ANALYSIS OF FACTORS IMPACTING THE INVOLVEMENT OF SOUTH ASIAN WOMEN IN STEM: A SURVEY

ABSTRACT

It is evident that the existence of deep-rooted gender inequalities has affected the participation of women in the STEM field. Different initiatives working to empower women in STEM have clearly low progress records in many countries than expected. In South Asia, the issue seems to be more prevalent. Although gender inequality is the responsible cause to some extent, the main factors affecting the involvement of women in STEM have always been unclear. To address the very issue, the current study surveyed citizens from some South Asian countries to identify the underlying causes. The data gathered from the survey was used to understand the factors affecting the participation of South Asian women in STEM. This paper analyzes the obtained data to elaborate on these factors. With further analysis, the paper concludes the rate of economic growth of the country as the deciding factor for the status of women in STEM. Women are underrepresented in STEM disciplines in nations with less severe economic problems and vice versa. The relation between the economic growth rate of the country and the liberty of women is also discussed with evidence from slow-paced and fast-paced developing South Asian countries. Some recommendations to the government, civil society, and educational institutions are also outlined to improve the current scenario for women in STEM.

Women in South Asian Education At a Glance

One of the primary discussion topics for global development has always been the significance of women in education. Researchers, socialists, and policymakers in South Asia have been working hard to emphasize the value

of education for girls. Women in South Asia are less literate and less engaged in educational pursuits than women in western societies.
The United States has a female literacy rate of over 77 percent and is one of the most technologically and educationally developed nations. But, South Asia is still behind the United States by 20%. Between 2000 and 2010, South Asia's female literacy rate increased from 45.5 percent to 57 percent. The average literacy rate of South Asia is definitely commendable, but the range among rates of South Asian countries isn't. The disparity in women's educational opportunities between South Asia's fast-growing and slow-growing nations is itself huge. The Maldives rank at the top with a female literacy rate of 98 percent, while Afghanistan comes in last among south Asian countries with only a 29.8 female literacy rate. This makes a difference of 68.2%. The fact that there are more women scientists, teachers, researchers, etc. in western societies than in South Asia shows that there has historically been a barrier to women's education in this region.

Status of Women In STEM

The acronym STEM as it stands for the study of technological, mathematical, and scientific disciplines as well as various specialized branches of engineering indirectly creates an image of men in mind.

It is an undeniable fact that women have historically been underrepresented in STEM fields (science, technology, engineering, and mathematics). In the 21st century, the world has advanced significantly as a result of major contributions to STEM. The number of

women working in STEM fields has grown substantially from the time of Madame Curie to the time of Cynthia Kenyon. However, a sizable gender disparity has continued to exist globally over the decades among all divisions of STEM (science, technology, engineering, and mathematics). In these professions, women are still underrepresented. South Asian emerging nations continue to have a glass ceiling for women's participation. Less South Asian women tend to pursue careers in STEM fields. Girls in South Asia typically choose STEM-related occupations in the medical field, particularly nursing.

As of 2022 February, just 23 of the 608 STEM Nobel laureates were female sheds insight into the underrepresentation of women in this discipline. None of those women are South Asian, either.

Approaches by South Asian Countries

The fast-paced developing nations like India and Pakistan are promoting women's involvement in STEM by establishing various initiatives. The Indian government launched the “Beti Padhao, Beti Bachao” (*Teach Girls, Save Girls*) campaign to encourage parents to send their daughters to school. This initiative was extremely effective, and many young Kalpana Chawla is being prepared in Indian classrooms. Women make up 28% of the world's scientists, engineers, and technologists. India, a rising nation, is aiming to surpass this record soon but different factors still affect its pace.

Meanwhile, its nearby sister, Nepal, is far behind in the competition. The government of Nepal appears to disregard the fact that men and women are equally capable. Unfortunately, despite a few pieces of legislation aimed at boosting women's participation, the Nepalese government has been unable to come up with good solutions. In Nepal, women make up a tiny percentage of the STEM and tech fields.

The situation is no different in Afghanistan, a country where schools were previously closed for girls. However, a group of 5 Afghan robotics team ladies aged 14 to 17 was part of a program to design low-cost ventilators for COVID patients. This proves that when opportunity meets preparation, growth is ensured. Still, as of today only 15% of Afghan

women can read and write according to UNICEF. Afghanistan, being a slow-paced developing country, has a long way to go. Women in Afghanistan should be encouraged to pursue education in science and technology, as well as given an opportunity. Pakistan, India's and Afghanistan's neighbor, appears to be well ahead of Nepal and Afghanistan. Pakistan's female literacy rate is 46.49 percent. According to the UNESCO Science Report for 2030, Sri Lanka ranks first in terms of women's presence in science, with 41%, followed by Pakistan (36%), and India (15%).

Recognizing the need to eliminate the gender gap in STEM, the Pakistan Alliance for Maths and Science (PAMS) and Lahore College for Women University (LCWU), in collaboration with UNESCO and UNWOMEN, organized a "National Dialogue on Women in Science" on 11 - 12 February 2019-International Day for Women and Girls in Science. UNWOMEN and UNICAF also have been notably more active in recent years in South Asia to develop missions and initiatives in encouraging more women to enroll in school and build a career in disciplines with a male predominance, including STEM.

Methodology

A web survey was conducted to obtain the primary data for this research. The questionnaire was put forward in the google form and circulated throughout four countries in South Asia with the help of Sustainable development advocates in each country. The survey form was circulated in two slow-paced developing countries (Nepal and Afghanistan) and two fast-paced developing countries(India and Maldives) over a period of six and half months (December-June) in the year 2022. The slow-paced and fast-paced developing countries were taken based on the GDI growth rate of 2021. Maldives had the highest GDP growth rate and Afghanistan was one of the countries with the lowest GDP growth in 2021.

In this survey, the information was collected mainly from the urban areas of all four countries. There were 28% rural and 72% urban respondents. We had a total of 3567 respondents of which 13% were men and 87% were women. A copy of an authentic id of each respondent was made required to avoid faulty responses. Respondents of this survey are from different economic statuses as well as representing different educational levels and career preferences. Separate questionnaires were asked according to the age and educational level of women. For men, similar questions were asked to all age groups to know their perspectives on Women in STEM.

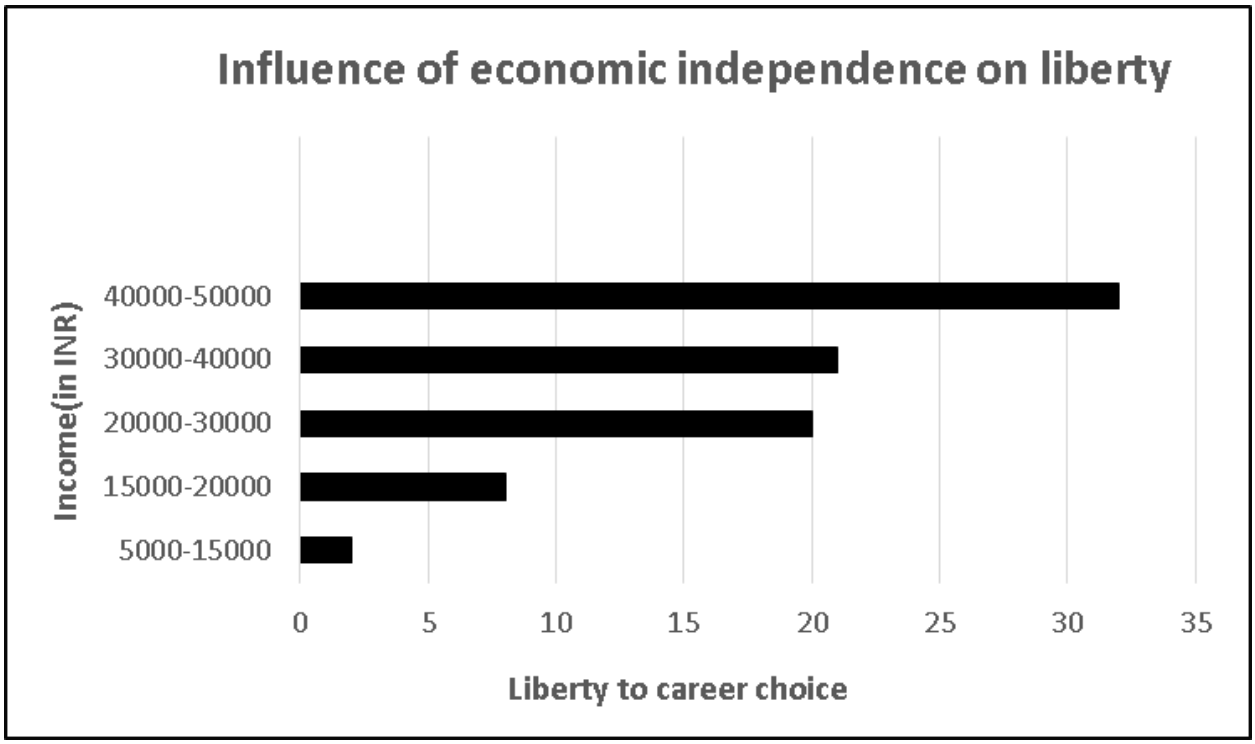
Among the women, 41% have started studying or working in the Non-STEM field, 34% are students studying in or below the k-12 level and 25% have started studying or working in the STEM field. Muslims and Hindus predominantly dominate the four countries chosen for the survey but we tried our best to take responses from people of all religions residing in these countries.

Factors Affecting Women in STEM in South Asia

- Perspective gap- When asked to picture a scientist, 97% of the respondents, including men and women, named a male scientist. Following up, we asked sixty random groups of kids aged 7-10 to draw different professions. Fifty-one out of sixty drew a man with a stethoscope around his neck when asked to draw a Doctor. Fifty-six out of the sixty drew a man holding a toolkit or working to build a bridge when asked to draw an engineer. When asked to draw a scientist, fifty-eight students drew a man again which led us to dive deeper to+ find the reason. This data clearly shows that there is a perspective gap built from an early age which is subconsciously pulling women from pursuing STEM. Men seem to ignore the fact that

women can do the roles traditionally dominated by men and women don't seem to have enough confidence in themselves to go out and break the existing stereotype.

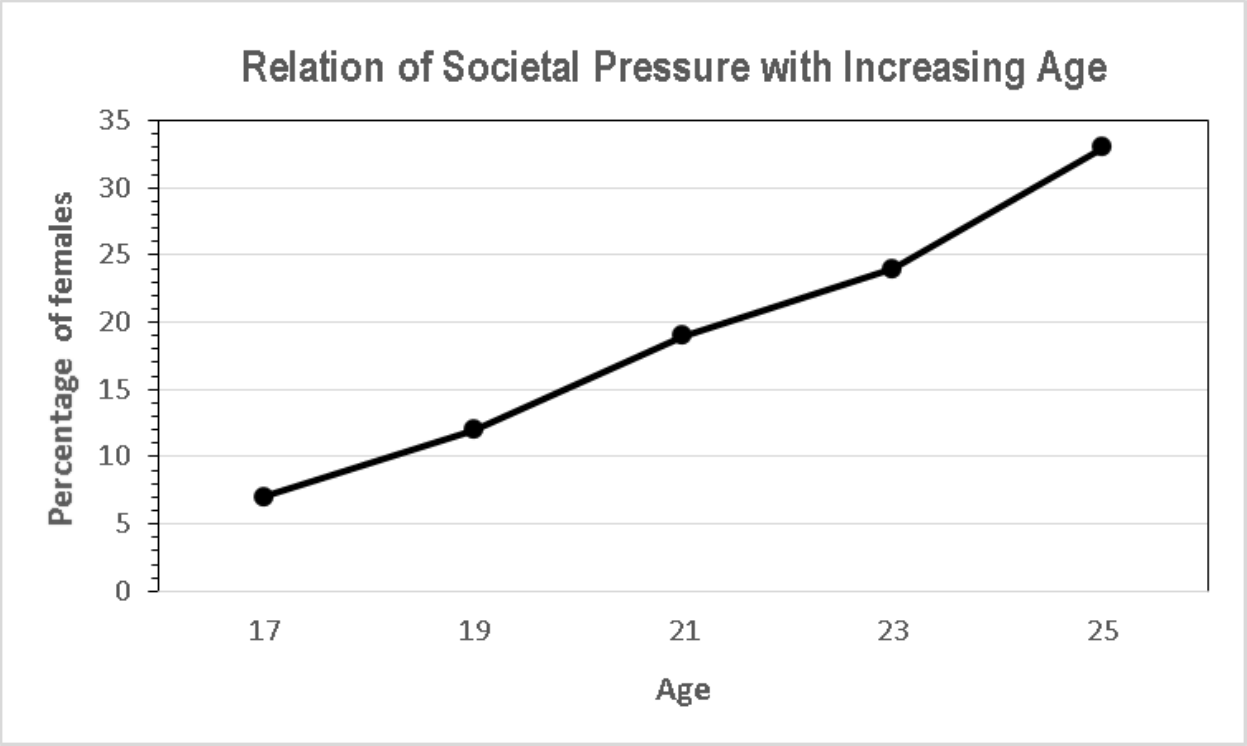
- Mother's economic independence- We asked our respondents if their mother is financially independent. As per the data we collected, only 44% of the respondents' mothers have contributed to the family economically. After analyzing the data we found that the economic independence of the mother in the family plays a great role in whether or not their daughter gets the liberty to choose their career path. In short, the more the mother is literate and economically independent, the more her daughter gets to choose the right career for herself without any family pressure. From our research, we can definitely say that this trend has affected the involvement of women in STEM in South Asia.



- Gender preference and lack of support from male counterparts- Without the "early bird privilege", women require immense support from their male counterparts to sustain a STEM career. 92% of the male respondents who also happen to work around females pursuing STEM careers/studies don't see their female colleagues/peers as a

competition. That simply means females are not even considered part of the race which directly suggests a presumed doubt about women's abilities. Adding to that, many workplaces seem to prefer male figures in leading and more responsible positions. 66% of our female respondents who are pursuing STEM careers felt not considered for leading positions despite having equal qualifications and skills as their male colleagues. This attitude of silent domination towards women creates an unhealthy work environment and demotivates women in STEM which has evidently resulted in women abandoning STEM careers halfway.

- Stereotypical societal pressure- In a society where men can walk free and decide for themselves, women are constrained under certain boundaries. From the age of attending school, the majority of females in South Asia, especially in countries with a slow development pace, are taught to revolve their studies and career around marriage and family. Our research suggests that the trend rises and reaches its peak as the age of the female increases. The prevalence of this practice of stigmatizing females with certain family responsibilities over their careers is definitely holding females from pursuing STEM careers. This career path requires more time commitment and focus which females cannot agree with the presence of existing societal expectations.



RECOMMENDATIONS

- Government should focus on committing itself to ensure women working in STEM roles across the nation are valued and supported so that no women have to feel left out and eventually abandon the STEM field.

- Lawmakers should implement legislation to create women-specific workplaces to help women get confident in their subject matter in a healthy and supportive work environment.
- Educational institutions should provide female-specific sessions to motivate female students in breaking the stereotypes in STEM careers and male-specific sessions to shape the psychology of male students to support their female colleagues in every work environment in the future.

- Government should support and invest in a range of activities intended to increase women's participation in STEM. The Government should also focus its support on long-term strategic interventions that will affect national change or target areas of particular need, and encourage evaluation to gauge whether initiatives are producing the results they set out to and shape future interventions.

- Lawmakers should create logical frameworks for policy development that are founded on a political commitment to gender equality in STEM and the mainstreaming of gender concerns at all levels.

- Schools should treat both male and female students equally in terms of the availability of every educational resource and opportunity.

- Gender stereotypes from educational resources should be examined and eliminated.

- Gender concerns should be considered in all programs for educating teachers.

- STEM programs and competitions should be organized frequently and equal participation of female students should be ensured with equal enthusiasm.
- Civil society should keep gender on the agenda of government at all levels through campaigning for a strong political commitment to gender equality in the STEM field.

- Non-profit organizations should forge strong connections with the government to support programs and policies that are gender-sensitive in STEM.

- Civil society should keep track of effective innovative methods for the purpose of sharing and advocating for gender equality in education.

- Attention to the gender aspects of national and global goals and ambitions should be maintained.

- Educational flexibility should be encouraged to accommodate the special needs of girls.

- Parents should be involved in any plans for education provision. There should be extensive consultation on what is believed to be a prevalent need and what is thought to be an acceptable solution. Women and girls should be included in all consultations.

- Communities should ensure that all community members are aware of the relevant laws, such as the age at which girls can be legally married, the right to equal opportunities, and equal pay. They should also mobilize community members to support the enforcement of such laws.

Analysis between slow-paced and fast-paced developing countries

Among all the factors affecting the participation of women in STEM, the economical independence of women in the family and country is directly proportional to the liberal life of women and vice versa. This is a continuous cycle where the economy plays a prominent role in determining the status of women. To be precise, the economic growth rate of the country is the key factor. In a country with a fast-paced growing economy, more women tend to become economically independent which directly supports a liberal life for all the women in that specific family.

For instance, in 2021, India was considered one of the fastest-growing economies in South Asia with a GDP growth rate of approximately 8.9 percent. India is also predicted to be the third largest economy by 2027. With this exhilarating economy, India is also opening doors for gender equality and women empowerment. The new federal abortion law is one of the examples of India moving forward to make the lives of female citizens more liberal. From our data, we got the maximum percentage of women engaged in the STEM field from India.
On the other hand, Afghanistan is one of the slow-paced developing countries with GDP growth rate of approximately -2.4percent in 2020.

CONCLUSION

By all counts and with detailed statistics of the comparative analysis of the status of women in STEM in fast-paced and slow-paced developing countries in South Asia, the economic curve of a country seems to, directly and indirectly, affect the participation of women in any field, mainly STEM. Subjects interrelated to life sciences and non-sciences seem to be more favored by women in slow-paced developing countries, and scientific and technical subjects are encouraged more in fast-paced developing countries by the government as well as family members.

In light of the fact that women in STEM fields contribute significant knowledge, skill sets, and ideas to the STEM industry, it makes sense for firms to promote gender equality and diversity in their recruiting procedures. Many scientific breakthroughs have been made possible by the contributions of women, including the discovery of the double helix structure of DNA, the creation of life-saving medications, the first computer, the internet, and numerous more achievements. History has proven that, when given the chance, women often make a significant influence. Economic collapses have an impact on participation by escalating poverty in society and, over time, lowering literacy, both of which slow down human civilization. And the underrepresentation of women in STEM disciplines is pervasive.

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