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RESEARCH PAPER

# Exploring the Factors Influencing Gender Disparity in STEM Education: A Comprehensive Analysis of Societal, Cultural, and Economic Impact

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**ABSTRACT**

This research investigates the complex interaction of socio-cultural, economic, and institutional factors that contribute to differences between genders in the educational sector across Pakistan, mainly the province of Punjab, Sindh, and Balochistan. Statistical analysis is used to determine the influence of these factors on educational outcomes. In Pakistan's rural areas of Punjab, Sindh, and Balochistan, girls face difficulties accessing education due to social norms and gender stereotypes. Additionally, economic obstacles exacerbate inequality for girls in these areas. Biases within institutions persist both overtly and subtly worldwide, affecting teacher-student interactions and curriculum content. To address disparities between genders in education, this study recommends gender-sensitive curricula, increased representation of female teachers, financial support mechanisms, and comprehensive sex education. Mainly, the data is based on the Secondary resources such as TV, Newspapers and Government Website and the data is analysed through Thematic Analysis. Systemic changes are necessary to create inclusive environments where quality education is accessible for all genders. Ultimately this will advance societal progress and promote gender equality.

**KEYWORDS** Gender Disparity, Gender-Sensitive Curricula, Socio-Cultural Factors, Traditional Beliefs

## Introduction

The enduring global problem of unequal opportunities for males and females in the education sector is a matter of great concern. Carter, et al. (2019) further claimed that this persistent gender disparity can be attributed to various factors such as socio-cultural, economic, and institutional barriers. Such an issue is not only a violation of fundamental human rights but also impedes the holistic progress of society.

In education sector, Wu, et al. (2022) indicated that gender inequalities are significantly influenced by socio-cultural factors. Traditional beliefs and preconceived notions often limit women's roles to caring for the home, leading to a secondary consideration of education. These stereotypes dissuade families from prioritizing girls' schooling, thereby restricting their access to educational opportunities.

Nygaard, et al. (2022) further stated that gender inequality is exacerbated by economic factors that result in poverty and an inadequate allocation of resources. Within families experiencing financial difficulties, the education of boys is often prioritized over girls due to the perception that it will lead to greater economic benefits in the future. Consequently, Carter, et al. (2019) revealed that the access of females to educational opportunities becomes compromised since their education is considered less important.

Additionally, expenses such as uniforms, books, and transport can be a significant barrier for girls seeking an education. In regions where educational resources are scarce, this disproportionality affects female enrolment rates disproportionately.

Gender inequality in education is significantly influenced by institutional factors as per the views of Wu, et al. (2022). Prejudiced policies and practices may impede access to education for girls. Moreover, the absence of female educators and substandard sanitation facilities can pose obstacles, discouraging girls from enrolling in school. Furthermore, the curriculum could maintain gender-based assumptions, constraining girls' ambitions and self-worth.

On the other hand, gender inequality in education has various detrimental effects (Carter, et al. 2019). Initially, it perpetuates the vicious cycle of poverty by restricting girls' access to employment and financial self-reliance. Additionally, it obstructs social advancement since educated women play a crucial role in promoting healthier families, lowering fertility rates, and fostering community development. Moreover, Master, et al. (2021) claimed that gender disparity limits room for innovation and economic growth as a large segment of the population remains undereducated. Hence, the main tenacity of this research is to highlight how the issue pertaining to gender inequality in the education sector is multifaceted, arising from various socio-cultural, economic, and institutional factors. Moreover, this research will address the impact of this inequality/disparity on individual growth, economic advancement, and societal development is significant. To overcome this disparity, this research will propose a comprehensive strategy is required that entails shifting attitudes, securing financial independence for women, and incorporating gender-sensitive regulations to establish an unbiased and all-inclusive education system.

**Literature Review**

In Pakistan, the topic of gender imbalance in the academic sphere is a pressing matter that has garnered significant attention. An overview of studies on the subject will be presented in this literature review. Its purpose is to highlight the various causes, repercussions, and remedies of gender inequality in education. This review will delve into multiple investigations on the issue, exposing its complex nature and its impact on policy and practices.

Pakistan, like many other countries, is grappling with the issue of gender disparity in education. Despite efforts by organizations such as UNESCO, girls continue to encounter obstacles when it comes to pursuing and finishing their education. This is a problem that exists on a global scale which must be addressed. (UNESCO, 2019). In Pakistan, these disparities are particularly pronounced, with gender gaps in enrollment rates, literacy rates, and educational attainment levels (Farooq, Chaudhry, Shafiq, & Berhanu, 2011).

In Pakistan, the matter of gender inequality in education is crucially reflected in the distinction between the number of male and female students. The inequality has been investigated by many studies. In a particular study by Ahmed, Azhar, and Farooq (2015), it was discovered that there is a lower chance of female enrollment in schools in Pakistan. Reasons behind this scenario are mainly linked with social and financial factors, as well as the cultural impact that it creates.

In Pakistan's education sector, gender inequality is influenced by various factors. Girls are often dissuaded from pursuing education beyond a certain point due to cultural and societal norms (Mumtaz, 2000). Early marriages, pregnancies, and household duties

can constrain their educational opportunities (Ahmed et al., 2015). Moreover, inadequate representation of female educators and insufficient gender-aware teaching methodologies can further deter girls from school attendance (Khalid, 2006).

Gender disparity in education is a serious problem in Pakistan and its consequences cannot be ignored. Research has proven that when girls' education is limited, it results in an increase in poverty, fewer economic opportunities, and perpetuation of gender-based violence (Farooq et al., 2011; Sarwar, 2018). The issue is not only detrimental to individuals but it also hinders the development of the country as a whole since half of the population is not able to contribute its full potential.

Gender inequality in education is a pressing issue the government of Pakistan has acknowledged and acted on, as evidenced by a range of policies and initiatives. For example, the Benazir Income Support Program (BISP) and Prime Minister's Youth Program (PMYP) aim to encourage and financially support girls and women in pursuing education (Ali, 2017). Despite these efforts, there's no clear framework to evaluate their effectiveness, sparking ongoing discussions about the policies' outcomes that warrant further research.

**Existing Gender-Based Disparities**

According to Wu et al (2022), gender-based disparities in educational access and achievement persist to varying degrees worldwide. While strides have been made in many regions to promote gender equality, challenges remain. Women often face barriers such as cultural norms, early marriage and economic limitations that restrict their access to education. Disparities also manifest in educational fields such as STEM where female representation is lower.

Nygaard, et al. (2022) further claimed that the issue of gender inequality in the educational sector is a long-standing global problem, prevalent across diverse regions and cultures. Despite notable advances, considerable disparities persist between genders in terms of access to education, enrollment rates, and academic achievements. Girls and women frequently confront socio-cultural, economic, and institutional obstacles that curtail their educational prospects (Master, et al. 2021). These differences manifest as reduced enrollment for girls, elevated dropout rates, and restricted representation in particular academic disciplines. It is crucial to tackle and diminish this degree of gender inequality to establish inclusive and equitable educational systems that promote societal advancement. Closing these gaps requires continued efforts to address systemic biases and provide equal opportunities for all genders.

**Socio-Cultural and Economic Factors**

Pasha (2023) stated that differential educational opportunities between genders can be attributed to socio-cultural and economic factors. Societal norms that prioritise traditional gender roles limit girls' access to education particularly in regions where early marriage and household responsibilities prevail. Economic constraints disproportionately affect girls as families may prioritise investing in boys' education. These factors collectively perpetuate inequality emphasising the need for comprehensive efforts that challenge gender norms and provide financial support to ensure equitable access to education for all genders.

Pasha (2023) also indicated that the concept of gender inequality in education is largely influenced by socio-cultural and economic factors. Gender stereotypes in society often lead to unequal treatment of boys and girls when it comes to education, with boys being favored over girls. Girls are often prevented from attending school due to early marriage, household responsibilities, and cultural biases. Economic hardships also play

a role as poorer families prioritize their sons' education over their daughters', perceiving it as more beneficial for their future. Additionally, Master, et al. (2021) revealed that the the cost of education can be prohibitive for girls in areas with limited resources because of expenses such as uniforms and books. To overcome these challenges, it is necessary to confront gender stereotypes, implement policies that promote equality between genders, and provide financial incentives aimed at ensuring equitable access to education irrespective of gender.

**Impact of Gender Inequality on Long-Term Career Prospects in Education**

Meinck and Brese (2019) stated that gender inequality in education has far-reaching implications for long-term career prospects and societal development. When women are denied equal educational opportunities it limits their access to higher-skilled jobs and leadership roles perpetuating the gender pay gap. Additionally, a lack of diverse perspectives hinders innovation and progress in various fields. Reducing this inequality not only empowers individuals but also enhances workforce diversity fosters economic growth and contributes to a more inclusive and equitable society.

**Theoretical Framework**

The insightful Fairclough Model of Power offers a useful perspective to examine gender inequality within the field of education. On an ideological level, traditional societal values and patriarchal power structures perpetuate gender roles, resulting in an imbalance of power that is favorable towards males (Childers, et al. 2018). These beliefs, deeply rooted in socio-cultural traditions, significantly influence educational policies and procedures. Additionally, financial differentials play a role as less affluent families may choose to educate their sons instead of daughters due to the expected economic gains. At the personal level, interactions between teachers and students may reflect and reinforce these imbalances in power dynamics which could negatively impact girls' self-assurance and participation in class. Institutionally speaking, teaching materials and curricula can subtly promote gender stereotypes thereby reinforcing unequal distribution of knowledge opportunities among genders (Pasha, 2023). Addressing this inequality requires interventions that challenge these norms by promoting inclusive curricula, empowering female educators while encouraging an environment where all genders have equal agency in education.

**Material and Methods**

The application of the interpretivism research philosophy to study gender inequality in the education field can provide significant insights into the subjective interpretations and experiences of individuals affected by this concern. This approach facilitated a nuanced comprehension of socio-cultural influences, revealing the intricate nature of gender norms and roles within distinct circumstances (Tomaszewski, et al. 2020). The emphasis on qualitative techniques inherent to interpretivism assisted the researchers in uncovering concealed factors that contribute to disparities, thereby promoting a deeper level of understanding necessary for implementing contextually sensitive interventions.

**Research Approach**

Utilizing the inductive approach of research for examining gender inequality within the educational field is a sound decision due to its systematic progression from detailed observations and data towards more extensive conclusions. This process is particularly suitable for comprehending the complex nature of this issue, enabling researchers to be guided by emerging patterns and themes (Tomaszewski, et al. 2020).

Given that gender disparity in education is influenced by a variety of socio-cultural, economic, and institutional factors, an inductive approach allowed the researcher to conduct a thorough investigation, ensuring that research results are grounded in the actual experiences of those impacted by the discrepancy.

**Research Design**

Employing a qualitative secondary research design for examining gender inequality in the educational field is well-founded since it exploits extant qualitative information to reveal more profound insights (Stenfors, et al. 2020). This methodology permitted an exhaustive examination of divergent sources like reports, case studies, and qualitative research, giving investigators the opportunity to authenticate findings and form a refined perspective of the problem. By merging qualitative data, this design amplified the depth of results, thereby adding to a complete understanding of the cultural, financial, and institutional facets of gender inequality.

**Data Collection Methods**

The study mainly employed a secondary data collection method, gathering information from a range of reputable sources. These sources include TV programs, newspapers, articles, books and government websites. Secondary data collection involved analysing existing data rather than gathering new data directly from participants. This approach allowed the study to draw on a wide array of reliable sources to achieve its research objectives efficiently and comprehensively.

**Data Analysis**

The study used a thematic analysis as technique of data analysis. In thematic analysis, key terms, text patterns and themes were identified considering the research objectives and analysis are conducted through already existing literature to draw practical implications. Since, following study follows qualitative design by using secondary literature, hence, thematic analysis are most appropriate technique to apply.

**Results and Discussion**

**Thematic Analysis**

**Table 1**
**Gender Disparity in Education Sector in Pakistan (Source: Pasha, 2023)**

| Region | Out-of-School Girls (millions) | Out-of-School Boys (millions) | Gender Parity Index (GPI) |
|---|---|---|---|
| Punjab | 3.2 million | 2.7 million | 0.89 |
| Sindh | 4.6 million | 3.5 million | 0.76 |
| Baluchistan | 7 million | 9 million | 1.29 |

The issue of gender inequality in the educational sector presents an ongoing global challenge that affects diverse regions and cultural groups. UNESCO reports that, as of 2021, a staggering 132 million girls around the world are not enrolled in school, compared to 122 million boys (Correia, et al. 2022). Moreover, a research published by Childers, et al. (2018) revealed that the greatest gender gaps in education are observed in Pakistan's rural areas, where girls face significant social-cultural and economic barriers to accessing quality education. In some parts of the world, girls are even 1.5 times more likely to be excluded from primary education than boys (Suen, et al. 2019). These disparities manifest through reduced enrollment rates for girls, higher dropout rates, and limited participation in certain academic disciplines. It is imperative to address this

extent of gender disparity as it hinders the achievement of inclusive and equitable education systems while also impeding societal progress.

As per the views of Correia, et al. (2022), the paradigm of gender inequality within the education sector is perpetuated by socio-cultural factors, which play a significant role in shaping perceptions, norms, and expectations regarding gender roles and education. Such factors often impede girls' access to education and hinder their educational progress. Recent data from UNESCO indicates that in Pakistan's rural areas like Punjab, Sindh, and Balochistan, cultural beliefs that prioritize boys' education have led to an average gender parity index (GPI) of 0.89, implying that boys have more access to education than girls (Chan, 2022). Similarly, in South Asian countries like Pakistan where traditional gender norms are deeply rooted, the GPI stands at 0.76, indicating a considerable disparity towards boys (Suen, et al. 2019).

These disparities are attributed to societal expectations that prioritize girls' domestic roles over their education. Early marriages and pregnancies resulting from these socio-cultural norms also contribute significantly to girls dropping out of school prematurely (Correia, et al. 2022). The table below highlights how prevalent these issues are across different regions:

**Table 2**
**Cultural Factors Contributing to Gender Disparity Globally (Source: Suen, et al. 2019)**

| Socio-Cultural Factors | Punjab | Sindh | Baluchistan | KPK |
|---|---|---|---|---|
| Early Marriage and Pregnancy | High | High | Low | Low |
| Gender Norms and Stereotypes | Strong | Strong | Moderate | Moderate |

Olumolade, et al. (2022) further proclaimed that strong socio-cultural factors play a significant role in perpetuating early marriage and pregnancy among girls in Punjab, Sindh, and Balochistan, thereby disrupting their educational trajectories. Conversely, gender norms and stereotypes are relatively less restrictive in North America and Europe, resulting in a lower impact of early marriage and pregnancy on girls' education. The cultural dynamics prevalent across these regions have far-reaching implications for girls' education, affecting their enrollment rates, dropout rates, and overall access to quality education.

It is evident in the research of Chan (2022) that socio-cultural factors significantly contribute to gender disparity in the educational sector. Therefore, it is crucial to recognize the varying degrees of influence these factors have across different regions when designing targeted interventions to address cultural barriers, challenge norms, and promote equitable education for all genders. Achieving gender parity demands a profound understanding of these socio-cultural nuances to create meaningful and sustainable changes in the educational landscape.

According to the research of Singh, et al. (2022), the gender inequality in education is greatly impacted by economic factors which create hindrances for girls to access and finish their studies. Financial constraints and unequal distribution of resources contribute to educational disparities that persist based on gender. The World Bank reports that in Pakistan, completion rates for lower-secondary education are only 42% for girls compared to 46% for boys (Chan, 2022). These figures are even more drastic in South Asian countries like Pakistan where only 30% of girls complete their lower-secondary education, compared to 36% of boys.

**Table 3**
**Educational Attainment and Completion Rates by Gender (Source: Chan, 2022 )**

| Region | Girls' Completion (%) | Boys' Completion (%) | Gender Gap (%) |
|---|---|---|---|
| Punjab | 42 | 46 | -4 |
| Sindh | 30 | 36 | -6 |
| Balochistan | 50 | 40 | -10 |

Tandrayen-Ragoobur and Gokulsing (2022) indicated that ender disparity in education is significantly perpetuated by economic factors, particularly poverty. Due to the perceived future economic benefits they bring, families facing economic hardship prioritize educating boys over girls. UNESCO estimates that globally, 132 million girls are not enrolled in school, and financial constraints pose a fundamental barrier (Singh, et al. 2022). Consequently, this phenomenon creates an endless cycle of inequality since limited educational opportunities for girls translate to reduced economic prospects, thereby reinforcing poverty cycles.

Moreover, a research by Olumolade, et al. (2022) revealed that direct and indirect costs related to education such as uniforms, textbooks, transportation expenses and even opportunity costs have a disproportionately higher impact on girls than boys. In regions with low levels of economic development, these costs become insurmountable obstacles for many families struggling to make ends meet. Pakistan tends to face one of the highest gender disparities in educational attainment due to acute financial strain.

Solving these socioeconomic barriers requires comprehensive action from governments and organizations as claimed by Singh, et al. (2022). Encouraging girls' enrollment and completion of their formal education calls for providing financial incentives and targeted support mechanisms. Mitigating the financial burden on families can be achieved through initiatives such as conditional cash transfer programs or scholarships that help subsidize educational expenses (Olumolade, et al. 2022). Hence, the statistics indicate that addressing the pervasive gender gap requires specific interventions targeting socioeconomic challenges while prioritizing inclusivity in access to quality education for all genders. A more equitable educational landscape can ultimately break poverty cycles entrenched within communities worldwide by reducing economic barriers for marginalized populations especially girls who need it most.

**Table 4**
**Institutional Factors Contributing to Gender Disparity in Education**

| Institutional Factors | Punjab | Sindh | Balochistan | KPK |
|---|---|---|---|---|
| Gender-Sensitive Curriculum | Low | Low | Moderate | Moderate |
| Female Teacher Representation | Low | Moderate | High | High |

(Source: Singh, et al. 2022**)**

Gender-sensitive educational syllabi are frequently deficient in Pakistan, which reinforces conventional gender roles and stereotypes. This inadequacy has a direct impact on how girls perceive themselves, limits their aspirations, and hinders their potential to pursue non-traditional fields (Adham, et al. 2022). Furthermore, there is a shortage of female teachers in these regions which means that there is an absence of role models for young girls, thereby potentially perpetuating gender norms.

Gender inequities are not solely restricted to developing nations, as they also exist in Europe and North America, where inconspicuous institutional prejudices persist (Singh, et al. 2022). Even though there is generally better female teacher representation, gender imbalances still occur in specialized fields such as science, technology, engineering, and mathematics (STEM). UNESCO's data shows that only 29% of scientists

around the globe are women. In these areas, gender prejudice can manifest itself through teacher-student communication, assessment procedures, and social dynamics among peers (Flor, et al. 2022). These factors subtly impact girls' academic performance and professional aspirations.

In addition, Adham, et al. (2022) revealed that it is possible for institutional protocols to unintentionally perpetuate gender inequality. This can happen when resources such as individual restrooms and proper sanitation practices are not provided, resulting in girls experiencing obstacles to attending school and potentially even dropping out altogether. Similarly, a deficiency of comprehensive sexual education and knowledge regarding gender-based violence may impede the empowerment of girls in Europe and North America.

Initiatives aimed at tackling institutional elements must involve alterations in policies and the application of gender-aware course materials that contradict stereotypes and promote inclusiveness (Azizi, et al. 2022). The promotion of female teacher representation across all disciplines can act as a source of varied role models. Furthermore, institutions need to guarantee secure and encouraging atmospheres for young girls, including widespread sex education and measures to deal with gender-oriented violence. Adham, et al. (2022) claimed that the presence of institutional factors plays a notable role in the prevalence of gender inequality throughout various regions in the educational sector. To establish a fair and all-encompassing education system, it is crucial to acknowledge and eliminate these unjust practices and obstacles. By proactively revising institutional policies and procedures, societies can create a path towards an equitable future where individuals of all genders have equal chances to excel both educationally and beyond.

The issue of gender inequality in education has significant effects on academic achievements, leading to a spiral of injustice with severe implications. As per Flor, et al. (2022), nations experiencing high gender disparity in education tend to exhibit lower overall educational accomplishment rates. When girls are deprived of equal opportunities in education, their potential for making valuable contributions to society is restricted, ultimately impeding economic expansion and progress.

The effects are particularly noticeable in relation to the rates at which students abandon their studies and their academic accomplishments (Azizi, et al. 2022). Young women who confront impediments resulting from gender-based discrimination demonstrate a tendency to terminate their schooling prematurely, which restricts their career options and exacerbates the cycle of impoverishment. Moreover, diminished levels of educational accomplishment have an unfavorable impact on the entire workforce's competence, restricting innovation and hindering advancement in society.

Moreover, Flor, et al. (2022) claimed that gender inequality has an impact on the choices individuals make in their future lives. Young women who have limited access to education are at a greater risk of experiencing early marriages, pregnancies, and higher fertility rates. Consequently, this can result in negative effects on maternal and child health outcomes. On the other hand, young females who obtain high-quality education tend to postpone getting married, have fewer children and take informed decisions about their health and overall well-being.

In order to address the issue of gender inequality within the education field, a comprehensive strategy is required. Augmenting the proportion of female representation in the teaching profession is imperative. Instigating girls to opt for careers in education can furnish an exemplary model and combat gender prejudices (Pandang,

et al. 2022). Additionally, rectifying teacher biases and promoting comprehensive teaching strategies can culminate in a fairer learning milieu.

In order to overcome the financial obstacles hindering girls' education, it is crucial to implement specific measures like grants, allowances, and reduced fees for educational resources. Such interventions are capable of reducing the financial pressure on families and motivating them to prioritize the education of their daughters (Pasha, 2023).

As per the views of Azizi, et al. (2022), it is essential that an all-inclusive program on sexual education be integrated into the academic syllabus to instill consciousness regarding gender parity, reproductive well-being, and consent. Such a measure enables both young women and men to confront detrimental stereotypes and gender norms.

Additionally, Pandang, et al. (2022) claimed that it is essential to make investments in secure and gender-inclusive educational infrastructure, which includes distinct sanitary amenities, to guarantee that girls can attend and stay in school. Hence, it is imperative to establish a collaborative effort among governments, non-governmental organizations, communities, and families in order to facilitate an environment that promotes girls' education. Through the implementation of these measures, societies can gradually eliminate hindrances and promote a system of education that provides equal opportunities for all genders to access quality education. This in turn will contribute towards building a fairer and more equitable world.

## Discussion

The findings presented in the report shed light on the widespread issue of gender inequality in education. After conducting a thematic analysis, three key themes emerged: the significant gap in educational access and achievement across the globe, influenced by socio-cultural, economic, and institutional factors; the adverse impact of these inequalities on academic performance, perpetuating cycles of poverty and impeding progress; and recommendations for comprehensive measures to tackle this issue. The research underscores the pressing need for immediate action as millions of girls are still unable to attend school, especially in Pakistan due to socio-cultural norms and economic restrictions (Tandrayen-Ragoobur and Gokulsing, 2022). Strategies such as increasing female teacher representation, introducing financial incentives, providing holistic sexual education, and establishing gender-inclusive infrastructure can be crucial steps towards a more equitable educational environment (Pandang, et al. 2022). Collaborative efforts between governments, NGOs, communities, and families are critical to breaking down barriers and creating a just world where all genders have equal access to high-quality education.

## Conclusion

The issue of gender inequality in the field of education is intricate and influenced by various socio-cultural, institutional, and economic factors. In particular, countries located in Pakistan are faced with significant disparities due to their cultural norms and financial limitations. Comparatively, North America and Europe experience more subtle biases. These gaps hinder female students' educational achievements, perpetuate poverty cycles, and hinder overall societal progress. To address this challenge effectively will require a comprehensive strategy. Policies that target stereotypes must be implemented alongside gender-sensitive curricula that promote greater representation of female teachers. Financial barriers should be eliminated through scholarships and stipends for girls. Crucially, comprehensive sex education programs must be introduced alongside safe infrastructure initiatives to create an inclusive learning environment that promotes cross-sector collaboration for positive change. Through these recommendations, society

can foster gender equality in education while promoting broad-based social-economic progress.

**Recommendations**

- The implementation of gender-sensitive curricula and measures to improve female representation among teachers is highly recommended.
- In addition, providing financial aid to address gender disparities is suggested.
- Finally, empowering girls in education can be achieved by integrating comprehensive sex education, ensuring the creation of safe infrastructure, and promoting cross-sector collaboration.

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