic stability has also been a focus of scholarly inquiry. Gender has a significant role in aggregate saving and economic stability, according to Seguino and Floro (2003). Thus, higher dependency ratios disproportionately increase the economic burdens borne by women within households. Yenilmez (2015) stated that demographic shifts to a growing strain on household resources and public support systems, particularly in contexts where gender disparities persist. Loichinger et al. (2017) further explored how variations in dependency ratios across age and gender groups directly affect economic outcomes at both household and national levels. As a solution, Barta and Novosz ath (2024) focused on the issue of declining fertility rates and retirement age adjustments to mitigate the economic challenges associated with declining working-age populations. Thus, shifts in working-age and retirement-age populations affect household economic stability.

Regarding household income and expenditure patterns, there is a relationship between disparities in education, economic resources and poverty reduction. Education-focused government expenditures in poverty reduction are significant, as reallocating educational resources enhances human capital and contributes to economic development (Odior, 2014). Therefore, there is an excellent need for balanced household expenditures in education and living standards, which could be achieved through equitable infrastructure investment (Chotia & Rao, 2017). Lastly, Heshmati et al. (2019) analyze household consumption expenditure determinants in India, illustrating how education levels, household size, and gender significantly influence poverty outcomes. Yu and Li (2021) emphasized that social security expenditures help to reduce rural poverty in China and soften economic challenges. Therefore, inclusive and education-centric expenditure strategies to mitigate poverty effectively are becoming the agenda of the current economy.

Demographic pressures, income inequality,

and expenditure disparities underline the complex socio-economic environment influencing poverty and education access. This study aims to address gaps in the literature by examining how Kazakhstan's unique demographic and economic dynamics—such as shifts in working-age populations, retirement age differences, and income disparities—affect poverty and educational access for girls and women. The following hypotheses were developed.

1. Increasing the proportion of children (0–14) significantly affects poverty levels.
2. Reduction in the working-age population negatively impacts preschool and secondary education access.
3. Differences in retirement age influence child poverty and access to education.
4. Household income and expenditures significantly affect poverty levels.
5. Household income and expenditures impact access to preschool and secondary education for boys and girls.

2. METHODOLOGY

The literature review revealed some issues that are the focus of poverty alleviation solutions. Most reviewed words emphasized access to education, income, and access to education. An increasing body of knowledge is paying increasing attention to the gendered aspect of existing challenges. Therefore, based on the review, key indicators for current research were selected.

Table 1 summarizes all the indicators used in this study.

The table shows the main age categories chosen for the analysis. The data address differences in age groups, particularly those distinguishing men and women based on pension age. Working age and pension age groups, differentiated by gender (61 for women, 63 for men), reflect societal structures, such as labor market participation, pension systems, and economic responsibilities, which influence household resources and the ability to invest in children's education.

TABLE 1. Selected indicators

Indicator description	Code	Unit
Number of girls in preschool organisations	PG0-7	Thousand
Number of boys in preschool organisations	PB0-7	Thousand
Gross preschool coverage rate (girls)	PR-W	%
Gross secondary education coverage rate (girls)	SR-W	%
Median income of population	MI	Tenge
Depth of poverty	DPOV	%
Severity of poverty	SPOV	%
Population under 14 years (boys)	M14	Thousand
Population under 14 years (girls)	W14	Thousand
Population between working and pension age (men 63)	M-63	Thousand
Population between working and pension age (women 61)	W-61	Thousand
Population above pension age (men 65)	M-65	Thousand
Population above pension age (women 63)	W-63	Thousand
Household income used for consumption per capita, tenge	HHCINC	Tenge
Population income used for consumption per capita per month, tenge	PCINC	Tenge
Household monetary expenditures per capita per month, tenge	HHCEXP	Tenge
Per capita nominal monetary income, tenge	HHNINC	Tenge
Real income index, %	RII	%
Population monetary expenditures per capita, tenge	PEXP	Tenge
Household income used for consumption per capita, tenge	HHCINC	Tenge

Note: compiled by authors

Preschool and school-age categories explore access to education, which is fundamental for addressing inequalities and long-term opportunities.

Additional demographic groups are included to analyze broader dependencies and economic pressures. Income and expenditure

indicators, such as median income, consumption expenditures, and poverty, are selected to evaluate households' financial capacity and the severity of poverty.

In Table 2 there are presented developed groups of sub-hypotheses

TABLE 2. Sub-hypotheses

No	Dependent Variable	Independent Variables	Sub-Hypothesis
1	DPOV	M14, W14	Increasing the proportion of the population aged 0–14 increases poverty levels.
	SPOV		Increasing the proportion of the population aged 0–14 increases poverty levels.
2	PR-W	M-65, W-65	Reducing the working-age population (15–65) increases the economic burden and negatively affects access to education.
	SR-W		Reducing the working-age population (15–65) increases the economic burden and negatively affects access to education.
3	DPOV	W-61, M-63, M-65, W-65	Differences in retirement ages (15–61 for women and 15–63 for men) affect child poverty levels.
	SPOV		Differences in retirement ages (15–61 for women and 15–63 for men) affect child poverty levels.
	PR-W		Differences in retirement ages (15–61 for women and 15–63 for men) affect access to preschool education.

	SR-W		Differences in retirement ages (15–61 for women and 15–63 for men) affect access to secondary education.
4	DPOV	HHCINC, PCINC, PEXP, MI, RII	Income and expenditures influence poverty levels (depth and severity).
	SPOV		Income and expenditures influence poverty levels (depth and severity).
5	PR-W	HHNINC, HHCEXP	Household income and expenditures influence preschool education coverage rates.
	SR-W		Household income and expenditures influence secondary education coverage rates.
	PG0-7		Household income and expenditures influence the number of girls in preschool.
	PB0-7		Household income and expenditures influence the number of boys in preschool.

Note: compiled by authors

MANCOVA analysis was conducted to test hypotheses, including multivariate and univariate tests. Indicators were deliberately repeated across multiple hypotheses to ensure a comprehensive analysis and to explore the contributions of men and women to education access, focusing on girls.

3. RESULTS AND DISCUSSION

The contribution of women and men to children’s access to education differs significantly, and understanding the nature of their roles from an economic perspective is crucial. The analysis revealed that while financial burden is one of the critical factors, it is influenced by additional variables not included in this study. However, the results suggest that cultural habits, traditions, and

societal perceptions are as influential as financial capability. Furthermore, the findings indicate that these impacts vary depending on the stage of education, highlighting their interchangeable influence over time. One of the major conclusions is that household income plays a pivotal role in shaping children’s future, as it directly affects access to primary education, which forms the foundation for further educational and professional opportunities. The results aligned with the main hypotheses to provide better clarity and organization.

Hypothesis 1 proposed that increasing the proportion of children (0-14) would result in higher poverty levels, measured in depth and severity. The hypothesis was partially confirmed (Table 3).

TABLE 3. Impact of population aged 0–14 on poverty levels

Model 1	Multivariate Tests				Univariate Tests					
	Test	value	F	p	Dependent Variable	Sum of Squares	df	Mean Square	F	p
M14	Pillai's Trace	0.858	21.07	0.001	DPOV	0.3993	1	0.39929	48.148	<.001
	Wilks' Lambda	0.142	21.07	0.001	SPOV	0.0353	1	0.03526	28.038	<.001
W14	Pillai's Trace	0.268	1.28	0.336	DPOV	0.0144	1	0.01436	1.732	0.225
	Wilks' Lambda	0.732	1.28	0.336	SPOV	1.32e-4	1	1.32e-4	0.105	0.754
Residuals					DPOV	0.0663	8	0.00829		
					SPOV	0.0101	8	0.00126		

Note: compiled based on calculations

The multivariate tests showed a statistically significant impact of the proportion of boys on poverty levels, with both tests yielding p-values less than 0.001. The group of boys significantly influenced both the depth of poverty ($F = 48.148$, $p < 0.001$) and its severity ($F = 28.038$, $p < 0.001$). An increase in the share of boys in this age group contributes substantially to the observed levels of poverty, both in terms of depth and severity. Conversely, the proportion of girls did not exhibit a statistically significant effect on poverty levels. The multivariate results did not reveal meaningful impacts. The univariate analysis showed that the depth of poverty or its severity is not affected by the girls' group of indicators. Thus, according to the results, girls in this age group do not impose a measurable economic burden on households, raising questions about the differing socio-economic dynamics associated with boys and girls.

The significant impact of boys (0–14 years old) on poverty levels in society and the economy. First, this finding aligns with the

societal perception of men as primary breadwinners, where their level of education directly influences career opportunities and, consequently, income levels. Second, the actual situation in male-dominated countries, including the primary position of head of a family, persists. In this case, women's economic roles are undervalued. Therefore, it is more often the case that girls are de-womanized in social norms. To these norms and standards, we relate to access to education, reflecting those societal norms limit the perceived economic significance of women. As a result, boys' educational opportunities and outcomes are more strongly associated with gender levels, reinforcing these gendered dynamics.

Hypothesis 2 proposed that a reduction in the proportion of the working-age population (represented by men and women) increases economic burdens on households and negatively impacts access to education, as measured by preschool and secondary education rates. The results are presented in Table 4.

TABLE 4. Effect of working-age population on educational access

Model 2	Multivariate Tests				Univariate Tests					
	Test	value	F	p	Dependent Variable	Sum of Squares	df	Mean Square	F	p
M-65	Pillai's Trace	0.571	4.66	0.052	SR-W	5.76	1	5.764	8.943	0.017
	Wilks' Lambda	0.429	4.66	0.052	PR-W	12.08	1	12.078	0.763	0.408
W-65	Pillai's Trace	0.563	4.52	0.055	SR-W	2.10	1	2.103	3.262	0.109
	Wilks' Lambda	0.437	4.52	0.055	PR-W	162.22	1	162.218	10.245	0.013
Residuals					SR-W	5.16	8	0.645		
					PR-W	126.67	8	15.834		

Note: compiled based on calculations

The multivariate tests for the proportion of working-age men approached significance, with Pillai's Trace and Wilks' Lambda yielding $p = 0.052$, indicating a potential influence on educational outcomes. The univariate analysis showed that for secondary education rates for girls, the effect of the male working-age group was significant ($F = 8.943$, $p = 0.017$). A reduction in this population

group could negatively impact access to secondary education. However, for preschool education rates for girls, the effect of the male working-age population was nonsignificant, implying no measurable impact on access to preschool education.

For the proportion of working-age women, the multivariate tests showed a similar pattern to that of men. The univariate results, however,

presented contrasting findings. For preschool education rates for girls, the effect of the female working-age group was significant ($F = 10.245$, $p = 0.013$). Conversely, there was no statistically significant impact on secondary education rates for girls. The hypothesis was partially confirmed, showing differing roles and economic contributions of men and women within households and their respective impacts on children's educational opportunities. However, it must be considered that in countries dominated by specific cultural habits

with the dominating position of men as breadwinners, women tend to stay at home and manage the preschool period in bringing up their children. However, as children are old enough and go to secondary school, women continue their careers and share the financial burden with their husbands.

The third hypothesis proposed that differences in retirement age and working age population would influence child poverty levels and access to education. The results are presented in Table 5.

TABLE 5. Influence of retirement ages on poverty and education

H 3	Multivariate Tests				Univariate Tests					
	Test	value	F	p	Dependent Variable	Sum of Squares	df	Mean Square	F	p
M-63	Pillai's Trace	0.896	6.453	0.079	DPOV	0.33900	1	0.33900	36.1480	<.001
					SPOV	0.03410	1	0.03410	24.6953	0.003
	Wilks' Lambda	0.104	6.453	0.079	SR-W	5.86423	1	5.86423	7.3936	0.035
W-61	Pillai's Trace	0.757	2.340	0.255	DPOV	4.92e-4	1	4.92e-4	0.0525	0.826
					SPOV	4.63e-4	1	4.63e-4	0.3356	0.583
	Wilks' Lambda	0.243	2.340	0.255	SR-W	2.27344	1	2.27344	2.8664	0.141
M-65	Pillai's Trace	0.599	1.121	0.482	DPOV	0.04798	1	0.04798	5.1160	0.064
					SPOV	0.00126	1	0.00126	0.9139	0.376
	Wilks' Lambda	0.401	1.121	0.482	SR-W	0.11554	1	0.11554	0.1457	0.716
W-65	Pillai's Trace	0.536	0.867	0.570	DPOV	0.03626	1	0.03626	3.8661	0.097
					SPOV	0.00134	1	0.00134	0.9694	0.363
	Wilks' Lambda	0.464	0.867	0.570	SR-W	0.01122	1	0.01122	0.0141	0.909
Residuals					PR-W	40.07356	1	40.07356	2.0127	0.206
					DPOV	0.05627	6	0.00938		
					SPOV	0.00829	6	0.00138		
					SR-W	4.75886	6	0.79314		
					PR-W	119.46506	6	19.91084		

Note: compiled based on calculations

The multivariate tests for the male retirement group showed significance (Pillai's Trace $p = 0.079$, Wilks' Lambda $p = 0.079$), reflecting a potential impact. Univariate test results supported that the male retirement group had a substantial effect on poverty depth (DPOV, $p < 0.001$) and severity (SPOV, $p = 0.003$). Moreover, the results showed a significant influence on secondary education rates for girls (SR-W, $p = 0.035$) or explained that reductions in this group could hinder children's access to education. However, the effect on preschool education rates for girls was insignificant (above α , $p = 0.443$) or had

limited influence within the context related to current research.

For the female retirement group, neither the multivariate nor the univariate tests demonstrated significant effects on girls' poverty depth, severity, and secondary education rates. The effect on preschool education rates for girls showed a significant impact ($p = 0.080$) but remained inconclusive.

For the working-age population variables (M-65 and W-65), neither multivariate nor univariate tests indicated significant effects on poverty or education outcomes. The results for M-65 suggested a marginal effect on poverty

depth (DPOV, $F = 5.116$, $p = 0.064$), but this did not reach statistical significance. Similarly, the results for W-65 showed no significant influence on any of the dependent variables, with all p-values exceeding the threshold for significance.

The hypothesis was partially supported. Differences in male retirement ages significantly influenced poverty levels and secondary education access, showing that male

economic contribution is important in alleviating child poverty and supporting education. However, the female retirement and working-age populations did not exhibit a consistent or significant impact.

The fourth hypothesis, that income and expenditures influence poverty level, has results presented in Table 6.

TABLE 6. Relationship between income, expenditures, and poverty

Model 4	Multivariate Tests				Univariate Tests					
	Test	value	F	p	Dependent Variable	Sum of Squares	df	Mean Square	F	p
HHNINC	Pillai's Trace	0.946	35.042	0.003	DPOV	0.37156	1	0.37156	63.442	<.001
	Wilks' Lambda	0.0540	35.042	0.003	SPOV	0.03647	1	0.03647	80.365	<.001
MI	Pillai's Trace	0.693	4.516	0.094	DPOV	0.01941	1	0.01941	3.314	0.128
	Wilks' Lambda	0.3070	4.516	0.094	SPOV	0.00500	1	0.00500	11.025	0.021
PCINC	Pillai's Trace	0.594	2.927	0.165	DPOV	0.02929	1	0.02929	5.001	0.076
	Wilks' Lambda	0.4059	2.927	0.165	SPOV	5.47e-5	1	5.47e-5	0.121	0.743
PEXP	Pillai's Trace	0.448	1.626	0.304	DPOV	0.02325	1	0.02325	3.970	0.103
	Wilks' Lambda	0.5515	1.626	0.304	SPOV	0.00110	1	0.00110	2.416	0.181
RII	Pillai's Trace	0.228	0.590	0.596	DPOV	0.00721	1	0.00721	1.230	0.318
	Wilks' Lambda	0.7722	0.590	0.596	SPOV	5.56e-4	1	5.56e-4	1.224	0.319
Residuals					DPOV	0.02928	5	0.00586		
					SPOV	0.00227	5	4.54e-4		

Note: compiled by author

The multivariate tests for household nominal income (HHNINC) revealed highly significant results (Pillai's Trace $p = 0.003$, Wilks' Lambda $p = 0.003$), indicating a strong influence on poverty levels. The univariate analysis confirmed this impact, showing that HHNINC had a substantial and statistically significant effect on both poverty depth (DPOV, $F = 63.442$, $p < 0.001$) and severity (SPOV, $F = 80.365$, $p < 0.001$).

The results confirm that household income is among the primary means of mitigating poverty and higher nominal income levels are directly associated with poverty depth and

severity reductions.

Median income (MI) demonstrated a more nuanced role. While the multivariate tests approached significance (Pillai's Trace $p = 0.094$, Wilks' Lambda $p = 0.094$), the univariate analysis indicated mixed effects. For DPOV, the influence of median income was not statistically significant ($F = 3.314$, $p = 0.128$), but SPOV reached significance ($F = 11.025$, $p = 0.021$). This suggests that median income primarily impacts poverty severity, reflecting its role in addressing extreme poverty.

The results were less conclusive for per

capita income (PCINC) and population expenditures (PEXP). The multivariate tests did not yield significant results (PCINC Pillai's Trace $p = 0.165$, Wilks' Lambda $p = 0.165$; PEXP Pillai's Trace $p = 0.304$, Wilks' Lambda $p = 0.304$). Similarly, the univariate tests showed marginal effects for DPOV (PCINC $F = 5.001$, $p = 0.076$; PEXP $F = 3.970$, $p = 0.103$) and nonsignificant effects for SPOV (PCINC $F = 0.121$, $p = 0.743$; PEXP $F = 2.416$, $p = 0.181$). These findings indicate that while these variables may contribute to poverty outcomes, their impact was not robust within this model.

Finally, the real income index (RII) did not significantly influence poverty levels. Both multivariate (Pillai's Trace $p = 0.596$, Wilks' Lambda $p = 0.596$) and univariate tests showed nonsignificant effects on DPOV ($F = 1.230$, $p = 0.318$) and SPOV ($F = 1.224$, $p = 0.319$). This suggests that the accurate income index, while reflective of broader economic conditions, may not directly translate to measurable changes in the depth or severity of household poverty.

In conclusion, the hypothesis was partially

supported. Household nominal income (HHNINC) emerged as the most significant factor, demonstrating a strong and consistent influence on poverty depth and severity. Median income (MI) was secondary, primarily affecting poverty severity. However, per capita income, expenditures, and the real income index showed limited or nonsignificant effects. These findings emphasize the importance of direct household income in addressing poverty and suggest that policies targeting income growth at the household level may have the most significant impact on reducing poverty, particularly for women and girls who are disproportionately affected by economic hardships.

The sixth hypothesis concerns household nominal income and consumption expenditures, which influence preschool and secondary education for girls and the number of boys and girls in preschool. The results are presented in Table 7.

TABLE 7. Impact of income and expenditures on educational access and preschool enrollment

Model 5	Multivariate Tests				Univariate Tests					
	Test	value	F	p	Dependent Variable	Sum of Squares	df	Mean Square	F	p
HHNINC	Pillai's Trace	0.982	67.01	<.001	PR-W	10.058	1	10.058	0.369	0.560
		0.0183	67.01	<.001	SR-W	5.877	1	5.877	6.756	0.032
	Wilks' Lambda	0.538	1.46	0.340	PG0-7	1.85e+10	1	1.85e+10	25.981	<.001
0.4619		1.46	0.340	PB0-7	2.55e+10	1	2.55e+10	39.029	<.001	
HHCEXP	Pillai's Trace	0.982	67.01	<.001	PR-W	73.142	1	73.142	2.687	0.140
		0.0183	67.01	<.001	SR-W	0.186	1	0.186	0.214	0.656
	Wilks' Lambda	0.538	1.46	0.340	PG0-7	6.49e0+8	1	6.49e0+8	0.914	0.367
				PB0-7	1.17e0+9	1	1.17e0+9	1.796	0.217	
Residuals					PR-W	217.770	8	27.221		
					SR-W	6.960	8	0.870		
					PG0-7	5.68e0+9	8	7.10e0+8		
					PB0-7	5.23e0+9	8	6.53e0+8		

Note: compiled by author

The multivariate tests for household nominal income showed a strong significant influence. Univariate tests showed that higher nominal income positively impacts secondary education rates for girls, and household nominal income demonstrated a significant impact ($F = 6.756$, $p = 0.032$). However, for preschool education rates, the effect was

insignificant ($F = 0.369$, $p = 0.560$), with no direct impact on access to preschool education. Regarding the number of children in preschool, household nominal income significantly impacted both boys (PB0-7, $F = 39.029$, $p < 0.001$) and girls (PG0-7, $F = 25.981$, $p < 0.001$) and showed significance in supporting early education. In contrast, household

consumption expenditures did not show significance across the variables. Although multivariate test results were significant (Pillai's Trace $p < 0.001$, Wilks' Lambda $p = 0.340$), univariate tests demonstrated insignificant effects.

The hypothesis was partially supported. Household nominal income emerged as a significant factor influencing secondary and preschool (number of boys and girls) education. This supported the assumption that higher income levels directly enhance access to fundamental educational opportunities. However, assumptions about household consumption expenditures were not supported. It can be assumed that household income level predefines children's access to education, which is especially critical in countries where local customs put women in lower roles. Therefore, when there is a case for deciding in favor of boys or girls, education is usually provided for boys. With further effect, influenced by local habits and societal perceptions, teenage girls consider a successful marriage as the appropriate option for economic safety.

5. CONCLUSIONS

Exploring the relationship between socio-economic and demographic factors and their impact on poverty levels and access to education was a goal of the research. However, the current study differs with a specific focus on gender disparities affecting girls and women.

The objectives included exploring the contribution of household income, expenditures, and demographic structures to poverty depth and severity and access to preschool and secondary education.

The findings of the study indicate that the objective was partially achieved. While significant relationships were identified between household income and access to education for girls and between demographic factors and poverty outcomes, some variables showed limited or nonsignificant effects. The analysis revealed several key insights

highlighting expected and unique aspects of how socio-economic factors influence poverty and access to education for girls and women. Therefore, results support that household economics is relied on in terms of economic stability and ensuring access to education. Household income significantly impacts girls' enrollment in preschool and secondary education, which was largely anticipated. Increased income allows families to allocate more resources toward their children's education. However, the fact that this effect is particularly pronounced for girls underscores that female populations continue to face barriers that are closely tied to economic support within families.

A unique finding was that boys aged 0–14 years have a more significant impact on household poverty levels compared to girls of the same age. Therefore, one might assume that societal norms affect the way people associate boys with higher expenses or broader differences in the costs of raising them. This highlights the importance of considering gender differences when designing poverty alleviation policies.

Demographic factors also have taken a major part. However, credit must be given to the proportion of the working-age population, and differences in retirement ages between men and women must also emerge as important. The findings indicate that a decrease in the working-age population negatively affects children's access to education, particularly for girls. Leading to increased household income, it directly provides the opportunity to improve girls' education access, showing that current measures to support family incomes, such as subsidies and social benefits, can play a decisive role in reducing gender gaps in education.

However, risks related to poverty and economic instability persist, disproportionately affecting girls in certain age groups. These findings emphasize the need for comprehensive policies that address the following areas:

1. increasing household incomes through employment support, particularly for women;

2. ensuring access to affordable preschool education to alleviate financial burdens on families;
3. integrating gender considerations into social programs to reduce poverty risks for girls;
4. implementing balanced demographic policies to maintain a sustainable ratio of working-age to dependent populations;
5. by taking these steps, it is possible to create more equitable opportunities for both girls and boys while reducing poverty in the long term.

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AUTHOR BIOGRAPHIES

***Elvira Nurekenova** – Cand. Sc. (Econ.), Associate Professor, D. Serikbayev East Kazakhstan Technical University, Oskement, Kazakhstan. Email: emadiyarova@mail.ru, ORCID ID: <https://orcid.org/0000-0002-2944-6968>

Ayaulym Baitekova – Bachelor, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: ayaulymbaytekova4272@gmail.com, ORCID ID : <https://orcid.org/0009-0002-1204-3481>

RESEARCH ARTICLE

The Role of Women and Macroeconomic Factors in Sustainable Development

Lyudmila Kan^{1*}Zhanat Malgarayeva²¹ Turan University, Almaty, Kazakhstan² Narxoz University, Almaty, Kazakhstan**Corresponding author:**

* Lyudmila Kan – PhD candidate, Turan University, Almaty, Kazakhstan.

Email: 21220835@turan-edu.kz

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Abstract

Women's economic participation and financial stability are key drivers of sustainable development, forming the foundation for equitable growth and long-term progress. This study investigates the relationship between macroeconomic factors, women's economic participation, and sustainable development in Kazakhstan from 2013–2023. The analysis is focused on key indicators, including gross value added, deflator indices, shadow economy metrics, employment rates, and environmental protection investments. Two hypotheses were tested. Regression analysis was used: (1) structural factors such as economic growth, employment, and environmental policies significantly influence sustainable investments, and (2) women's workforce participation positively impacts sustainable development.

The results confirmed the first hypothesis, supporting those macroeconomic indicators, particularly deflator indices and the shadow economy, significantly impact shaping investment patterns. However, the second hypothesis is only partially supported, as women's employment correlates with economic growth but is hindered by persistent disparities in workforce representation and access to resources. The findings of the research contribute to the existing body of knowledge on the dual role of macroeconomic stability and gender inclusion in driving sustainable development while identifying structural barriers limiting women's full economic potential. The results reveal the importance of targeted, inclusive policies to enhance gender equity and sustainable progress, offering valuable insights for policymakers in Kazakhstan and other emerging economies.

Keywords: Gender, Gender Wage, Economy, Gender Inequality, Structural Barrier, Employment, Kazakhstan

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1. INTRODUCTION

Global economy is at the stage of revealing new challenges related to achieving sustainable development. Observed changes and transformations encompass environmental issues, social equity, and economic resilience. Altogether, it forms the foundation for implementing global Sustainable Development Agenda. One of the key objectives of this agenda is achieving gender equality and empowering women, which is considered an integral part of sustainable issues related to employment, access to resources as finance, professional and occupational promotion leading to decision making participation, are affected by gender imbalance and there appears the need for gender equality in the economy. It is directly linked to economic efficiency, social stability, and environmental responsibility, and it requires our entire engagement and commitment to the cause. Broader inclusion of women in economic activities accelerates innovation and improves overall labour productivity. Women's participation in the economy and investments contributes to portfolio diversification of financial institutions and operations, sustainable development, and strengthening corporate social responsibility.

Particular attention is given to investments in environmental protection to ensure ecosystem preservation and stimulate job creation, including opportunities for women. Thus, combining ecological responsibility and gender equality is a key driver in achieving sustainable development goals.

These issues are equally relevant to Kazakhstan as women are less engaged in economic processes, particularly in sectors such as the financial market and investments, as the result of gender pay gap and limited access to financial resources.

Mutual funds are regarded as a tool or a mechanism for collective investment, which enables funds accumulation. Moreover, it is another mechanism for funds allocation to

economic sectors or environmental projects. However, the country's current structure of mutual funds poorly reflects gender aspects. Further analysis is required to understand women's participation and role in developing these funds. The aim of current research is to analyze the factors affecting the development of mutual funds in Kazakhstan.

2. LITERATURE REVIEW

The relationship between macroeconomic and gender-specific factors in sustainable development has been widely discussed, including various topics such as investment, employment patterns, and environmental policies—well, the impact of gender disparities, particularly in the labour market.

Some studies focused on macroeconomic indicators, such as gross value added (GVA) or deflator indices, as key measures of economic performance, productivity and growth potential. According to some studies, while macroeconomic indicators remain central, they cannot fully capture sustainability unless augmented with ecological and social dimensions. Hanley (2000) evaluated the integration of sustainability into macroeconomic measures through flow-based and stock-based approaches that can be assessed by adjusting the Net National Product (NNP) to account for environmental depreciation or by monitoring changes in natural and human capital stocks. Nevertheless, the need to view sustainable development is required apart from the traditional growth paradigm. Jespersen (2004) analyzed growth-dependent economic systems and suggested to pay attention to three models. First, zero-growth strategies focused on maintaining a stable level of production and consumption instead of continuously increasing them, aiming to reduce pressure on natural resources. Second, labour-sharing mechanisms can redistribute work among the population to decrease unemployment and improve social equity. Third, effective demand

focuses on maintaining sufficient demand for goods and services to ensure economic stability and balance the economy without exerting excessive pressure on the environment. Ezigbo (2012), on the contrary, focused on financial instruments as monetary and fiscal policies essential for managing inflation, employment, and growth in achieving sustainable development. Countries where economic management directly impacts poverty reduction and environmental health are considered primarily dependent.

In contrast, Missouri (2013), focusing on financial instruments, suggested an interdisciplinary approach, financial and non-financial metrics, that ties financial instruments to broader sustainability goals. Therefore, an integrated approach provides deeper analysis both at the macro and meso levels. State et al. (2019) suggested that for emerging economies, cluster analysis and empirical testing, indicators such as GDP and Human Development Index (HDI) are vital for evaluating countries' progress toward sustainability. Pieloch-Babiarz et al. (2021) suggested that macroeconomic stabilization policies encourage businesses to invest in sustainable technologies or adopt long-term environmental strategies to align with environmental and sustainability goals, such as reducing emissions, improving energy efficiency and optimizing resource use.

There is a great body of knowledge devoted to employment and economic growth. However, recent studies, relate workforce participation and employment rates as indicators of financial health. Central to this discussion is analyzing how workforce participation—particularly by women—shapes and is shaped by broader economic trends. Moreover, employment often reflects broader issues of gender inequality and barriers to economic inclusion. However, disparities in workforce structure and employment opportunities are still key challenges and subject to structural changes. Education and employment opportunities stand out as major factors for women workforce inclusion. Thus, poorly educated women are often pushed into

the labour force by necessity, driven by economic hardship rather than opportunity, whereas for women with higher education, pull factors such as better wages and improved employment conditions attract participation (Klasen & Pieters, 2012). In developing countries, female labour force participation is highly dependent on education, so progress is not uniform. Verick (2014) stressed the importance of improving employment quality, as women's participation often reflects economic necessity, with informal and low-wage jobs predominating. It is not merely economic growth but the composition of growth—such as the expansion of the service sector—that drives women's economic activity, and sector-specific policies targeting growth are critical in addressing gender-based structural barriers (Lahoti & Swaminathan, 2015). Policies supporting education, subsidies for childcare, and cultural shifts have indirect significant impact and affect increasing women's labour force participation as they are major drivers of disparities in male and female participation rates (Kumari, 2018). Hence, existing challenges showed that the labour force age range differs, and inclusive policies that facilitate participation across all age groups are necessary (Walwei & Deller, 2021).

Environmental sustainability and gender equality have emerged as central themes in sustainable development discourses, and related to various socio-economic and ecological domains. Women face various challenges in economic, political, and social spheres. In developing countries, empowerment of women is a moral imperative (Bayeh, 2016). Across all 17 Sustainable Development Goals (SDGs), gender is a cross-cutting issue influencing the success of other SDGs, such as poverty reduction and climate action and embedding gender perspectives transform, improve and reshape how sustainable development goals are achieved (Leal Filho et al., 2023; Wroblewski et al., 2023; Medina-Hernández & Fernández-Gómez, 2024).

Integrating gender perspectives into economic development frameworks has been

recognized as essential for achieving balanced and inclusive growth. For resource management, Kunst and Kruse (2001), particularly water, put their side on providing access for women's participation in decision-making processes improves resource allocation efficiency and ensures long-term sustainability. To promote gender equity in public finance, Rubin and Bartle (2005) suggested the implementation of gender-responsive budgeting to address systemic inequalities in resource allocation and revenue generation. Ogundana et al. (2021) presented a gender-based growth model revealing women's barriers, including limited access to capital and markets. According to Edwards (2021), inclusivity in achieving sustainable economic development will allow addressing the complex relationship between economic growth and sustainability and align growth objectives with ecological and social goals. While the literature provides substantial insights into the influence of macroeconomic factors, employment dynamics, and environmental policies, integrating these elements into gender-specific analyses remains underexplored. Existing studies often treat these dimensions separately, leaving a gap in understanding their combined impact on sustainable development. The following hypotheses were developed.

Hypothesis 1. Structural factors such as

economic growth, employment, and environmental policies significantly influence investments in sustainable development, including those tied to women's participation.

Hypothesis 2. Women's economic participation positively impacts sustainable development, with their inclusion in the workforce and access to resources driving broader economic and environmental.

3. METHODOLOGY

Based on the hypotheses developed, the research is focused on a comprehensive analysis of the factors influencing the development of mutual funds (PIFs) in Kazakhstan, which have implications for sustainable development goals and gender-specific dynamics. This study aims to understand how macroeconomic factors and gender-specific dynamics influence investments in sustainable development, particularly those tied to women's participation. Data for 2013–2023 were obtained from the official website of the Bureau of National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan. The selected indicators are presented in Table 1.

TABLE 1. Key indicators for analysing the development of mutual funds in Kazakhstan

Code	Indicator	Measure	Dependent/Independent
INV_ENV	Investments in Environmental Protection	million tenge	Dependent (Model 1)
CURR_ENV	Current Expenditures on Environmental Protection	million tenge	Dependent (Model 2)
SHADOW_ECON	Share of the Shadow Economy in Gross Domestic Product (GDP)	%	Independent
IFO_GVA	Index of Physical Volume of Gross Value Added (GVA)	%	Independent
DEF_GVA	Deflator Indices for Gross Value Added (GVA)	%	Independent
GVA_2010	Gross Value Added by Sector in 2010 Constant Prices	million tenge	Independent
WORKFORCE	Total Workforce	Thousand,people	Independent
WORKFORCE_POP	Share of Workforce in Total Population	%	Independent
EMPLOYED	Total Employed Population	thousand,people	Independent

Note: compiled by authors

Two models will be constructed for the analysis: the first analyses overall environmental investments and expenditures, while the second analyses women's role in economic activity.

4. RESULTS

Women have taken a central role in the transition to sustainable economy. The main

contribution is observed in economic and social equity, and environmental progress. Current analysis examines how structural factors such as economic growth, environmental policies, and employment patterns influence sustainable investments and women's role in advancing these outcomes.

The following sections present the detailed findings and discuss their implications for policy and practice (Table 2).

TABLE 2. Model Fit Metrics for Regression Analysis for environmental investments and gender dynamics

Model	R	R ²	Adjusted R ²
M ₁	0.990	0.980	0.934
M ₂	0.956	0.914	0.714
Models include SHADOW_ECON, IFO_GVA, DEF_GVA, GVA_2010, WORKFORCE, WORKFORCE_POP, EMPLOYED			

Note: compiled based on calculations

The analysis of the model fit metrics provides insights into the validity of the hypotheses and the models' ability to capture the dynamics of women's economic participation and its influence on sustainable development.

For the first hypothesis, which suggests that structural factors like economic growth, employment, and environmental policies significantly impact investments in sustainable initiatives, Model 1 demonstrates strong explanatory power. With an R-value of 0.990 and an R² of 0.980, the model explains nearly all the variance in the dependent variable. The adjusted R² of 0.934 confirms the fitness of the model, that predictors such as the deflator indices and shadow economy are closely aligned with changes in environmental investments. Hypothesis 1 is supported, that macroeconomic indicators are significant in shaping investment trends, including those affecting women's employment indirectly through overall economic dynamics.

For the second hypothesis, focusing on the role of women's economic participation in sustainable development, Model 2 shows a slightly weaker explanatory power than Model 1. Although the value of R (0.956) and R² (0.914) indicate a strong relationship between

the predictors and the dependent variable, the adjusted R² (0.714) reflects prompts chosen gender-specific economic dynamics in the model may not explain or need more predictor to give a deeper picture of relationship between the dependent and independent variables.

Thus, the results validate the first hypothesis by demonstrating the significant influence of macroeconomic factors on investments in sustainability. However, the second hypothesis can be partially accepted as there were revealed limitations in the predictors' ability to explain the roles of women economic activity.

The results for regression analysis are presented in Table 3.

The regression analysis results highlight the overall performance of two models examining environmental investments and gender dynamics. Model 1 demonstrates strong explanatory power with an F-statistic of 21.220 and a p-value of 0.015, below the conventional significance threshold ($\alpha=0.05$); predictors collectively have a meaningful and statistically significant impact on the dependent variable, the structural factors in this model effectively explain variations in environmental investments.

TABLE 3. Regression analysis results for environmental investments and gender dynamics

	df(M ₁)	F (M ₁)	P (M ₁)	df (M ₂)	F (M ₂)	P (M ₂)
Regression	7	21.220	0.015	7	4.565	0.120
Residual	3			3		
Total	10			10		

Note. The intercept model is omitted, as no meaningful information can be shown.

Note: compiled based on calculations

In contrast, Model 2 shows weaker explanatory power, with an F -statistic of 4.565 and a p-value of 0.120, which exceeds the $\alpha=0.05$ threshold. This lack of statistical significance implies that while the predictors in Model 2 may have some influence, their collective effect is not strong enough to explain the dependent variable

confidently. The results showed a disparity between the models, with Model 1 providing statistically strong results and Model 2 falling short of the significance threshold.

The results for regression coefficients are presented in Table 4.

TABLE 4. Regression coefficients for models analysing environmental investments and gender dynamics

Independent Variables	Standardised (M ₁)	t (M ₁)	p (M ₁)	Standardised (M ₂)	t (M ₂)	p (M ₂)
(Intercept)		5.140	< .001		10.514	< .001
		1.647	0.198		1.390	0.259
SHADOW_ECON	-1.015	-2.654	0.077	-0.986	-1.239	0.304
IFO_GVA	0.502	2.384	0.097	0.729	1.665	0.195
DEF_GVA	-0.733	-5.133	0.014	-0.746	-2.510	0.087
GVA_2010	0.512	0.670	0.551	-0.688	-0.432	0.695
WORKFORCE	-3.590	-2.599	0.080	-1.556	-0.541	0.626
WORKFORCE_POP	0.042	0.112	0.918	-0.818	-1.052	0.370
EMPLOYED	3.240	2.297	0.105	1.936	0.659	0.557

The intercept model is omitted, as no meaningful information can be shown

Note: compiled based on calculations

The analysis of Model 1 highlights that DEF_GVA (Deflator Indices for Gross Value Added) is the most significant factor, demonstrating a strong negative relationship ($p=0.014$) and indicating its critical impact on environmental investments. Higher deflator indices are associated with reduced investment levels, reflecting the sensitivity of such expenditures to inflation. SHADOW_ECON (Share of Shadow Economy) also exhibits a negative influence, albeit with marginal significance ($p=0.077$), suggesting that shadow economic activities may suppress sustainable investment potential. IFO_GVA (Index of Physical Volume of GVA) shows a positive

coefficient ($p=0.097$), which, though not statistically significant, implies a potential supportive role in driving environmental investments. Other predictors, such as WORKFORCE, WORKFORCE_POP, and EMPLOYED, show no significant effects. In other words, employment-related variables alone may not fully explain investment patterns.

The results for Model 2, focus on women's economic roles. DEF_GVA retains a negative relationship ($p=0.087$), indicating its marginal influence on gender-specific factors in economic activity. IFO_GVA exhibits a more substantial positive effect (0.729) than Model 1,

suggesting a potential but statistically insignificant ($p=0.195$) role in supporting women's economic contributions. SHADOW_ECON shows a weaker negative effect than Model 1 ($p=0.304$), implying that the shadow economy may have a limited but adverse impact on women's economic inclusion. The variables which reflect employment (GVA_2010, WORKFORCE, and EMPLOYED) showed statistical

insignificance. The results, align with model fitness results.

Overall, the findings emphasise that while inflation-adjusted metrics such as DEF_GVA significantly influence investment behaviour, their effects on women's economic roles remain marginal.

The results for Q-Q plots are presented in Figure 1.

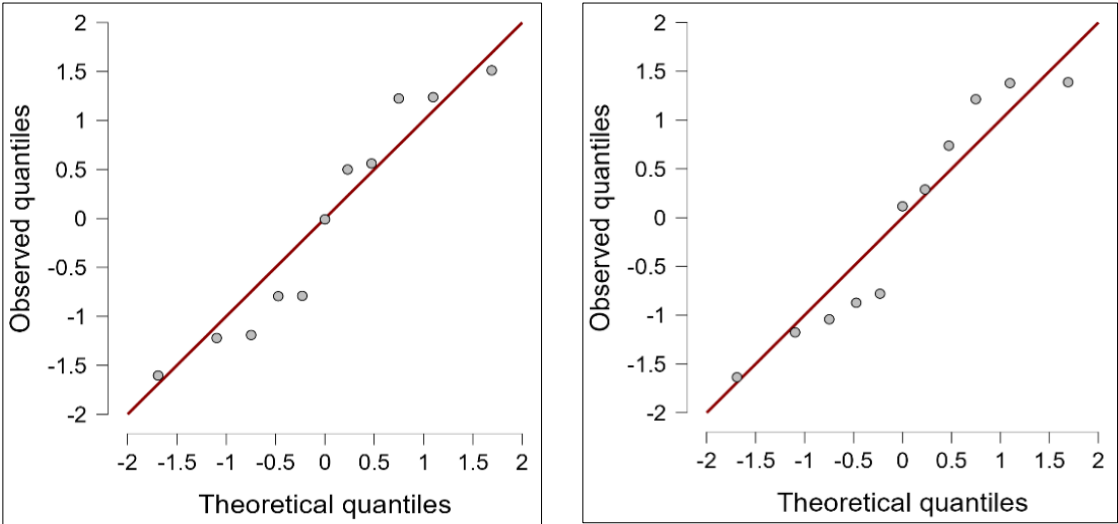


FIGURE 1. Q-Q Plots for Residual Normality in Regression Models

Note: The models from left to right environmental investments and gender dynamics

The Q-Q plots serve as diagnostic tools to evaluate the normality assumption of the residuals for two regression models. For Model 1, where the dependent variable is investments in environmental protection, the residuals align closely with the theoretical quantile line, indicating that the assumption of normality is well satisfied. This suggests that the model provides a reliable fit for the data. In contrast, Model 2, which examines current expenditures on environmental protection as the dependent variable, shows residuals that largely align with the theoretical quantile line but exhibit slight deviations at the tails. These deviations,

while minor, may reflect potential outliers or a mild departure from normality, particularly in extreme values. Together, the Q-Q plots provide a visual representation of the behavior of residuals in both models, highlighting how well the normality assumption is upheld in each case. These insights are crucial for determining the validity of subsequent statistical inferences drawn from the regression models.

Figure 2 presents the dynamics of key indicators over multiple years, showing how these changes are connected to women's economic and social participation.

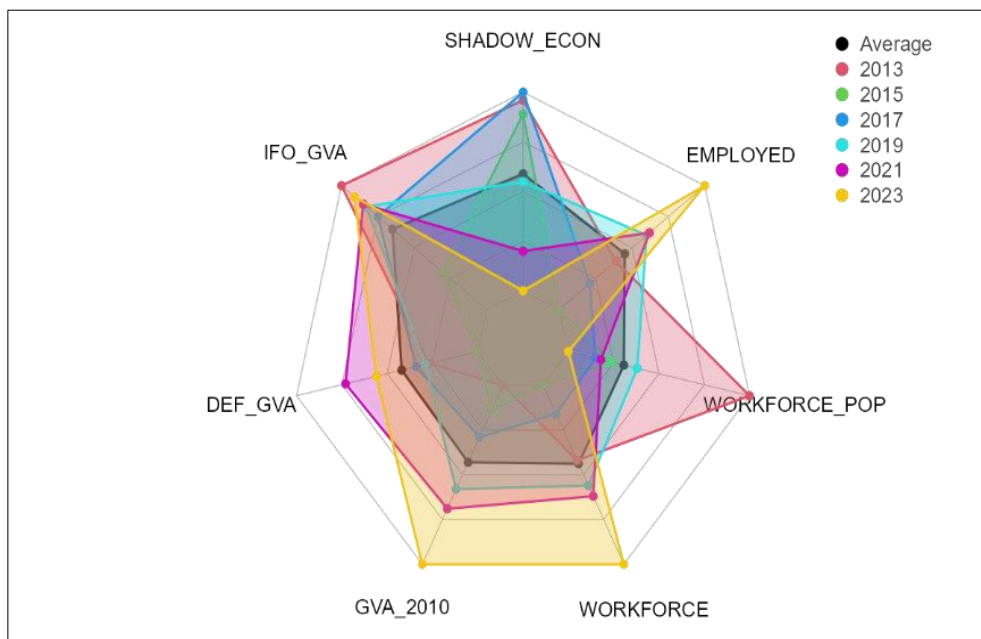


FIGURE 2. Dynamics of key indicators over multiple years

Note: compiled based on calculations

The chart reflects changes in key economic indicators and women’s employment over the analyzed period. In the early years, such as 2013, the indicators show relatively stable but low values for most metrics, including women’s employment, the overall workforce, and gross value added. Between 2013 and 2023, Kazakhstan's economy's structure was characterized by limited women's involvement in key sectors.

The identified changes in the regression analysis confirmed the first hypothesis that structural factors, such as economic growth, employment, and environmental policy, significantly impact economic development and women’s role. The chart demonstrated that there was a gradual improvement in employment for women, including workforce growth and gross value added over the analyzed period. However, fluctuations in some indicators, particularly those related to productivity and value-added, indicate instability in economic dynamics in recent years. The dynamics supported regression analysis outcomes that economic growth can

have positive and negative aspects. From the perspective of sustainable development, such changes could serve as a prerequisite for strengthening governmental support for environmental initiatives, which would, in turn, positively impact the economy and women’s involvement. The second hypothesis, that there is a correlation between women’s employment growth and the economy's overall development, is partially confirmed.

The chart supported the regression analysis outcomes and showed differences in employment indicators and workforce share exhibiting disparities and limited access for women to key economic opportunities throughout the analyzed period. In the long term, the results prompt that policies directed at removing revealed barriers for women should lead to an increase in women’s economic activity, which will help not only improve living standards but also sustain economic growth. The results also showed that the economy was undergoing structural economic changes, which could have affected women’s employment and access to resources.

Over time, several indicators, such as the employed population and the share of the workforce in the total population, emphasize a positive trend. However, significant fluctuations are observed in the period's later years, particularly in gross value added and productivity indicators. Significant changes in indicators reflecting the share of the workforce do not always correspond to similar growth in metrics related to improved employment conditions or women's access to key economic sectors.

5. CONCLUSION

The main goal of current study was to analyze factors influencing the development of mutual funds in Kazakhstan, with a focus on the role of women in economic activity. The analysis has largely achieved this goal through identification of key trends and relationships between economic indicators, gender dynamics, and sustainable development.

The findings supported the first hypothesis, that structural factors (economic growth, employment, and environmental policies) significantly impact development.

The results highlighted those improvements in gross value added and workforce indicators

align with increased economic activity. Yet, these benefits are not distributed evenly, as disparities in women's participation in key sectors and access to resources remain evident.

The second hypothesis was partially accepted. It covered women's employment and its influence on sustainable development. Women's employment correlated with economic growth during periods of stability. Existing barriers, such as wage gaps and underrepresentation in key sectors, limited the full realisation of women work force potential.

There was observed progress in certain areas for women, but achieving equitable and sustainable development requires a stronger focus on gender equality. Women are overtaking the attention as vital contributors to driving economic transformation. Increase in the inclusion of women in decision-making processes, employment opportunities, and resource access are gaining their importance. Existing trends showed, there will be a prominent necessity in women workforce for the continued development of mutual funds and broader economic resilience in the country. While structural factors contribute to overall progress, their impact on women's economic roles is still limited.

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AUTHOR BIOGRAPHIES

***Lyudmila Kan** – PhD candidate, Turan University, Almaty, Kazakhstan. Email: 21220835@turan-edu.kz, ORCID ID: <https://orcid.org/0009-0009-1555-7876>

Zhanat Malgarayeva – Cand. Sc. (Econ.), Associate Professor, Narxoz University, Almaty, Kazakhstan. Email: zhanat.malgaraeva@narxoz.kz, ORCID ID: <https://orcid.org/0000-0003-4783-5438>

RESEARCH ARTICLE

Gender Inequality and Labor Market Dynamics: Analyzing Short- and Long-Term Trends in Kazakhstan

Assel Akhmetkyzy^{1*}| Zhanel Birzhanova² |

¹ University of International Business named after K. Sagadiyev, Almaty, Kazakhstan

² Kazakh-British Technical University, Almaty, Kazakhstan

Corresponding author:

*Assel Akhmetkyzy – Master of Business, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan.
Email: assel.akhmetkyzy@gmail.com

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EJGS**Abstract**

Gender-based public policy is crucial for ensuring equal opportunities for men and women across all spheres of life. The objective of this study is to analyze gender inequality trends in Kazakhstan from 2013 to 2023 by focusing on key social and economic indicators, such as political representation, educational attainment, labor force participation, and wage disparities. The study employs K-means clustering to group Kazakhstan's regions into clusters based on gender inequality indicators, such as the Gender Inequality Index (GII), wage gap, maternal mortality, and political representation. The data used in this study come from official statistics provided by the Bureau National of Statistics of the Republic of Kazakhstan and international organizations such as the United Nations from 2013 to 2023. The analysis revealed that Cluster 0 had the lowest gender inequality, with a Gender Inequality Index (GII) of 0.34 and a 27% wage gap. Cluster 1, with a GII of 0.37, exhibited higher disparities, particularly in adolescent birth rates and wage gaps (33%). Cluster 2, with the highest inequality (GII of 0.41), also showed a 32.73 maternal mortality rate and a 24% wage gap. These findings underscore the persistent challenges in gender equality, especially in the areas of economic and political participation, despite improvements in educational access. The study's implications are significant, highlighting the need for targeted policies to reduce wage disparities, improve political representation for women, and address maternal health. These insights can guide policymakers in prioritizing gender-focused interventions for sustainable development, thereby contributing to the broader goal of achieving long-term gender equality in Kazakhstan.

Keywords: Gender, Gender Inequality, Wage Gap, Labor Force Participation, Kazakhstan

SCSTI: 12.35.00

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1. INTRODUCTION

Gender inequality and unemployment in the labour market is a pressing issue worldwide. It is not only a social equality issue but also directly impacts economic growth, productivity and sustainable development. According to the International Labour Organization (ILO), women earn, on average, 20% less than men for the same job. This gap persists even in developed countries with highly developed economies, such as the United States, Germany and Japan. In some countries, the gender pay gap is exacerbated by women's lack of access to high-paying and leadership positions. Women are likelier to work in less protected and lower-paid sectors, such as health care, education and retail. In fragile economies, such as Latin America, South Asia and Africa, women face higher unemployment rates than men. This is often due to social norms limiting their economic participation. COVID-19 has made the situation worse. Women around the world have faced a high number of layoffs as the pandemic has hit hard the sectors where they are traditionally highly employed (services, tourism, healthcare). Automation and digitalization also create unequal conditions in countries with market economies, such as the US or UK. Women and men are losing jobs in sectors where technology replaces labour, but women are less represented in promising and technology-driven industries such as IT and engineering.

Structural features of the economy, dependence on male-dominated raw materials industries, and insufficient support for women in the labour market are crucial factors in Kazakhstan. The experience of other countries shows that sustainable growth and reduction of inequality are possible only by removing barriers for women, creating new jobs, and ensuring equal access to resources and opportunities (Stoker et al, 2024). The topic of gender inequality and unemployment is not just a problem; it is a challenge that all countries face, regardless of their level of development. For Kazakhstan, this is also an

opportunity to adapt the best global practices and reach a new social and economic development level. The current study aims to analyze the trends in the labour market in Kazakhstan by focusing on the immediate impacts of unemployment and wage disparities and the long-term structural drivers of inequality accelerations.

2. LITERATURE REVIEW

An extensive body of knowledge discusses gender inequality in labour markets. The current study has addressed the multidimensional nature and interconnectedness of discussed topics, including the wage gap, economic activity, and labour unemployment. Wage inequality remains a persistent challenge, with studies examining how segmented labour markets and structural barriers limit women's access to higher-paying opportunities (Berik et al., 2009). Patterns of women's labour force participation over time have been explored, particularly how industrialization and economic restructuring influence women's engagement in the workforce. The shifts in gender disparity are often non-linear. Moreover, they are highly context-specific and mirror variations in the structures of the economy, society and cultural habits (Gaddis & Klasen, 2014). In terms of the labour force, unemployment and underemployment have been exclaimed as key drivers of economic inequality (Tilly et al., 2022). On the other hand, there is a correlation between supply and demand in the labour force, which is highly dependent on equitable access to education and skills training to foster workforce adaptability (Aji & Akbardin, 2024). Thus, gender inequality in labour markets is shaped by a complex of structural, demographic, and policy factors.

Gender wage inequality persists across sectors and regions. Most often as occupational segregation, devaluation of women's work, and between-firm inequality. As a result, women are concentrated in lower-paying roles

and firms, as there are barriers that limit access to leadership and high-wage positions. In some regions, the issue of social perception of women's role significantly affects offered opportunities, and structural reforms, including anti-discrimination policies, wage transparency, and equitable access to leadership opportunities, are required (Mandel & Semyonov, 2014). Firm-level practices, such as wage surpluses disproportionately favouring men, perpetuate disparities (Brynin & Perales, 2016; Brick et al., 2023). In transition economies like Kazakhstan, these patterns are compounded by historical gender norms and discriminatory labour practices, sustaining gaps despite women's high educational attainment (Koskinen & Sandberg, 2018). A widely spread issue, according to McGee et al. (2024), is that women of colour face disadvantages such as lower wages and barriers to career advancement.

Unemployment and underemployment have been consistently identified as key drivers of economic inequality, with distinct impacts on marginalized groups. Women are disproportionately hit by unemployment and precarious employment, and they lack stable and high-quality jobs (Worth, 2016). This is particularly characteristic during economic downturns, where women are the first to lose jobs because they are often concentrated in vulnerable sectors like retail and hospitality (Chesters & Cuervo, 2019). Precarious employment, characterized by temporary or insecure work, compounds these disparities, as seen across European economies, where such employment is increasingly prevalent among younger populations and women (Kretsos & Livanos, 2016). Even more, the effects of accelerating unemployment are not limited to financial instability but also extend its impact on health outcomes, especially for youth promoting precarious job markets (Vancea & Utzet, 2017).

The role of workforce participation in reducing economic inequality has been widely explored in the literature. Increasing women's labour force participation contributes considerably to economic growth, but systemic

barriers, including inadequate childcare services, inflexible work environments, and societal norms, continue to impede their full inclusion in the labour market. Macroeconomic factors influence gendered labour market outcomes, and international trade policies can influence gender wage gaps and women labourer force participation (Sauré & Zoabi, 2014). Despite investments in education and skill development including improvement of women's qualifications, there is barely progress in quality employment or increased workforce participation (Klasen et al., 2020). Therefore, current research is focused on the analysis of fluctuations in inequality, focusing on the immediate impacts of unemployment and wage disparities, as well as the compounding effects of changes over time to identify the structural drivers of inequality accelerations. Following hypotheses were developed.

1. *Unemployment and gender pay gaps significantly influence short-term changes in overall inequality.*

2. *Acceleration in unemployment and acceleration in gender pay gaps drive long-term systemic changes in inequality.*

3. METHODOLOGY

The conducted literature review allowed to develop the methodology in to explore gender disparity indicators using first and second derivatives for trends and patterns over time analysis. The data was collected from the Bureau of National Statistics and covered the period from 2014 to 2023, includes normalized economic indicators such as wage disparities, unemployment rates, and labor force participation. Data cleaning was conducted by excluding highly correlated predictors identified through correlation matrices and retaining only statistically significant predictors determined via preliminary regression analyses to ensure model reliability.

The first derivative was calculated to represent the rate of change in each indicator

on a year-over-year basis, following the formula (1):

$$(\Delta X = X(t + 1) - X(t)) \quad (1)$$

Specifically, the first derivative was employed to quantify incremental changes, offering insights into whether trends are improving or worsening. The second derivative was calculated according to the following formula:

$$(\Delta^2 X = \Delta X(t + 1) - \Delta X(t)) \quad (2)$$

The second derivative assessed the acceleration or deceleration of these changes, indicating whether the trends are stabilizing, intensifying, or reversing over time.

Linear regression models were employed to analyze both the first and second derivatives of integral measures, particularly SC_OII (first derivative) and AC_OII (second derivative). Independent variables included SC_GEP (gender earnings gap), SC_PW (participation in the workforce), SC_UN (unemployment rates), and SC_UP (underemployment rates), which represent key components of gender disparities. The analysis included coefficient of determination (R^2) and p-values of individual predictors. Diagnostic tests, including the Durbin-Watson test for autocorrelation and Variance Inflation Factor (VIF) for multicollinearity, were conducted. The regression model for SC_OII followed the equation:

$$SC_{OII} = \beta_0 + \beta_1 SC_{GEP} + \beta_2 SC_{UN} + \epsilon \quad (3)$$

where β_1 and β_2 are the coefficients of SC_GEP and SC_UN, respectively, and ϵ is the error term. Similarly, the regression model for AC_OII accounted for second-order dynamics with the equation:

$$AC_{OII} = \beta_0 + \beta_1 AC_{GEP} + \beta_2 AC_{UN} + \epsilon \quad (4)$$

The model captured the acceleration of changes in integral measures.

A methodology with first—and second-order derivatives, correlation, and regression analysis will allow us to better understand how short-term changes and long-term accelerations affect inequality.

Identify dynamics over time: how key economic indicators change year after year (first derivative) and how structural changes accumulate (second derivative), which gives a holistic view of short-term and long-term processes.

Assess the relationships between indicators: Correlation analysis will help us determine which factors – unemployment, the gender gap or others – are most closely associated with inequality, excluding less significant variables to simplify the models.

Quantify the impact of factors: Regression analysis can accurately measure how much each factor (for example, unemployment or the gender gap) affects the level of inequality.

This integrated approach is better because it allows us to describe the situation and explain its causes, which makes the conclusions more justified.

4. ANALYSIS AND RESULTS

The analysis of gender inequality in labor market included three key stages: an examination of the derivatives, a correlation analysis based on a heatmap, and a regression analysis. The first stage involves analyzing the first and second derivatives of gender disparity indicators to identify trends and acceleration patterns over time. The second stage focused on the relationships among variables for both hypotheses. The correlation analysis was used to identify key predictors and address multicollinearity by excluding highly correlated variables. Finally, the regression analysis results, reveal the influence of significant predictors on the dependent variables, highlighting the role of earnings gaps and unemployment rates as primary drivers of both year-over-year changes and accelerations in gender disparities.

Our analysis showed that during the observed period, the labour market in Kazakhstan experienced differentiated negative economic conditions shifts faced by men and women. Gender wage equality, as captured by the first derivative, highlights significant instability. In 2020, the situation for women had a brief improvement in wage gaps (0.145), primarily due to the potential driven by short-term policies or conditions, which converted the period for pandemic-related economic support. However, this progress was not sustained, with a sharp decline by 2023 (-0.193), suggesting that underlying structural barriers to economic independence remained unaddressed. Thus, it resulted in financial insecurity and limited access to stable employment for women.

Economic activity results showed relatively modest year-over-year changes overall. Again, a favourable short-term period was observed during the pandemic in 2019 (0.189). However, these changes were insufficient to address underlying disparities in job accessibility. On top of existing challenges, women faced additional sectoral segregation, unequal hiring practices, and a heavier burden of unpaid care work. For vulnerable groups, including rural populations, these systemic obstacles meant limited employment opportunities and increased reliance on informal or less secure jobs.

The radar charts represent the results for both derivatives in Figure 1.

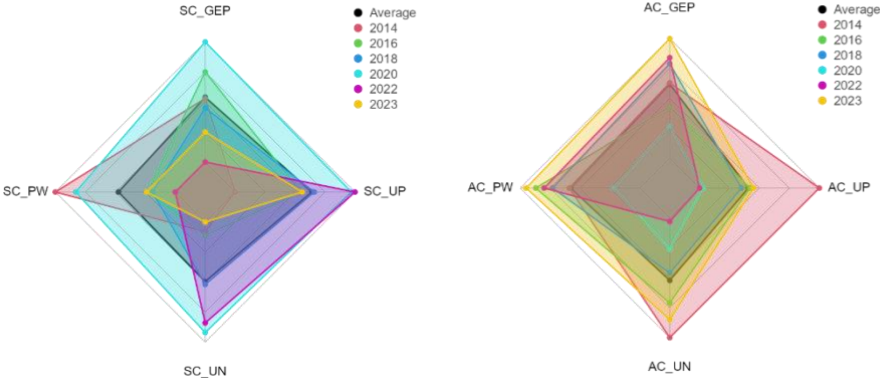


FIGURE 1. Changes and Acceleration Trends Across Economic Indicators, 2014–2023

Note: compiled by authors based on data from the Bureau of National Statistics (2023)

Unemployment trends showed negative changes, and by 2022, the deceleration in unemployment (-0.450) pointed to systemic issues that disproportionately affected women, who are often more vulnerable to labour market shocks. The results showed prolonged periods of unemployment restricted by financial strain and strong dependence on informal support systems. Although positive acceleration was observed in 2021 (0.182), which mainly explained that job creation efforts may have temporarily alleviated some

of the pressures, it failed to provide long-term stability.

Income stagnation or reduction was a persistent issue, particularly for women, whose earning potential remained constrained by structural inequities in the labour market. Observed conditions in the labour market, especially for families relying on dual incomes, were highly vulnerable. The stress was mostly due to restricted opportunities to meet basic needs (including access to quality healthcare and education and financial resilience) because

of inconsistent employment opportunities and the wage gap.

Overall, the analysis showed that long-term reforms to stabilize income levels and promote inclusive economic growth were difficult to achieve in Kazakhstan. Women faced

economic instability and structural inequities, with limited opportunities for upward mobility, constrained financial security, and reliance on informal safety nets.

In Figure 2, there are presented results for correlation analysis.

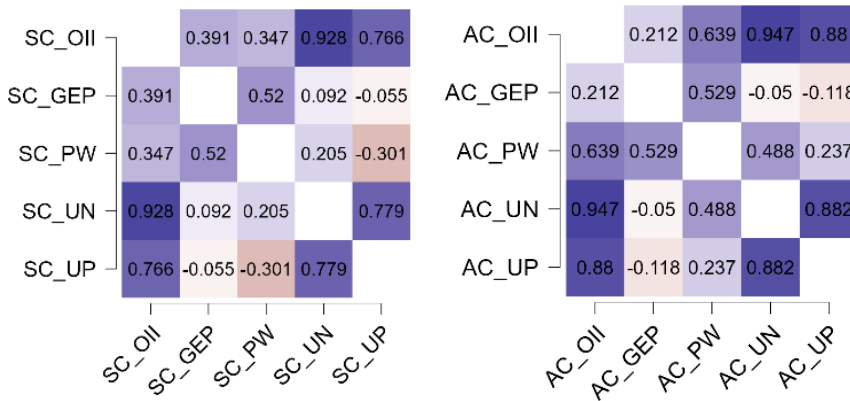


FIGURE 2. Mapping Interconnections: correlation dynamics across economic indicators

Note: compiled by authors based on calculations

The heat maps showed the relationships between dependent and independent variables. The analysis was done to exclude multicollinearity in further analysis. In the first hypothesis, the dependent variable (SC_OII) strongly correlated with dependent variables (SC_UN and SC_UP), emphasizing the significant influence of unemployment and underutilized labour on societal outcomes. In other words, the participation of women and men in the labour market was disproportionately shaped. However, SC_GEP showed weaker correlations with SC_OII (0.391), indicating that while gender pay disparities are important, they play a secondary role in driving overall inequality compared to unemployment-related factors.

In the second hypothesis, the dependent variable (AC_OII) maintained strong correlations with independent variables (AC_UN and AC_UP) above 0,8. This showed the central role of employment-related dynamics in shaping long-term systemic changes. For women, the consistent influence of unemployment acceleration (AC_UN)

highlights the structural vulnerabilities they face in accessing stable and equitable employment. Interestingly, AC_GEP demonstrates a weaker relationship with AC_OII (0.212), reflecting how wage inequality, while persistent, contributed less to systemic inequality accelerations during the observed period compared to the broader challenges posed by unemployment and underemployment.

Therefore, certain variables, such as SC_PW and AC_PW (workforce participation indicators), were excluded due to their weaker correlations with societal outcomes. While workforce participation remains essential for economic inclusion, its immediate impact on overall inequality during this period was overshadowed by more pressing issues like unemployment and income disparities. The results supported the analyzed dynamics of employment indicators and the impact of systemic barriers, such as unequal hiring practices and gendered expectations, diminishing their impact on aggregate outcomes on women's economic activity. The

economy of Kazakhstan relies on sectors such as oil and mining, explaining favourable opportunities for men. Women are often observed in precarious or informal employment. Consequently, unemployment and existing labour potential became the most influential factors.

By focusing on these high-impact variables, the analysis sharpens its lens on the root causes of inequality. The regression analysis demonstrated a strong explanatory power for both models (Table 1).

TABLE 1. Structural inequalities and labor market dynamics

Model	R	R ²
1 (SC_OII)	0.977	0.955
2 (AC_OII)	0.982	0.963

Note: compiled by authors based on calculations

The regression results closely reflect the trends observed in the earlier figures, reinforcing the analysis's consistency and the selected variables' reliability. The regression analysis results for both models confirmed the role of gender pay equality (SC_GEP), unemployment (SC_UN), and their long-term dynamics (AC_GEP and AC_UN) due to their high explanatory power (R² exceeding 95%). The selected indicators strongly influenced labour market outcomes during the observed period.

The analysis captures a period characterised by fluctuations in gender pay equality and workforce participation, as illustrated in the derivatives and visualised earlier. The strong correlations between unemployment variables and overall inequality, revealed in heat maps, supported that labour market inefficiencies and structural barriers were central causes shaping economic dynamics in the labour market. Interestingly, gender pay gaps, while significant, played a less dominant role in shaping the labour market but still played a meaningful role in increasing disparities.

To sum up, regression analysis results showed that unemployment-related indicators (SC_UN and AC_UN) had the most substantial and consistent impact in terms of inequality. Persistent unemployment worsened systemic disparities and limited economic mobility, predominantly for women. Ultimately, restricted access to well-paying jobs and long-term financial insecurity made it difficult for women to improve their economic stability, but further widened gender inequalities. Even though workforce participation metrics revealed weaker impacts, the results confirmed unequal opportunities for women in the labour market. The analysis allowed us to paint a picture of an economy grappling with deep-seated inefficiencies. Thus, systematic issues in unemployment and gender pay inequality stagnated economic growth and worsened social inequalities. The labour market was defined in two ways, but it was characterized as instability, inequity, and barriers to career promotion for women.

Coefficient results are presented in Table 2.

TABLE 2. Dominant role of unemployment in short- and long-term inequality trend

	Predictor	Estimate	SE	t	p
1 (SC_OII)	Intercept	-0.00178	0.0102	-0.175	0.866
	SC_GEP	0.34652	0.0908	3.818	0.007
	SC_UN	0.53141	0.0477	11.141	<.001
2 (AC_OII)	Intercept	0.00225	0.0127	0.177	0.864
	AC_GEP	0.38657	0.1075	3.597	0.009
	AC_UN	0.53875	0.0406	13.267	<.001

Note: compiled by authors based on calculations

The regression analysis of coefficients showed a consistent pattern across both models. The SC_UN and AC_UN indicators were identified as the strongest predictors of economic inequality, supporting that unemployment is central in driving short-term changes and long-term systemic shifts within the labour market. There was a direct and significant impact on inequality by SC_UN, while the influence on gender pay gaps showed gradual shifts. The indicator SC_GEP showed an insignificant impact. Therefore, unemployment is identified as a fundamental factor affecting economic conditions in the labour market, while the gender pay gap has an insignificant role.

According to the results, unemployment, which is the dominant role of AC_UN in the second model, also stresses long-term structural inequalities. Accelerating unemployment created compounding effects, further marginalizing vulnerable groups and deepening cycles of exclusion.

The findings support that woman have long experienced barriers in the access to stable and equitable employment, and for younger workers, whose entry into the labor market was likely delayed or destabilized during periods of economic disruption.

The significance of unemployment variables in both models pointed to challenges

beyond mere job access. The results showed growing instability in the labour market, especially for women. For both models, SC_UN and AC_UN, the results reflect the widespread financial insecurity and reduced economic confidence of many households. For women, these systemic inequalities translated into limited opportunities for career advancement and persistent vulnerability to economic shocks. As unemployment rates fluctuated and accelerated, the informal income system was the central source of income for individuals and families. The gap is widening, and financial insecurity is worsening between those with access to stable employment and those left behind.

Overall, these results reflect a labour market struggling to deliver equity and stability, with unemployment as a structural driver of inequality. Short-term changes in inequality are mainly explained by fluctuations in the unemployment rate, and the influence of the gender factor remains, but less pronounced. Long-term changes in inequality are mainly explained by acceleration of unemployment had the greatest impact on long-term changes in inequality. Acceleration of the gender pay gap also had an impact, but to a lesser extent.

Further, in Table 3 there are assumptions check results.

TABLE 3. Validation of regression models: statistical assumptions

Model	Durbin–Watson Test for Autocorrelation			Collinearity Statistics		
	Autocorrelation	DW Statistic	p		VIF	Tolerance
1 (SC_OII)	-0.210	1.90	0.916	SC_GEP	1.01	0.991
				SC_UN	1.01	0.991
2 (AC_OII)	-0.358	2.39	0.490	AC_GEP	1.00	0.997
				AC_UN	1.00	0.997

Note: compiled by authors based on calculations

The results of the assumption check in Table 3 confirm the reliability and robustness of the selected indicators for the analysis in the current research. The results ensure the accuracy of findings presented in the regression and correlation results and reflect

labour market dynamics in Kazakhstan. The Durbin–Watson test for autocorrelation shows no significant evidence of serial correlation in the residuals for both models. For SC_OII, the Durbin–Watson statistic of 1.90 indicates that residuals are independently distributed

($p=0.916$), while for AC_OII, the statistic of 2.39 further reinforces the absence of autocorrelation ($p=0.490$). These results ensure that the relationships captured by the models are free from temporal bias, reflecting genuine patterns in the data.

Collinearity statistics confirm the predictors' independence, with VIF values near 1 and tolerance values close to their maximum of 1 for all variables. This indicates that key predictors—such as SC_GEP, SC_UN, AC_GEP, and AC_UN—each contribute unique explanatory power to the models without redundancy. The lack of multicollinearity is essential for isolating the distinct effects of gender pay disparities and unemployment dynamics on overall inequality. These assumption checks (based on Durbin–Watson and Collinearity tests) validate the accuracy of the hypotheses and support the accuracy of the findings. The results highlight unemployment, particularly SC_UN and AC_UN, as critical factors influencing inequality. The models provide a reliable lens through which to understand the interplay of gender and labor market dynamics in Kazakhstan.

5. CONCLUSIONS

The objective was to study the dynamics of inequality in Kazakhstan's labour market, emphasising short-term changes caused by unemployment, the gender pay gap and long-term structural factors contributing to the acceleration of inequality. The objective of current research was to reveal the main factors influencing inequality and recommend developing more inclusive economic policies. Short-term hypothesis was partly confirmed.

Unemployment and the gender pay gap significantly affect short-term changes in the

overall level of inequality. Unemployment was the main factor in short-term changes, while the effect of the gender pay gap was less significant.

The long-term hypothesis was fully confirmed. *The acceleration of unemployment and the gender pay gap are key drivers of long-term structural changes in inequality.* Results confirmed that structural problems in the labour market related to unemployment are the primary source of long-term inequalities.

The results showed that unemployment is the main driver of inequality. It strongly influences both short-term changes (where the situation changes from year to year) and long-term trends (where the effect is cumulative). The level and acceleration of unemployment play a more significant role than the gender pay gap. The gender pay gap was also important, but its impact was weaker. It increased inequality but was not as “systemically important” as unemployment. So, women's wage problems were more a part of the overall crisis than its primary cause. Finding stable work was difficult. Women were more likely to be unemployed or to have to accept low-paid positions. The acceleration of unemployment led to more people dropping out of the labour force, which created long-term problems: less income, more debt, and dependence on family or state assistance. Families, especially those with dual incomes, were vulnerable as earnings became unstable and expenses remained high. Under conditions of economic instability, the main problem was unemployment, which not only made it difficult to find work but also exacerbated the gap between rich and poor. Women mainly suffered because they earned less and had difficulty finding stable jobs. The economy as a whole did not provide equal opportunities, which is why many had no chance of breaking out of poverty.

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AUTHOR BIOGRAPHIES

***Assel Akhmetkyzy** – Master of Business, Researcher, University of International Business named after K. Sagadiyev, Almaty, Kazakhstan. Email: assel.akhmetkyzy@gmail.com, ORCID ID: <https://orcid.org/0009-0004-1980-484X>

Zhanel Birzhanova – Bachelor, Kazakh-British Technical University, Almaty, Kazakhstan. Email: birzhanovazhanel6@gmail.com, ORCID ID: <https://orcid.org/0009-0009-4622-5567>

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